

Young, wild and free?

**The social and cultural context
of adolescent risk behavior**

Margaretha de Looze

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Young, wild and free?

The social and cultural context of adolescent risk behavior

'Young, wild and free?'

De sociale en culturele context van risicogedrag bij adolescenten

(met een samenvatting in het Nederlands)

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For my mother

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Chapter 1

Introduction

Adolescence, the transitional phase between childhood and adulthood, is a unique period of discovery and experimentation. It is a complex but exciting phase of life during which young people gradually develop into adults. Physically, adolescents experience many changes, including changes in sexual characteristics. In terms of social relationships, their focus shifts from their family to their peers. While desiring more autonomy and freedom to make their own choices and decisions, adolescents typically distance themselves from their parents and start spending more time with peers (Meeus, Iedema, Maassen, & Engels, 2005), for example at school, while playing sports, or during leisure activities at night in bars and pubs. In the course of this process, many adolescents start experimenting with tobacco, alcohol, and cannabis use as well as sexual activities. The present thesis aimed to investigate socio-cultural factors that may influence substance use and sexual behaviors among adolescents in Europe and North America.

Adolescent substance use and sexual activity: Problematic or normative?

Substance use and sexual activity often co-occur during adolescence. Adolescents who engage in any form of substance use are more likely to engage in other forms of substance use and to be sexually active, and vice versa (Jessor, *in press*; Willoughby, Chalmers, & Busseri, 2004; Zweig, Duberstein Lindberg, & McGinley, 2001). These clustered behaviors are generally perceived as norm-breaking behaviors (Arnett, 1992; Jessor & Jessor, 1977; Moffitt, 1993; 2006). Two different perspectives exist in research on these behaviors. While the first stresses the problematic nature of these behaviors, the second focuses more on their developmental and normative character.

Jessor and Jessor's problem behavior theory (PBT, 1977) is an influential theory that is based on the first perspective, underlining the problematic nature of adolescent substance use and sexual activity. According to PBT, substance use and sexual activity during adolescence are part of a larger cluster of problem behaviors, including also aggressive, antisocial, and delinquent behaviors. All these behaviors are seen as expressions of an underlying syndrome of problem behavior, the Problem Behavior Syndrome (PBS). PBS has a number of negative social correlates, such as detachment from parents and school (Petraitis, Flay & Miller, 1995; Ream, 2006; Rostosky, Wilcox, Wright, & Randall, 2004; Schvaneveldt, Miller, Lee, & Berry, 2001), the potential development of deviant friendships, and an increased likelihood to engage in delinquent and other deviant behaviors (Jessor & Jessor, 1977; Jessor, 1991; 1998; *in press*). Furthermore, the fact that these behaviors can have negative health outcomes, such as sensitization for addiction and mental health problems,

brain damage, sexually transmitted diseases (STDs), and teen pregnancy (Blum, Solberg, & Wolinsky, 2004; Kaestle, Halpern, Miller, & Ford, 2005; MacLeod et al., 2004; McLaren, Silins, Hutchinson, Mattick, & Hall, 2010; Minozzi et al., 2010; Moore et al., 2007; Spriggs & Halpern, 2008a), strengthens the problematic nature of adolescent substance use and sexual activity.

On the other hand, Moffitt's theory of adolescence-limited antisocial behavior (1993; 2006) supports the second perspective, stating that adolescent substance use and sexual activity are expressions of an underlying set of normative, developmental processes. According to this theory, norm-breaking behaviors, including substance use and sexual activity, are normative and adjustive for the majority of adolescents; thus, they should be understood in the context of adolescents' transition to adulthood. More specifically, adolescent substance use and sexual activity are seen as expressions of adolescents' strive for autonomy, desire to explore different (adult-like) behaviors, and the need to develop an identity. According to Moffitt's theory, most adolescents starts engaging in norm-breaking behaviors because they are trapped in a so-called maturity gap, i.e., 'a time warp between biological and social age' (Moffitt, 1993; p. 687). As they are biologically mature but not yet accepted as fully mature individuals by society, they become frustrated and feel the need to demonstrate their maturity to the outside world. This motivates them to engage in norm-breaking behaviors that can convey the symbolic message that they are mature enough to make their own decisions. As peers may regard engagement in norm-breaking behaviors as an ultimate sign of autonomy and maturity (Moffitt, 1993), these behaviors can increase adolescent peer status and facilitate peer group integration. Without trivializing the negative correlates and potential harmful outcomes of adolescent substance use and sexual activity (Odgers et al., 2008), Moffitt's theory places norm-breaking behaviors during adolescence in a developmental context and thereby provides an explanation for why these behaviors peak and co-occur specifically among adolescents.

Empirical research has provided supportive evidence for both the problematic and normative perspective. Both cross-sectional and longitudinal investigations (e.g., Costa, Jessor, Donovan, & Fortenberry, 1995; Jessor et al., 2003; Madkour et al., 2010b; Vazsonyi et al., 2008; 2010) have provided extensive empirical support for PBT by identifying associations among the clustered 'problem behaviors' and by demonstrating associations between this cluster and various social and cultural risk factors, including negative parental and peer models, low parental control, and low contextual support from the family, peers, school, and the neighborhood. Support for Moffitt's perspective underlines that there is also a

positive side to adolescent substance use and sexual activity, in particular in the realm of peer relations and peer contexts. For example, both the quality and quantity of adolescent peer relations was positively related to adolescent alcohol use (Engels, 2003; Engels & ter Bogt, 2001; Engels & Knibbe, 2000; Engels, Knibbe, & Drop 1999) and cannabis use (Engels & ter Bogt, 2001), suggesting that these behaviors may serve social functions in terms of providing the opportunity to intensify contacts with peers or initiate new relations. In addition, male adolescents who do not engage in alcohol use or start using alcohol later compared to their peers have been found to have “a delayed entry into the adult role” (i.e., they experience a delay in reaching financial independence from parents, getting involved in a steady romantic relationship, and leaving the parental home; Pape & Hammer, 1996; p. 362). The authors of this study consequently concluded that “getting drunk for the first time in mid-adolescence seems to be an ingredient in the normal developmental process in young males” (p. 362).

Summarizing the literature on adolescent substance use and sexual activity, these behaviors have both problematic and normative aspects. Both Jessor’s and Moffitt’s traditions of research have underlined the importance of social and cultural factors in the etiology of adolescent risk behavior. This thesis aims to increase our understanding of the social and cultural context of adolescent substance use and sexual activity. Thereby, it aims to provide a balanced perspective to discuss both the problematic and normative aspects of these behaviors. In the following paragraphs, I outline the specific social and cultural factors that are addressed in this thesis.

The social and cultural context of adolescent substance use and sexual behavior

Large individual differences exist both in the timing and the intensity with which adolescents engage in substance use and sexual behaviors (e.g., Currie et al., 2012). Insofar research has focused on individual factors in explaining these differences, most studies have focused on early pubertal timing (Richards & Oinonen, 2011; Stattin, Kerr, & Skoog, 2011) and personality characteristics, such as sensation seeking and impulsivity (Malmberg et al., 2012). Both have been related to earlier and more intense engagement in substance use and sexual activity. This thesis has a different approach; it focuses on the role of socio-cultural contextual factors in explaining individual differences in adolescent substance use and sexual activity.

Bronfenbrenner’s theory of the ecology of human development (Bronfenbrenner, 1979, 1989; 1994; Bronfenbrenner & Morris, 1998; 2006) provides an overarching conceptual framework to understand how different social and cultural contexts contribute to adolescent

behavior and development. Bronfenbrenner (1979) asserted that human development is a product of the interaction of the individual with the environment. His model focuses on different “layers” of the environment within which development occurs and on the interactions of the individual within and across those layers (Bronfenbrenner, 1989). Bronfenbrenner described five layers of the environment: the micro-system (the adolescent’s immediate surroundings, such as family, school, and peers), the meso-system (the connection between two or more micro-systems, such as the relationship between parents and teachers), the exo-system (the larger social system in which the child does not directly function but is influenced by, such as parental work experiences), the macro-system (cultural values, customs, and laws), and the chrono-system (changes across time, such as changes in social relationships across age or changes in socio-historical circumstances across decades).

Bronfenbrenner’s model follows three postulates: (a) the developing person is a dynamic entity that not only is influenced by his or her environment, but that also influences the environment; (b) the environment is also developing and dynamic; thus, development is a process of mutual accommodation characterized by reciprocity; and (c) the environment is not viewed as one static setting but rather as a system of interconnecting and interacting settings all relevant to the individual. Therefore, it is necessary to understand the components of each system affecting adolescents to understand their development and behavior.

As Bronfenbrenner’s model is complex, few research projects have been able to address contextual influences on adolescent substance use and sexual behavior across multiple layers of the environment simultaneously. The Health Behaviour in School-aged Children (HBSC) study provides a unique opportunity to fill this gap in the literature. The HBSC study is a World Health Organization (WHO) collaborative cross-national study on health and well-being, social environments, and health behaviors among 11- to 16-year-olds (Currie et al., 2012). It is a cross-sectional study that is conducted every four years in classroom settings in a growing number of countries. The first HBSC study was conducted in 1983/4 in five countries, and it has grown to include 43 countries and regions in Europe and North America in 2009/10. Due to the repeated cross-sectional design, it enables the examination of associations among adolescent substance use, sexual behavior, and social and cultural factors in the micro-, macro-, and chrono-system. Moreover, it provides the opportunity to study interactions within and across these layers of the environment as well as interactions between the individual characteristics (e.g., gender) and these layers.

Although the HBSC study provides many opportunities for studying social and cultural factors that may be associated with adolescent substance use and sexual behavior, it cannot

capture all variables that are included in Bronfenbrenner's model. Hence, for pragmatic reasons, this thesis focuses on three specific social and cultural factors, specifically educational track (micro-system), parenting practices (micro-system), and the national context and time in which adolescents live (macro- and chrono-system). In the following paragraphs, I describe how educational track, parenting practices, and national context – and their interaction – may contribute to our understanding of adolescent substance use and sexual behavior in Europe and North America during the period between 2002 and 2010.

Part I: The role of educational track in adolescent substance use and sexual activity

In the literature on adolescent substance use and sexual activity, the role of school-related factors, such as school drug policies on substance use (e.g., Evans-Whipp et al., 2004; Foxcroft & Tsertsvadze, 2012) and peer influences within the classroom (e.g., Ali & Dwyer, 2010; Ali & Dwyer, 2011; Fletcher, 2012; McVicar, 2011), has been extensively researched. In countries with differentiated educational systems in which adolescents are placed in different (vocational versus academic) tracks at secondary school, educational track is one of the strongest school-related predictors of adolescent substance use and sexual behavior. A number of studies conducted in different cultural contexts has provided evidence that students in vocational tracks engage substantially more frequently in substance use and sexual activity compared to students in academic tracks (Friestad & Klepp, 2006; Geckova, Van Dijk, Groothoff, & Post, 2002; Hagquist, Sundh, & Eriksson, 2007; Richter & Leppin, 2007; Vereeken, Maes, & De Bacquer, 2004).

While the association between educational track and adolescent substance use and sexual activity is well established, its underlying mechanisms remain unclear. Studies explaining the observed educational differences are scarce, and they have mainly sought explanations by looking at elevated levels of social-emotional and behavioral problems among vocational students (Schrijvers & Schoemaker, 2008). These studies are based mostly on the perspective of adolescent substance use and sexual activity as problematic behaviors (Jessor & Jessor, 1977). Yet, while the rates of socio-emotional and behavioral problems are indeed generally higher among vocational students, the correlations between these problems and adolescent substance use and sexual behaviors are not so strong that they can fully account for the educational differences.

An alternative explanation for the relatively high prevalence of substance use and sexual activity among vocational students is that they experience the transition to adulthood at an

earlier age compared to academic students. This explanation is more in line with the literature on the normative character of substance use and sexual activity, as suggested by Moffitt (1993; 2006). Demographic research demonstrates that vocational students enter the labor market a few years earlier compared to their academically educated peers (Berzin & De Marco, 2010; Raymore, Barber, & Eccles, 2001; Scherger, 2009). In addition, they experience other major life transitions, such as getting married and having a first child, at an earlier age compared to academic students (Beets, Dourleijn, Liefbroer, & Henkens, 2001). Scholars have considered these social role transitions as traditional markers of adulthood (Arnett, 1997; Arnett, 2001; Buchmann & Kriesi, 2011; Hogan & Astone, 1986; Shanahan, 2000). As such, it can be concluded that vocational students have a shorter youth compared to academic students. Classic ethnographic research (Willis, 1977) suggests that an early transition to adulthood and, thus, a short youth increase the likelihood of substance use and sexual activity during adolescence, potentially because the expectation of a short youth may lead young people to prioritize short-term gains, i.e., engagement in fun behaviors that may provide them with a high peer status. Hence, it can be hypothesized that greater engagement in substance use and sexual behavior among vocational students may be explained by their earlier transition to adulthood. Surprisingly, contemporary, quantitative research has not tested this hypothesis yet.

The first part of this thesis addresses this gap in the literature by examining the extent to which differences in pathways to adulthood explain why vocational students in the Netherlands are more likely to engage in substance use and sexual activity compared to academic students. First, it examined whether normative changes in social relationships with parents and peers during the transition to adulthood mediated the association between educational track and adolescent substance use and sexual behavior. Second, it looked at the role of expectations and conceptions of adulthood in this association.

Part II: The role of parents in adolescent substance use and sexual activity

While substance use and sexual activity are normative, at least to some extent, behaviors that should be understood in the context of the transition to adulthood, these behaviors do entail serious risks, from which adolescents may need to be protected. Parents play an important role in this process. As adolescents develop into adults, parents have the challenging task to, on the one hand, acknowledge their increasingly mature status and gradually allow them more autonomy, and on the other hand, protect them from the risks that are potentially involved in their explorative and experimental behaviors. By providing adequate parenting practices, parents can guide their children through this exciting, but vulnerable phase of life.

Parental support and the gradual provision of autonomy to adolescents have an important place in Moffitt's (1993; 2006) theory, while PBT (1977) focuses more on the importance of parental control (appropriate supervision, rules and monitoring). In 1966, Baumrind started a line of research demonstrating that a combination of parental support and control leads to the best outcomes for adolescent development. Consistent with this line of research, contemporary empirical research showed that a combination of high parental support and control is related to lower degrees of adolescent tobacco use (Castrucci & Gerlach, 2006; Harakeh et al., 2010), alcohol use (Roche et al., 2008; Ryan et al., 2010), and cannabis use (Chen et al., 2005), as well as to delayed sexual debut (de Graaf et al., 2010, 2011; Roche et al., 2008).

Although the role of parental support and control has been studied extensively, the role of specific parenting practices in delaying or reducing adolescent substance use and sexual activity has become a topic of research only recently. Specific parenting practices refer to practices that target a specific adolescent behavior. Examples are parent-adolescent communication about sex (DiIorio, Pluhar, & Belcher, 2003; Jerman & Constantine, 2010; Markham et al., 2010) or alcohol use (Miller-Day & Kam, 2010; Spijkerman et al., 2008; van der Vorst, Burk, & Engels, 2010; van Zundert, van der Vorst, Vermulst, & Engels, 2006), parental rules on smoking (Emory, Saquib, Gilpin, & Pierce, 2010) and drinking (van der Vorst et al., 2007; Koning et al., 2010; 2012), and parental attitudes towards adolescent substance use (Bahr, Hoffman, & Yang, 2005; Ryan, Jorm & Lubman, 2010).

Overall, the above-mentioned studies suggest a negative association between specific parenting practices and adolescent substance use and sexual activity. However, they provide mixed findings. The mixed findings are likely to be related to the use of different definitions of the parenting practices. To illustrate, with respect to parental rules on smoking, studies focusing on whether adolescents are allowed to smoke at home found a strong association of parental rules with reduced adolescent smoking (Pennanen, Vartiainen, & Haukkala, 2012). However, studies focusing on more general house rules did not report this association (Andersen, Leroux, Bricker, Rajan, & Peterson, 2004; de Leeuw et al., 2010; den Exter Blokland et al., 2006; Harakeh et al., 2005; Henriksen & Jackson, 1998). Furthermore, studies have been conducted in different national contexts, and this may have influenced their results. As Bronfenbrenner (1979) hypothesized, factors at the micro- and macro-systems may interact in influencing adolescent behavior. Consequently, differences in the national contexts in which the studies are conducted may have produced different results for the association between parenting practices and adolescent behavior.

The second part of this thesis adds to the existing literature by examining the association between specific parenting practices on the one hand and adolescent substance use and sexual activity on the other in a sample of Dutch adolescents and their parents. We specifically examined the prevalence of parent-adolescent sexual communication and its association with adolescent sexual behaviors, the association of parental rules on smoking and drinking with adolescent substance use and sexual behavior, and trends in alcohol-specific parenting practices and their associations with adolescent alcohol use between 2007 and 2011. As Part I of this thesis strongly underlines the role of educational track in adolescent substance use and sexual behavior, we consistently controlled for educational track in the studies in Part II. Thus, we tested the extent to which parents can make a difference, irrespective of the educational track of their child. Moreover, we tested whether the role of parents is comparable for adolescents attending different educational tracks.

Part III: The role of national context in adolescent substance use and sexual activity

In addition to educational track and parenting practices at the micro-level, the broader socio-cultural context in which adolescents live may have a profound influence on their engagement in substance use and sexual behavior. This is illustrated by large cross-national differences in adolescent substance use and sexual activity. For example, in a study among 43 European and North American countries conducted in 2009/10, the percentage of 15-year-old adolescents who smoked tobacco at least weekly ranged from 6% in Armenia and Iceland to 57% in Greenland. Weekly alcohol use ranged from 7% in Iceland to 39% in the Czech Republic; and lifetime cannabis use ranged from 3% in the former Yugoslav Republic of Macedonia to 33% in Canada. The percentage of sexually active adolescents at age 15 ranged from 13% in Slovakia to 59% in Greenland (Currie et al., 2012).

Several factors may play a role in explaining these cross-national differences, such as national wealth, marketing cultures, prevention approaches, cultural norms and values, adult prevalence of substance use, and the presence of a teen culture (Schalet, 2011; Simons-Morton et al., 2009; Unger et al., 2003). By linking cross-nationally comparative data from the World Bank and the European Social Survey on national wealth and cultural norms to the HBSC data, the present thesis tested the role of national wealth and cultural norms in adolescent substance use and sexual behavior.

With respect to the association between national wealth and adolescent substance use, higher rates of adolescent substance use can be expected in wealthier countries based

on Moffitt's (1993; 2006) assumption that the maturity gap is a typical phenomenon for industrialized and wealthy societies due to the delayed age of labor force participation and the development of modern youth culture in those countries. Adolescents in these countries adopt adult (social) roles – and are perceived as adults – at a later age. Consequently, they have a stronger desire to express their maturity by engaging in adult-like behaviors. Moreover, they have the financial means to experiment with these behaviors. Empirical research in the late 1990s and early 2000s confirmed this hypothesis and showed that adolescent substance use was higher in industrialized and wealthy Western European countries compared to the poorer countries in Eastern Europe (Anderson & Baumberg, 2006; Lopez, Collishaw, & Piha, 1994; Rehm et al., 2009; Rehm et al., 2003; ter Bogt et al., 2006).

However, more recent research has suggested that the association between national wealth and adolescent substance use is non-linear. According to Rehm et al. (2009), adolescent substance use increases substantially as national wealth increases up to a GDP per capita of about \$10,000, but only marginally thereafter. Adolescent substance use in wealthy countries may even decrease at some point, as a function of increasing wealth. Potentially, people in wealthier countries are more aware of the risks that are involved in adolescent substance use and are better able to implement measures aimed at reducing these risks. The recently increased attention to the harmful effects of substance use for adolescents and the implementation of prevention efforts aimed at reducing adolescent substance use in many (especially the wealthier) European countries (Anderson & Baumberg, 2006; European Commission, 2009) is consistent with this hypothesis. If we assume that these prevention efforts are effective in reducing adolescent substance use, adolescent substance use may gradually become less characteristic of countries with high national wealth in Europe. The potentially changing association between national wealth and adolescent substance use in the beginning of the 21st century has not been addressed by previous research, to the knowledge of the author.

With respect to the association between cultural norms and adolescent sexual activity, previous research has suggested that norms that are more conservative are associated with a lower likelihood of early sexual initiation. At the micro-level, conservative personal norms (O'Donnell, Myint, O'Donnell, & Stueve, 2003; Santelli, et al., 2004) or perceived peer norms (Kinsman, Romer, Furstenberg, & Schwarz, 1998; Santelli, et al., 2004) on the acceptability of adolescent sexuality have been found to be associated with a lower likelihood of adolescents being sexually active. While various scholars speculated about whether cultural norms at the national (macro-) level are also associated with the timing of sexual debut (Darroch,

Frost, & Singh, 2001; Madkour, Farhat, Halpern, Godeau, & Nic Gabhainn, 2010a; 2010b), they have not examined this association. Cultural norms that determine the age at which it is culturally accepted to become sexually active are known to differ considerably across countries (Darroch, Frost, & Singh, 2001; Hofstede & Hofstede, 2005; Schalet, 2011). It can be hypothesized that adolescents living in countries with stricter age norms are less likely to become sexually active at an early age, compared to adolescents living in countries with more liberal age norms.

The third part of this thesis addresses the role of macro-level factors in adolescent substance use and sexual behavior. First, it examines the role of national wealth in adolescent tobacco, alcohol, and cannabis use across Europe and North America between 2002 and 2010. Subsequently, it investigates the role of cultural norms in cross-national variability in adolescent sexual activity across Europe. In this part, we considered the role of educational track and parenting practices, where possible. However, sometimes this was not possible due to pragmatic reasons, for example because different countries have different educational systems and because questions on parenting practices in the international HBSC survey are limited.

Part IV: Cross-national similarities in the clustering and correlates of adolescent substance use and sexual activity

While the first three parts of this thesis examine the role of social and cultural factors in the *prevalence* of adolescent engagement in substance use and sexual activity, the fourth and last part of this thesis addresses cross-national similarities in the *co-occurrence rates* of substance use and sexual activity and their *associations* with social and health correlates across countries.

The co-occurrence of substance use and sexual activity during adolescence has been a topic of extensive research over the past few decades, both in studies looking at their problematic (Jessor & Jessor, 1977; Willoughby et al., 2004) and normative (Moffitt; 1993; 2006) aspects. The close interrelatedness of adolescent substance use and sexual activity may be explained by the fact that they are all adult-like behaviors that take place in similar settings (i.e., in the peer context during leisure activities) and that can have a similar symbolic function in adolescents' transition to adulthood. Based on these similarities, it is not surprising that adolescent substance use and (early) sexual activity have been found to be associated with various social and behavioral factors in a similar way (Dunn, Kitts, & Lewis, 2011; Vazsonyi et al., 2010).

While research on the co-occurrence of adolescent substance use and sexual activity has been conducted in many countries, including the US (e.g., Calvert, Bucholz, & Steger-

May, 2010; Donovan, Jessor, & Costa, 1999; Dunn, Ilapogu, & Taylor, 2008; Guilamo-Ramos, Litardo, & Jaccard, 2005; Poulin & Graham, 2001), Canada (Afifi, Cox, & Katz, 2007; Pickett et al., 2002; 2006), Brazil (Cazuza de Farias Júnior, 2007; Dumith, Muniz, Tassitano, Hallal, & Menezes, 2012), Israel (Harel-Fisch, Abdeen, Walsh, Radwan, & Fogel-Grinvald, 2012), and Korea (Kim & Kim, 2009), cross-national comparative studies on this topic are scarce. A question that remains unanswered is whether the co-occurrence rates and associations with social and health correlates are similar across countries.

Based on the assumption that developmental processes are invariant across adolescents from different cultural or ethnic groups (Jessor, 2008; Rowe, Vazsonyi, & Flannery, 1994), it seems likely that the observed co-occurrence rates and associations with social and health correlates can be generalized across a large and diverse set of cultures or macro-level contexts (Bronfenbrenner, 1999). A few studies that compared the clustering of adolescent substance use and sexual activity and their psychosocial correlates across countries, i.e., in the United States, Taiwan, and China (Chen et al., 1998), the United States, China, Korea, and Czech Republic (Dmitrieva et al., 2004), the United States, Korea, and China (Greenberger et al., 2000), Georgia and Switzerland (Vazsonyi et al., 2008), China and the United States (Jessor et al., 2003), or Hungary, the Netherlands, Slovenia, Spain, Switzerland, Taiwan, Turkey, and the United States (Vazsonyi et al., 2010), confirmed this hypothesis. It is however unclear whether their findings can be generalized to a larger number of countries.

Addressing this gap in the literature, the fourth and last part of this thesis examines cross-national similarities in the co-occurrence rates of substance use and sexual activity and their associations with psychosocial and health correlates across Europe and North America. First, it tests the cross-national applicability of a ‘risk behavior factor’ across 27 countries as well as cross-national similarities in the associations of this factor with parent, peer, and school factors. Subsequently, it examines whether early substance use and sexual activity are associated with an increased risk for injury at age 15 across 25 countries.

The present thesis

This thesis aims to offer a better understanding of the factors that drive adolescents to engage in substance use and sexual behavior in European and North American countries in the beginning of the 21st century. In doing so, it aims to provide a balanced perspective to address both the problematic and functional aspects of these behaviors. Furthermore, it addresses both the shared and unique predictors of adolescent substance use and sexual

behavior. In line with the abovementioned literature, this thesis was divided into four parts, each answering one of the following research questions:

- I To what extent can normative and developmental processes related to the timing of adolescents' transition to adulthood explain why vocational students are more likely to engage in substance use and sexual activity compared to academic students?
- II To what extent are behavior-specific parenting practices (i.e., parent-adolescent communication about sex, alcohol-specific parenting practices, and parental rules on adolescent smoking and drinking) associated with adolescent engagement in substance use and sexual behavior?
- III To what extent can socio-cultural factors at the national level (i.e., societal wealth and cultural norms) explain the observed cross-national variation in adolescent substance use and sexual activity in Europe and North America? Have these associations changed over time between 2002 and 2010?
- IV Are co-occurrence rates of substance use and sexual activity, as well as their associations with social and health factors, similar across countries in Europe and North America?

This thesis utilized the data from the Health Behaviour in School-aged Children (HBSC) study. Data from the 2001/2, 2005/6, and 2009/10 study waves were used. The first two parts (chapters 2–6) are based only on Dutch data, while the last two parts (chapters 7–13) are based on international data. Throughout the thesis, attention has been paid to the stability of the hypothesized associations over time (in 2002, 2006, and 2010).

Outline of the thesis

The exact outline of this thesis is as follows. Part I addresses the explanatory role of the transition to adulthood in the association between educational track and adolescent substance use and sexual activity. In **Chapter 2**, the transition to adulthood is operationalized in terms of the creation of distance from parents and the intensification of contacts with peers. In **Chapter 3**, we assess the extent to which adolescents perceive substance use and sexual behaviors as mature behaviors as well as adolescent expectations of the timing of their transition to adulthood. Part II compromises three chapters on the role of parenting practices in adolescent substance use and sexual activity. **Chapter 4** examines the association between alcohol-specific

parenting practices and adolescent alcohol use. It also addresses trends in these alcohol-specific parenting practices and adolescent alcohol use between 2007 and 2011. **Chapter 5** reports on the association of parental rules on smoking and drinking with adolescent tobacco, alcohol, and cannabis use, and sexual activity. **Chapter 6** addresses the association between parent–adolescent sexual communication and adolescent sexual behavior. Part III consists of four chapters on the role of national context in explaining cross-national differences in the prevalence of substance use and sexual activity among adolescents in Europe and North America. **Chapter 7** describes the trends in educational differences in tobacco use between 2002 and 2010 in seven (Eastern as well as Western) European countries. In **Chapter 8**, we report trends in adolescent alcohol use in 25 countries. **Chapter 9** reports and explains trends in adolescent cannabis use in 30 countries. **Chapter 10** describes the role of cultural norms in adolescent sexual initiation. Part IV addresses cross-national similarities and differences in the co-occurrence of adolescent substance use and sexual activity, as well as cross-national similarities in the associations of adolescent substance use and sexual activity with social and health correlates. In **Chapter 11**, these cross-national similarities and differences are addressed with respect to the co-occurrence of substance use and sexual activity and with respect to associations between this cluster of behaviors and psychosocial predictors. **Chapter 12** examines cross-national consistencies in the association of early engagement in substance use and sexual activity with a physical health outcome (i.e., injury). **Chapter 13** integrates and discusses the findings of the previous chapters.

*“So what we get drunk
So what we smoke weed
We’re just having fun
We don’t care who sees
So what we go out
That’s how its supposed to be
Living young and wild and free”*

*Wiz Khalifa and Snoop Dogg,
ft. Bruno Mars (2011).*

Part I

The role of educational track in adolescent substance use and sexual activity

Chapter 2

Explaining educational differences in adolescent substance use and early sexual debut: The role of parents and peers

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ABSTRACT

Previous studies from a wide variety of European countries have demonstrated that low educated adolescents engage more frequently in health risk behaviors compared to high educated adolescents. The present study investigates the mediating roles of parental knowledge and time spent with peers in this relationship. Data were retrieved from a nationally representative sample of 12- to 16-year-old Dutch adolescents ($N = 5,422$). Risk behaviors were measured by adolescents' report of daily smoking, binge drinking and cannabis use in the previous month, and sexual debut before age 17. Low educated adolescents indicated that their parents had less knowledge on their whereabouts and reported spending more time with peers than high educated adolescents. Both factors mediated the relationship with health risk behaviors. These results hint to parenting practices and adolescent peer relations as points of reference for prevention and intervention work aiming to reduce educational inequalities in adolescent health risk behaviors.

INTRODUCTION

Studies from different cultural contexts, including Norway, Sweden, Germany, Belgium, and Slovakia (Friestad & Klepp, 2006; Geckova, Van Dijk, Groothoff, & Post, 2002; Hagquist, Sundh, & Eriksson, 2007; Richter & Leppin, 2007; Vereecken, Maes, & De Bacquer, 2004), have shown that considerable educational differences exist in adolescent substance use and early sexual debut, with adolescents attending lower educational levels engaging more often in these behaviors compared to adolescents attending higher educational levels. While the influence of educational level on adolescent substance use and early sexual debut is well established, far less is understood regarding the mechanisms underlying this association.

Previous research has demonstrated that parents and peers have an important mediating role in the association between adolescent substance use and various socio-demographic factors, such as race/ethnicity and family structure (Wang, Simons-Morton, Farhart, & Luk, 2009). To date, no study has examined whether parents and peers play a similar role in the association between educational level and adolescent substance use and early sexual debut. It is important to fill this gap in the literature as educational differences are large and directly predict future health inequalities (Due et al., 2011). Moreover, parents and peers are modifiable factors that can be used as points of reference for prevention and intervention programs.

Adolescent substance use and early sexual debut: the role of parents and peers

Previous research has shown that effective parenting is inversely associated with adolescent substance use and early sexual debut (DeVore & Ginsburg, 2005). Parental knowledge is an important construct in this respect, reflecting reasonable parent-child communication leading to parental awareness of their adolescent's friends, activities and whereabouts (Keijsers, 2010; Kerr, Stattin, & Burk, 2010). It is a protective factor against adolescent use of cigarettes (Harakeh, Scholte, Vermulst, de Vries, & Engels, 2004; Simons-Morton, Haynie, Crump, Eitel, & Saylor, 2001), alcohol (Barnes & Farrell, 1992; Bogenschneider, Wu, Raffaelli, & Tsay, 1998; Nash, McQueen, & Bray, 2005), and cannabis (Lac, Alvaro, Crano, & Siegel, 2009), and early sexual intercourse (de Graaf, Kruijer, van Acker, & Meijer; in press; Zimmer-Gembeck & Helfand, 2008).

Peer contacts are another important predictor of adolescent substance use (Engels & ter Bogt, 2001; Kuntsche, Simons-Morton, Fotiou, Ter Bogt, & Kokkevi, 2009) and the initiation of romantic relationships, including early sexual debut (Zimmer-Gembeck, 1999). As adolescents grow older, parental knowledge typically decreases, while peer contacts are

intensified (Larson et al., 1996). According to the separation-individuation theory (Blos, 1967; Kroger, 1985; Meeus, Iedema, Maassen, & Engels, 2005), these two parallel developmental processes are crucial for adolescents' identity development. In the course of these processes, adolescents are however also likely to run certain risks, as they start finding themselves in new contexts (bars, clubs), where they experiment with behaviors such as substance use and dating behaviors.

Parents and peers as mediators

Given the potential importance of parental knowledge and time spent with peers in the prevention of adolescent substance use and early sexual debut, it is of interest to examine whether these modifiable variables explain educational differences in adolescent substance use and early sexual debut. In a recent study, Wang et al. (2009) found that adolescents belonging to the more socially advantaged groups in society (e.g., in terms of family structure and ethnicity) had less substance using peers and shared more information on their friends, activities and whereabouts with their parents compared to adolescents from less advantaged groups. It can be hypothesized that the same holds true for adolescents who are most advantaged in terms of educational level (i.e., the high educated). High educated adolescents may be less likely to spend time with peers (independent of their levels of substance use) and may indicate that their parents know more of their activities, friends and whereabouts, because they generally have higher amounts of homework and may spend more time on school-related activities (often at home). Related to this, the peers of higher educated adolescents are less likely to be available as they are also busy with their schoolwork, and parents of high educated youth may tend to be more restrictive compared to parents of low educated youth (Herweijer, 2010; Spijkerman, Van den Eijden, & Huiberts, 2008).

Another potential explanation for the educational differences in parental knowledge and time spent with peers may be the fact that low and high educated adolescents have different perspectives on their future. Whereas low educated adolescents may expect to enter the labor market and get adult responsibilities at a relatively early age, high educated adolescents are likely to expect a relatively long period of studying. Existing research shows that low educated adolescents not only finish their education and start working at an earlier age (Berzin & De Marco, 2010; Gillis, 1981; Raymore, Barber, & Eccles, 2001; Scherger, 2009), but also experience other major life events, such as marriage and having a first child, at an earlier age (Beets, Dourleijn, Liefbroer, & Henkens, 2001). Consequently, it has been suggested that the transition to adulthood for low educated adolescents occurs earlier compared to

high educated adolescents (Borowsky, Ireland, & Rensick, 2009; Keijsers, 2010; McDade et al., 2011). This may be reflected in the fact that low educated adolescents experience the processes of individuation and separation (i.e., they create more distance from their parents and intensify their peer contacts) to a higher extent at high school age compared to high educated adolescents. If this holds true, then parental knowledge and time spent with peers can be expected to mediate the association between educational level and adolescent substance use and early sexual debut.

The present study

The purpose of the present study was to examine educational differences in adolescent substance use and early sexual debut and the mediating roles of parental knowledge and time spent with peers in a nationally representative sample of Dutch adolescents. The following research questions were addressed: (1) What is the variability in adolescent substance use and early sexual intercourse by educational level?; (2) To what extent do parental knowledge and time spent with peers mediate the association between educational level and adolescent substance use and early sexual intercourse?

METHOD

Study population and procedures

The sample was drawn from the Dutch Health Behavior in School-aged Children (HBSC) survey. The HBSC study is a World Health Organization (WHO) collaborative cross-national study on the health, health-related behaviors, and social context of young people's health. Data from Dutch students in the first through fourth years of secondary education (12–16-year-olds) were collected via an anonymous self-report questionnaire at secondary schools from October to November 2005. Schools were randomly selected from a governmental list of all secondary schools in the Netherlands after stratification based on urbanicity. In total, 64 schools participated in the study. Per school, four classes were randomly selected from a list of all classes in the first through fourth years (one class per grade). The Dutch secondary education system consists of four educational levels that range from pre-vocational training to higher academic education, and students from all educational levels were included. The percentage of students included in each educational level was similar to the national percentage

of students enrolled in these levels. Only students whose parents did not object to their child's participation in the study and who volunteered to participate were included in the study.

The response rate within the classes was 92%, with the most important reason of absence from the study being illness. More detailed information on the data collection procedures can be found in the study protocol (Griebler et al., 2010; Roberts et al., 2007; Roberts et al., 2009). The total sample included 5,422 students, who are representative (in terms of gender, educational level, ethnicity, family structure, and religion) of the Dutch youth aged 12–16 years ($M = 13.83$; $SD = 1.27$) in the first through fourth years of secondary education. The education level distribution was as follows: 29.2% pre-vocational training (lowest level; $M_{age} = 14.0$; $SD = 1.22$), 28.4% middle educational level ($M_{age} = 13.9$; $SD = 1.20$), 24.4% higher educational level ($M_{age} = 13.6$; $SD = 1.41$), and 18.0% pre-university education (highest level; $M_{age} = 13.8$; $SD = 1.10$). These percentages were representative for the general education level of the Dutch population (CBS Statistics Netherlands, 2010). Further, the demographics of the final sample were as follows: 50.8% were boys; 19.2% of the adolescents had an ethnic minority background, 21.6% came from incomplete families (i.e., the adolescent was not living together with his or her biological father and mother), 44.5% were religious (either Catholic, Protestant, Muslim, Jewish, Hindu, or Buddhist).

Measures

Various latent constructs were used in our model. To describe the quality of these constructs, we report the model fit of each latent construct separately as part of the measures section. As the sample size was large and the chi square statistic is sensitive to sample size, we specifically focused on the Comparative Fix Index (*CFI*), Tucker-Lewis Index (*TLI*), and Root Mean Square Error of Approximation (*RMSEA*) values as indicators of model fit. The *CFI* and *TLI* are related to the total variance accounted for in the model; values larger than .95 are desired and larger than .90 are acceptable (Kline, 2010). The *RMSEA* estimates the likelihood of model misspecification; values less than .05 are desired, and values between .05 and .08 are acceptable (Kline, 2010).

Adolescent risk behavior. Adolescent risk behavior was measured as a latent construct based on four indicators: (1) daily tobacco smoking, (2) binge drinking (i.e., drinking five or more alcoholic drinks on one occasion) in the previous month, (3) cannabis use in the previous month, (4) early sexual intercourse (i.e., having had sexual intercourse at age 16 years or younger). With respect to smoking tobacco, adolescents were asked: 'How often do you smoke?' The original answer categories (*never, less than weekly, weekly but not daily,*

daily) were recoded into *no daily smoking* and *daily smoking*. With respect to binge drinking, adolescents were asked: ‘How often have you, in the previous month, drunk five or more alcoholic drinks on one occasion (e.g., at a party or a night out)?’ Original answer categories (ranging from *never* to *nine times or more*) were recoded into *never* and *at least once*. Cannabis use in the previous month was measured by the item ‘How often have you smoked cannabis in the previous month?’ The original answer categories (ranging from *never* to *40 times or more*) were recoded into *never* and *at least once*. Finally, adolescents were asked whether they had ever engaged in sexual intercourse (*yes/no*). Based on these four dichotomous items, a latent factor was constructed (also see (Willoughby, Chalmers, & Busseri, 2004). By means of the option ‘categorical are...’ under the variable command in Mplus, we accounted for the fact that the indicators of the CFA were dichotomous. The confirmatory factor analysis in Mplus (Muthén & Muthén, 1998-2010) revealed a good model fit ($\chi^2(2) = 3.73, p = .15, CFI = 1.00, TLI = 1.00, RMSEA = .01$).

Parental knowledge. Adolescents’ perception of parental knowledge on his/her friends, activities and whereabouts was measured by means of a second order latent factor (see Figure 2.1). This factor had two indicators: adolescents’ perception of the knowledge of their mother (1) and father (2). These were in turn latent factors with five indicators, which were identical for mothers and fathers: (1) ‘How well does your mother/father know who your friends are?’ (2) ‘How well does your mother/father know how you spend your money?’ (3) ‘How well does your mother/father know where you go after school?’ (4) ‘How well does your mother/father know how you spend your free time?’ (5) How well does your mother/father know where you go when you go out? (Rispens, Hermanns, & Meeus, 1996). Response categories varied from 1 = *she/he knows little* to 3 = *she/he knows much*. The fourth category included the responses ‘I don’t have a mother/father or I do not see her/him’. Children who did not see or have contact with their mother ($N = 62$) or father ($N = 252$) received a missing value on this variable. In these cases, the answers for the parent who was not present in the child’s life were estimated in Mplus based on the model estimation. As the five items were similar for mothers and fathers, identical items were correlated in the model. By means of the option ‘categorical are...’ under the variable command in Mplus, we accounted for the fact that the indicators of the CFA were ordinal variables. The factor analysis revealed a good model fit ($\chi^2(29) = 92.42, p < .001, CFI = 1.00, TLI = 1.00, RMSEA = .02$).

Time spent with peers. The amount of time adolescents spent with peers was measured by the frequency of their peer contacts and was measured as a latent construct based on three items: (1) ‘How many days a week do you usually spend time with friends right after school?’ (Answer categories ranging from zero to five days.) (2) ‘How many evenings a week

do you usually spend out with your friends?' (Answer categories ranging from zero to seven evenings.) (3) 'How often do you talk to your friend(s) on the phone or send them text messages or have contact through the internet?' (Answer categories ranging from *never or hardly ever (zero days per week)* to *every day (7 days per week)*). A confirmatory factor analysis revealed the following fit statistics: $\chi^2(1) = 62.90$, $p < .001$, $CFI = .98$, $TLI = .93$, $RMSEA = .11$. The relatively high *RMSEA* value does not threaten the model fit as the *CFI* and *TLI* values are good (Kline, 2010) and as the *CFI* and *TLI* values are relatively more important in confirmatory factor analyses with count variables as indicators (Yu, 2002).

Educational level. Educational level was included as an observed variable in our model. In the Netherlands, four different educational levels exist in secondary education, ranging from pre-vocational education (lowest level) to a pre-university education (highest level). Educational level is a strong predictor of adolescents' future socioeconomic status (Research Centre for Education and Labour Market, 2009). The choice for a specific educational level generally depends on students' achievement at primary school, but is also influenced by factors such as parents' socioeconomic status (especially its cultural and intellectual aspects; Herweijer, 2010) and access to social capital (Eriksson et al., 2010). For the purpose of the present study, dummy variables were created for the three highest educational levels and the lowest level was the reference category.

Covariates. Gender, age, ethnicity (native Dutch vs. ethnic minority background), religion (religious vs. nonreligious), and family structure (complete vs. incomplete family) were all measured by means of self-report and were included as observed variables in the model.

Statistical analyses

First, we calculated descriptive statistics to identify the prevalence of substance use and early sexual debut among adolescents across the different educational levels. In addition, we provided the percentages of adolescents who indicated that their parents knew a lot about their friends, activities and whereabouts and the percentages of adolescents who spent a lot of time with their peers.

Second, we performed a mediation analysis using the software package Mplus, version 6.0 (Muthén & Muthén, 1998–2010). We tested the effect of educational level on risk behavior via parental knowledge and time spent with peers. In this model, we tested both direct and indirect paths (via time spent with peers) from parental knowledge to adolescent substance use and early sexual debut. Furthermore, we examined the indirect effects from educational

level via parental knowledge and time spent with peers to adolescent substance use and early sexual debut.

Data were weighted for educational level, grade, gender, and urbanicity with poststratification weights. All analyses were corrected for cluster effects of pupils within the same school (primary sampling unit). As our sample was large and as our model included many estimated parameters, we used $\alpha = .001$ instead of the regular 5% to reduce type 1 errors. In the analyses, missing values were dealt with by using the full information maximum likelihood estimator.

RESULTS

Descriptive statistics

Table 2.1 shows the percentages of youth who engaged in substance use and early sexual intercourse, stratified by educational level. Low educated adolescents engaged more often in all four behaviors compared to high educated adolescents. Specifically, 55.8% of students in the lowest educational level engaged in at least one risk behavior compared to 26.4% in the highest educational level.

Differences across educational levels were also found in adolescents' perception of parental knowledge on their friends, activities and whereabouts. Although percentages are high overall, fewer adolescents attending the lowest educational level indicated that their parents knew a lot (86.1% for mothers and 64.6% for fathers) compared to adolescents in the highest educational level (95.9% for mothers and 83.1% for fathers). In addition, the percentages of youth with frequent peer contact ranged from 21.1% (highest educational level) to 45.2% (lowest educational level).

The mediation analysis

Figure 2.1 illustrates the results of our research model. The model fit indices were: $\chi^2(221) = 1063.68$, $p < .001$, $CFI = .96$, $TLI = .95$, $RMSEA = .03$. For complicated models that include a second order factor analysis, this result indicates a (very) good fit (Browne & Cudeck, 1993; Tabachnick & Fidell, 2007).

The model explained 74.2% of the variance in the latent construct representing adolescent substance use and early sexual debut. Educational level was positively associated with

Table 2.1 Overview of adolescent risk behavior, parental knowledge and time spent with peers stratified by educational level ($N = 5,422$; %)

		Adolescent educational level ¹				
		Total	Prevocational training	Intermediate secondary education	Higher secondary education	Pre-university education
		$N = 5,422$	$N = 1,583$	$N = 1,540$	$N = 1,323$	$N = 976$
Risk behaviors	Daily tobacco smoking	8.3	16.8 ^a	7.0 ^b	4.8 ^{bc}	2.0 ^c
	Binge drinking in previous month	39.3	47.8 ^a	42.5 ^a	36.3 ^a	25.3 ^b
	Cannabis use in previous month	6.9	10.4 ^a	6.5 ^b	5.7 ^b	3.9 ^b
	Early sexual debut	14.6	24.5 ^a	14.5 ^b	12.0 ^b	5.8 ^c
# of risk behaviors	0	55.9	44.2 ^a	52.7 ^{ab}	59.6 ^b	73.6 ^c
	1	27.9	29.5 ^a	32.1 ^a	27.6 ^{ab}	19.4 ^b
	2	9.3	13.2 ^a	9.2 ^b	8.1 ^{bc}	4.8 ^c
	3	4.5	8.7 ^a	3.2 ^b	3.2 ^b	1.6 ^b
	4	2.5	4.4 ^a	2.8 ^{ab}	1.5 ^{bc}	0.6 ^c
Mother's knowledge on adolescents' whereabouts		Much ²	91.2	86.1 ^a	91.4 ^b	93.6 ^b
Father's knowledge on adolescents' whereabouts		Much ²	74.0	64.6 ^a	72.6 ^b	79.9 ^c
Time spent with peers		Much ³	33.9	45.2 ^a	35.4 ^b	28.0 ^c
						21.1 ^c

¹ In rows, values with different alphabets are statistically different from each other at $p < .001$.² Youth were categorized as 'much' if they scored on average less than 2 on the five items measuring parental knowledge.³ Youth were categorized as 'much' if they belonged to the 33% highest scoring youth on the peer items.

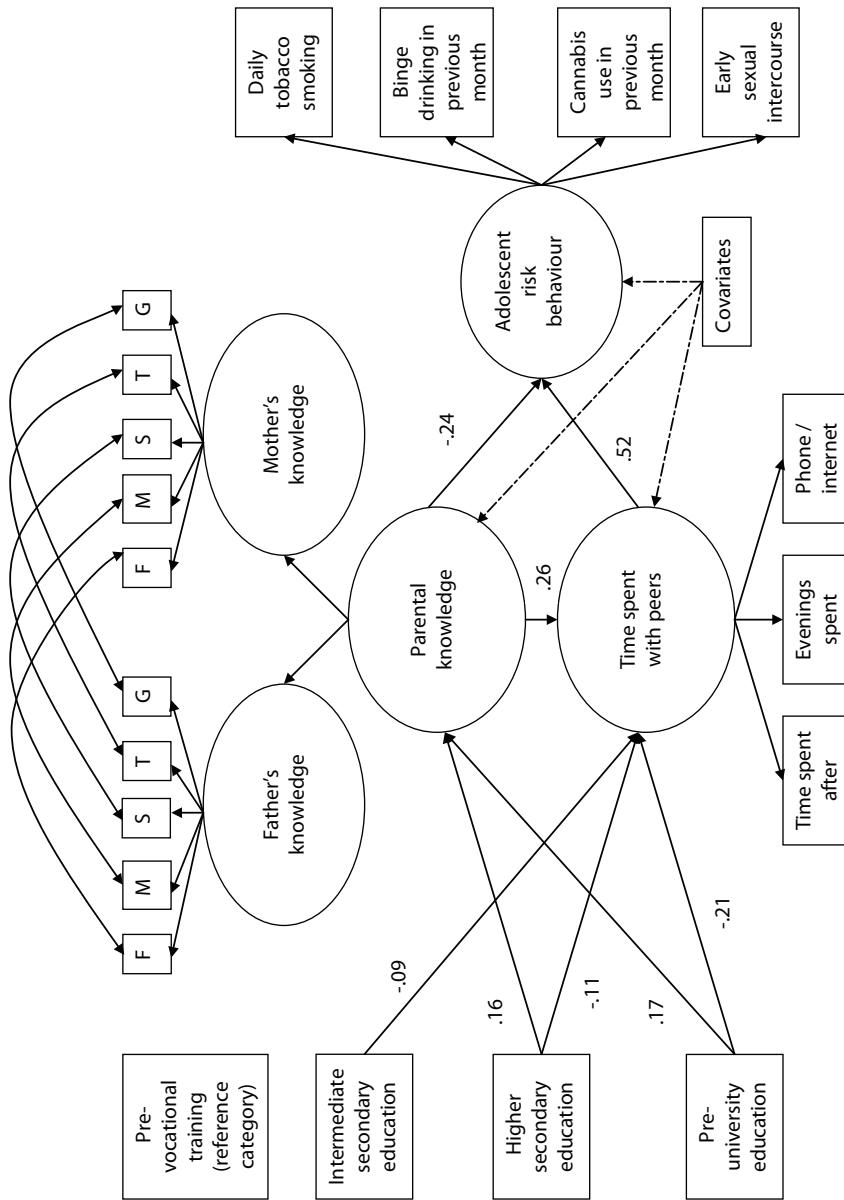


Figure 2.1 Mediation model. Note. All shown regression paths are significant with $p < .001$. F = friends; M = money; S = time after school; T = free time; G = going out. Covariates were: gender, age, ethnicity, religion and family structure. In this model, the three dummies for educational level were also directly regressed on adolescent risk behavior. The coefficients of these paths are presented in Table 2.2. For the readability of the figure, factor loadings and residual error terms were not presented. They are available with the authors.

parental knowledge, and negatively with time spent with peers. This indicates that higher educated adolescents reported that their parents knew more about their friends, activities and whereabouts, and that they spent less time with peers compared to lower educated adolescents. Furthermore, adolescent substance use and early sexual debut was negatively associated with parental knowledge and positively associated with time spent with peers.

Besides the direct association between parental knowledge and adolescent substance use and early sexual debut ($\beta = -.24$), there was an indirect association via time spent with peers ($\beta = -.14$). This indirect path was the result of the strong effect of parental knowledge on time spent with peers ($\beta = -.26$) and the strong association between time spent with peers and adolescent substance use and early sexual debut ($\beta = .52$).

Furthermore, the association between the different educational levels and substance use and early sexual debut were mediated by both parental knowledge and time spent with peers. The indirect effects ranged from $\beta = .01$ to $\beta = .04$ ($ps < .01$) for parental knowledge and $\beta = -.05$ to $\beta = -.11$ ($ps < .001$) for time spent with peers. The relatively low indirect effects via parental knowledge can be explained by the fact that the effect of parental knowledge on risk behavior was in turn mediated by time spent with peers.

Without the mediation, the standardized direct paths (β) from the three educational levels on adolescent substance use and early sexual debut (controlled for gender, age, ethnicity, religion, and family structure) were $-.13$ (intermediate secondary education), $-.22$ (higher secondary education) and $-.31$ (pre-university education), indicating that youth from higher educational levels engaged less often in these behaviors. After adding the mediation, only the paths from higher secondary education and pre-university education on risk behavior remained significant, but were considerably reduced ($\beta = -.09$ and $\beta = -.13$, respectively; see Table 2.2), indicating that the association between educational level and adolescent substance use and early sexual debut was, for a large part, accounted for by the mediators parental knowledge and time spent with peers.

DISCUSSION

The purpose of this study was to examine the mediating roles of parental knowledge and time spent with peers in the association between educational level and adolescent substance use and early sexual debut. Our main finding was that considerable variation in adolescent substance use and early sexual debut according to educational level can be partially explained by both factors. This finding can be explained in different ways.

Table 2.2 Model with and without mediation: Model estimates (N = 5,422)

Effect		B	SE	β
Model without mediation				
Intermediate secondary education ¹	→	Adolescent risk behavior	-0.23	0.05
Higher secondary education ¹	→	Adolescent risk behavior	-0.39	0.05
Pre-university education ¹	→	Adolescent risk behavior	-0.66	0.07
Mediation model				
Intermediate secondary education ¹	→	Adolescent risk behavior	-0.10	0.04
Higher secondary education ¹	→	Adolescent risk behavior	-0.17	0.05
Pre-university education ¹	→	Adolescent risk behavior	-0.29	0.08
Intermediate secondary education ¹	→	Parental knowledge	0.10	0.04
Higher secondary education ¹	→	Parental knowledge	0.26	0.04
Pre-university education ¹	→	Parental knowledge	0.30	0.05
Intermediate secondary education ¹	→	Time spent with peers	-0.25	0.09*
Higher secondary education ¹	→	Time spent with peers	-0.31	0.08
Pre-university education ¹	→	Time spent with peers	-0.66	0.11
Parental knowledge	→	Time spent with peers	0.47	0.04
Parental knowledge	→	Adolescent risk behavior	-0.30	0.04
Time spent with peers	→	Adolescent risk behavior	0.36	0.03
Gender (being a boy)	→	Adolescent risk behavior	0.09	0.03
Age	→	Adolescent risk behavior	0.23	0.02
Ethnicity (non-Dutch ethnic background)	→	Adolescent risk behavior	-0.21	0.04
Religion (being religious)	→	Adolescent risk behavior	-0.16	0.03
Family structure (incomplete family)	→	Adolescent risk behavior	0.08	0.03

¹ Reference category is prevocational training.* $p < .01$; ** $p < .001$.

First, the finding that low educated adolescents indicated that their parents knew less about their friends, activities and whereabouts may reflect that parents from low educated adolescents less often monitor their children and ask questions about where they go and with whom. This would provide adolescents with the opportunity to spend more (often unsupervised) time with peers, and thus with more opportunities to engage in risk behaviors. Existing evidence however suggests that information-sharing between adolescents and their parents for a large part is controlled by adolescents and not by their parents (Kerr et al., 2010; Stattin & Kerr, 2000). Although communication between parents and adolescents is a reciprocal process that is influenced by both parties (Keijsers et al., 2010), Kerr et al. (2010) and Stattin and Kerr (2000) revealed that adolescents actively controlled their parents' access to information about their activities. Moreover, parents' efforts to supervise and monitor were not very effective in controlling their teenagers' activities and could even backfire if teens felt controlled. This suggests that, although there may be differences in monitoring between parents from low and high educated adolescents, differences in parental knowledge are less likely to be the result of differences in parental monitoring, and are rather the result of differences between low and high educated adolescents' level of disclosure.

An alternative explanation of the mediation effects found may thus lie in the existence of different levels of adolescent disclosure across educational levels. These different levels of disclosure may be related to the fact that low and high educated adolescents have different future perspectives, with low educated adolescents being likely to experience major life transitions such as entering the labor market, getting married, and having a first child earlier in life compared to high educated adolescents (Beets et al., 2001; Berzin & De Marco, 2010; Gillis, 1981; Raymore, Barber, & Eccles, 2001; Scherger, 2009). Consequently, in line with evolutionary theory (Borowsky, Ireland, & Rensick, 2009; McDade et al., 2011), it can be suggested that the transition to adulthood for low educated adolescents occurs earlier compared to high educated adolescents, and that this is reflected in the fact that low educated adolescents experience the processes of individuation and separation (i.e., they create more distance from their parents and intensify their peer contacts) more than high educated adolescents. As these two processes in turn predict substance use and early sexual debut, parental knowledge and time spent with peers mediate the association between educational level and these behaviors.

Especially the effect of time spent with peers was found to be a strong predictor. Furthermore, parental knowledge had both a (negative) direct and indirect effect on adolescent substance use and early sexual debut, which is consistent with previous findings (Simons-Morton, 2007; Simons-Morton, Chen, Abroms, & Haynie, 2004; Wang et al., 2009). The direct

effect of parental knowledge may be explained by the fact that, if parents are less aware of their child's activities and whereabouts, they are also less able to monitor their engagement in risky behaviors. Alternatively, it has been suggested that emotional attachment between adolescents and their parents causes adolescents to communicate with their parents and to be better adjusted (Kerr & Stattin, 2000; Stattin & Kerr, 2000). The indirect effect through peer relations demonstrates that parental knowledge may have protective influences on adolescent substance use and early sexual debut by reducing the likelihood of spending much (often unsupervised) time with peers.

Although parental knowledge and time spent with peers mediated the association between educational level and adolescent substance use and early sexual debut, there was no full mediation, so there may be additional explanatory factors in the association between educational level and adolescent risk behavior that were not included in this study. For example, previous research suggests that adolescents who hold the image that smoking is more sociable or cool and less rebellious, are more likely to smoke (Spijkerman, van den Ejnden, & Engels, 2005; Van den Ejnden, Spijkerman, & Engels, 2006). Low educated adolescents may more often hold these images compared to high educated adolescents, for example because they more often have older peers (e.g., at school) who smoke, and this may explain their higher rates of smoking. Future research may investigate these mediating effects in more detail.

Study strengths and limitations

The Dutch data from the 2005/06 HBSC study present an outstanding opportunity to analyze national prevalence rates of substance use and early sexual intercourse by educational level, and allow for testing the mediation effects of parental knowledge and time spent with peers in this association. The strengths of this study include the use of a large nationally representative dataset and the high predictive value of our model. In total, 74% of the variance of adolescent risk behaviors was explained by the variables in our model. In this model, parental knowledge and time spent with peers mediated the association between educational level and adolescent substance use and early sexual intercourse. All associations in the model were tested in a conservative way as we used $\alpha = 0.001$ instead of the regular 5%. Not many studies that use SEM modeling correct for type 1 errors as we did. Although more advanced correction techniques are available, for an overview see Hsu (1996), the use of $\alpha = .001$ in the present study was quite conservative and still the results provide strong support for our expectations.

A limitation of this study is that our data were based on adolescent self-report, which entails the risk of socially desirable answers. To counter this potential bias, anonymity was

stressed by interviewers before youth completed the questionnaires (Brener, Billy & Grady, 2003). We chose for this method as it outweighed the limitations associated with alternative methodologies for simultaneously collecting large amounts of data ($N = 5,422$) that were also representative of Dutch adolescents in the first four years of secondary education. A second limitation is that our data were cross-sectional, so we cannot make any strictly causal inferences. However, our data do provide a great opportunity to identify and explain group differences, which were the primary focus of this paper. To gain a deeper insight into the effects of educational level on adolescent substance use and early sexual debut over time, we recommend future longitudinal research.

Finally, in the literature, there is much discussion on the use and measurement of socioeconomic indicators for adolescents. Previous studies have convincingly demonstrated that educational level is one of the strongest predictor of adolescent health risk behaviors compared to other indicators of socioeconomic status, such as parental education or family income (Hanson & Chen, 2007). As adolescents' educational level is however often related to the socioeconomic position of the adolescent's family (although there are also opportunities for up- and downward social mobility; Herweijer, 2010), we repeated our analyses while controlling for parental education and family income. In this model, the strength of some associations is (slightly) smaller, but all associations remain significant and relevant, and the overall conclusion that can be drawn based on this model remains similar to the conclusion drawn based on the presented model (results not presented; available with the first author). This indicates that, even when controlling for the fact that high educated adolescents are more likely to belong to a family in the higher socioeconomic strata, while low educated adolescents are more likely to belong to a family with a lower socioeconomic background, the results of the present study remain strong and convincing.

Implications

The implications of the present study are threefold. First, the higher rates of substance use and early sexual debut among low educated adolescents indicate that prevention efforts need to specifically target lower educated adolescents. The relatively high prevalence of these behaviors among low educated youth is alarming as it leads directly to adolescent and adult health inequalities. For example, tobacco use can elicit various form of cancer (Peto, 2001), and exposure to alcohol (Tapert, Caldwell, & Burke, 2004) and cannabis (Jacobsen, Mencl, Westerveld & Pugh, 2004) during critical periods in adolescence can affect the course of brain development negatively. Similarly, early onset of sexual behaviors has been

related to long-term negative sexual health outcomes, including increased sexual risk taking, difficulties with saying ‘no’ in the future, and problems in sexual functioning (de Graaf et al., *in press*; Sandfort, Orr, Hirsch, & Santelli, 2008). Low educated adolescents can therefore be identified as a risk group in terms of substance use and sexual debut. The school setting may be an important context for prevention programs that aim to tackle current as well as future health inequalities.

Second, prevention programs may need consider incorporating adolescents’ social development (i.e., their relationships with parents and peers) in order to reduce adolescent engagement in substance use and early sexual debut. For example, they may aim to increase information-sharing between parents and adolescents, for example by means of a combined parent–adolescent intervention. With respect to peer contacts, previous studies have shown that the context of peer contact interacts with the influence that peers have on adolescent risk behavior (Kiesner, Poulin, & Dishion, 2010). As peer contacts can be both a protective factor for young people’s development and a risk factor for engagement in substance use and early sexual debut, prevention programs may stimulate peer activities that serve as a protective factor against substance use and early sexual debut.

Finally, an implication of the present study for future research is that, to fully understand the mechanisms behind young people’s engagement in these behaviors, more attention should be paid to the role that the transition to adulthood plays in young people’s motivation to engage in risk behaviors.

Chapter 3

Explaining educational differences in adolescent substance use and early sexual debut: The role of conceptions and expectations of adulthood

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Emerging Adulthood, in press

ABSTRACT

Secondary school adolescents attending vocational tracks engage considerably more often in substance use and sexual activity compared to those attending academic tracks. Prior studies have sought explanations for these differences in higher levels of social-emotional problems among vocational students. This study presents a novel approach. Inspired by ethnographic and cultural studies, it examines the role of conceptions and expectations of adulthood in the association between educational track and adolescent substance use and sexual activity. Self-report data were collected among 1,568 Dutch adolescents by means of a web-based questionnaire. First, in a preliminary qualitative analysis, conceptions of adulthood were explored among vocational and academic students. Next, a mediation analysis was employed. Results of the qualitative analysis revealed that vocational and academic students had different conceptions of adulthood, with vocational students perceiving substance use and sexual activity more often as typical adult behaviors. The results of the quantitative analysis confirmed this finding and added that vocational students expect social role transitions earlier in life than academic students. Both factors mediated the association between educational track and adolescent substance use and sexual activity. Implications of the findings and future directions for research are discussed.

INTRODUCTION

Numerous studies conducted in different cultural contexts have provided evidence that students in vocational tracks engage substantially more often in substance use and sexual activity compared to students in academic tracks (Friestad & Klepp, 2006; Geckova, Van Dijk, Groothoff, & Post, 2002; Hagquist, Sundh, & Eriksson, 2007; Richter & Leppin, 2007; Vereecken, Maes, & De Bacquer, 2004). While the association between educational track and adolescent substance use and sexual activity is well established, far less is understood regarding its underlying mechanisms. Recent evidence (De Looze et al., 2012) suggests that vocational students experience the transition to adulthood earlier in life than academic students, and that this may explain their higher levels of engagement in adult-like behaviors such as substance use and sexual activity. The present study elaborates on this suggestion. It explored to what extent adolescent conceptions and expectations of adulthood mediate the association between educational track and adolescent substance use and sexual activity.

Diversity in pathways to adulthood

Adolescence is a developmental period characterized by the transition from childhood to adulthood. As adolescents grow older, they increasingly assume adult roles and responsibilities in society. Pathways to adulthood however differ across individuals, as they are shaped by personal and societal factors (Shanahan, 2000). Recent evidence (De Looze et al., 2012) suggests that educational track may be one of these factors.

According to this study, vocational students may experience the transition to adulthood earlier in life than academic students. The earlier transition to adulthood for vocational students may be caused by the fact that they generally complete their education at an earlier age than academic students. As a result, vocational students also experience social role transitions, such as entering the labor market (Berzin & De Marco, 2010; Gillis, 1981; Raymore, Barber, & Eccles, 2001; Scherger, 2009), getting married, and having a first child (Beets, Dourleijn, Liefbroer, & Henkens, 2001), at an earlier age. Scholars have traditionally considered these social role transitions as markers for adulthood (Arnett, 1997, 2001; Buchmann & Kriesi, 2011; Hogan & Astone, 1986; Shanahan, 2000). The earlier transition to adulthood for vocational students is likely to influence their conceptions and expectations of adulthood. These factors, in turn, may explain their higher engagement in adult-like behaviors such as substance use and sexual activity.

Conceptions of adulthood

In the past few decades, young people's conceptions of adulthood have become a burgeoning area of research. Traditionally, individuals were considered adults when they had experienced certain social role transitions (completing school, leaving home, beginning a career, getting married and having children; Hogan & Astone, 1986). More recently, due to a delay in the ages at which young people experience these transitions, the process of becoming an adult has become less ordered and more diversified (Settersten, Furstenberg, & Rumbaut, 2005). As a result, young people have increasingly used subjective, individualistic criteria for adulthood, such as accepting responsibility and making independent decisions (Arnett, 2001; Donoghue & Stein, 2007; Nelson & Barry, 2005; Westberg, 2004).

According to Donoghue and Stein (2007), demographic variation in young people's conceptions of adulthood exists as young people define adulthood in ways that are consistent with their own experiences. They tend to attach value to those markers for adulthood they think they have already mastered, so that they can strengthen their own status as a mature, adult individual. In line with this reasoning, vocational students, who expect to experience social role transitions earlier in life, may be more likely to perceive these social role transitions as markers of adulthood. In contrast, academic students, who tend to delay these social role transitions, may reject these standards of adulthood in favor of more subjective and individualistic benchmarks which they may believe they have mastered, such as being responsible or independent.

Another potential difference in vocational and academic students' conception of adulthood is the extent to which they associate (the transition to) adulthood with overt, adult-like behaviors, such as substance use and sexual activity. While both qualitative and quantitative studies have revealed that many adolescents perceive substance use and sexual activity as typical adult behaviors (Arnett, 2001; Kloep, Hendry, Ingebrigtsen, Glendinning, & Espnes, 2001; Moffitt, 1993; Treacy et al., 2007), only few studies have touched upon the idea that this perception may differ across adolescents attending different educational tracks. One of the first scholars who touched upon this topic was Willis (1977). In his classic ethnographic study, he described how working class boys in Britain were more likely to perceive smoking and drinking as typically adult behaviors, and were consequently more likely to engage in them, compared to their peers from a higher social class. This finding may be explained by the fact that the working-class boys faced an earlier transition to adulthood and were therefore more oriented toward obtaining an (overt) adult status among peers. In addition, it may reflect the fact that lower-class boys had relatively few other resources

to attain status among peers. While higher-class boys for example were more likely to use educational achievement as a resource to acquire peer status, working-class boys often had lower educational achievements and instead used their engagement in adult-like behaviors to attain status. A similar mechanism may apply to vocational and academic students. As vocational students are likely to make the transition to adulthood at an earlier age and have lower educational achievements than academic students, they may be more likely to engage in adult-like behaviors and to use these behaviors to acquire status among peers.

In sum, it can be hypothesized that conceptions of adulthood differ among adolescents attending vocational and academic tracks. Vocational students can be expected to attach more value to social role transitions as markers of adulthood, while academic students are more likely to attach value to individualistic or subjective norms as markers of adulthood. Further, it can be hypothesized that vocational students are more likely to perceive substance use and sexual activity as typical adult behaviors, and that this perception mediates the association between educational track and adolescent substance use and sexual activity.

Expectations of adulthood

Besides adolescent conceptions of adulthood, adolescent expectations of adulthood may also explain why vocational students engage more often in substance use and sexual activity compared to academic students. Although previous studies have convincingly demonstrated that vocational students experience social role transitions, and therewith the transition to adulthood, at an earlier age than academic students (Beets et al., 2001; Berzin & De Marco, 2010; Gillis, 1981; Raymore et al., 2009), it is not known whether vocational and academic students, at high school age, are already aware of the differences in future pathways.

If they are, then theories of human behavior scaffolded by a life history framework (Roff, 1992; Stearns, 1993) predict that vocational students are more likely to adopt a fun morality, go out, and engage in behaviors such as substance use and sexual intercourse, because the expectation of earlier social role transitions - or a higher pace of life in general - makes them believe that there are fewer opportunities for personal advancement in the future, and this in turn causes them to become more present-time oriented and to prioritize short-term gains. In contrast, if academic students expect to make social role transitions at a relatively old age, they can be expected to be less likely to adopt a fun morality and engage in these behaviors, because they will have more confidence in the future and are more likely to prepare themselves to obtain long-term goals at the expense of short-term gains. Recent empirical studies confirmed that adolescents growing up in settings with fewer opportunities

were more likely to engage in fun, but sometimes risky behaviors such as substance use and sexual intercourse than adolescents growing up in settings with more opportunities (Borowsky, Ireland, & Resnick, 2009; Chisholm, 1993; Harris, Duncan, & Boisjoly, 2002; Kruger, Reisch, & Zimmerman, 2008; McDade et al., 2011; Stearns, 1992). To date, however, no study has specifically applied these theories to explain differences in substance use and sexual activity between adolescents attending different educational tracks.

Research questions and hypotheses

This study aimed to explain why vocational students in the Netherlands engage more in substance use and sexual activity compared to academic students. We tested whether conceptions and expectations of adulthood mediated the association between educational track and adolescent substance use and sexual activity. First, we explored conceptions of adulthood among adolescents attending vocational and academic tracks in a qualitative, preliminary analysis. Second, we conducted a mediation analysis based on quantitative data. We expected that vocational students were more likely to mention social role transitions as markers of adulthood, while academic students were more likely to mention individualistic and subjective norms as markers of adulthood. Further, we expected that vocational students were more likely to perceive substance use and sexual activity as typical adult behaviors, and that this (partly) explained their higher levels of engagement in these behaviors (mediation effect 1). Finally, we hypothesized that vocational students expected to experience social role transitions earlier in life than academic students, and that this also explained their higher levels of engagement in substance use and sexual activity (mediation effect 2).

METHOD

The sample was comprised of a subgroup of adolescents who participated in the 2009 Dutch *Health Behavior in School-aged Children (HBSC)* survey. The HBSC study is a World Health Organization collaborative cross-national study on the health, health-related behaviors, and the social context of young people's health. For detailed information on the data collection procedure we refer to the study protocol (Griebler et al., 2010; Roberts et al., 2007; Roberts et al., 2009).

In October and November 2009, data were collected in a nationally representative sample of students in the first through fourth grade of secondary education in the Nether-

lands (see Van Dorsselaer et al., 2010). Data were collected via an anonymous self-report questionnaire at secondary schools. After filling in the questionnaire, all students were invited to participate in a longitudinal study. 37% of the students ($N = 2,131$) agreed to participate, and provided a valid email address and phone number. In November 2010, these students were approached by email to fill in an online questionnaire. At that time, they were aged 13 to 17 years old. If youth did not fill in the questionnaire, they were repeatedly reminded by email and phone. Also, they were offered the option to answer the questions over the phone. Respondents were instructed to fill in the online questionnaire or respond to the questions over the phone only when there were no other people present in the room.

In total, 1,568 students (74% of the youth that were approached) filled in the questionnaire. 64% of them participated via internet and 36% participated via a phone interview. 44% of the sample were boys, the mean age was 14.6 ($SD = 1.2$), and 45% attended a vocational track. Compared to the nationally representative sample from 2009, the adolescents in the 2010 sample were more often female ($\chi^2 (1) = 23.11, p < .001$), younger of age ($t = 9.00, p < .001$), and more often attended academic tracks ($\chi^2 (1) = 79.63, p < .001$).

Measures

Adolescent substance use and sexual activity

Adolescent risk behaviors were measured by means of a latent construct based on the four indicators, which had a very good model fit: $\chi^2(2) = .44, p = .80$, $CFI = 1.00$, $TLI = 1.00$, $RMSEA = .00$. The four indicators were:

1. Daily tobacco smoking. With respect to tobacco smoking, adolescents were asked: ‘How often do you smoke at present?’ The original answer categories (never, less than weekly, weekly but not daily, daily) were recoded into ‘no daily smoking’ and ‘daily smoking’. The focus on daily smoking was based on the fact that daily smoking is a crucial aspect of nicotine dependence (Jarvis, 2004), which increases adolescents’ likelihood of smoking in the future and developing smoking-related health problems leading to premature deaths (Hublet et al., 2006).

2. Binge drinking in the previous month. With respect to alcohol use, adolescents were asked: ‘How often have you, in the previous month, drunk five or more alcoholic drinks on one occasion (for example at a party or a night out)?’ Original answer categories (ranging from ‘never’ to ‘nine times or more’) were recoded into ‘never’ and ‘at least once’. Regular binge drinking is considered an indicator of excessive alcohol use (as per Lammers et al., 2011).

3. Cannabis use in the previous month. Lifetime cannabis use was measured by the item 'How often, in your entire life, have you smoked cannabis?' The original answer categories (ranging from never to 40 times or more) were recoded into 'never' and 'at least once.' Cannabis use is rare among adolescents aged 13–17 (e.g. Currie et al., 2012; Hibell et al., 2011); if adolescents at this age already have experience with cannabis use, this is generally interpreted as a risk behavior.

4. Sexual intercourse. In 2009, students were asked whether they had ever had sexual intercourse. Answer categories were either 'yes' or 'no'. In 2010, students were asked whether they had had sexual intercourse in the year previous to our study. Based on these two variables, the variable 'sexual intercourse' (defined as ever having had sexual intercourse) was created.

The perception of substance use and sexual activity as adult behaviors

Respondents were specifically asked about the extent to which they perceived substance use and sexual intercourse as adult behaviors by means of the question: "To what extent do you associate the following behaviors with adulthood: (a) smoking tobacco; (b) drinking alcohol; (c) using cannabis/soft drugs; and (d) having sexual intercourse?" Answer categories (5) ranged from 'absolutely not' to 'absolutely, yes.' A latent construct was created based on these four indicators. Items b and d were correlated. The latent factor had a good fit: $\chi^2(1) = .90$, $p = .34$, $CFI = 1.00$, $TLI = 1.00$, $RMSEA = .00$.

Transition expectations

Adolescents' expectations of when they will make the transition to adulthood was measured as a latent factor, which was based on six (open-ended) items: 'At what age do you expect to be when you: (a) have a full-time job; (b) are financially independent; (c) have a steady (romantic) relationship; (d) are able to take care financially for your own family; (e) get married or live together with a partner; and, (f) have a first child?' Because of their interrelatedness, items c, e, and f were correlated. The latent factor had a good fit: $\chi^2(6) = 48.39$, $p = .00$, $CFI = .99$, $TLI = .92$, $RMSEA = .07$.

As some adolescents are already involved in a romantic relationship, we tested whether this influenced their answer to Item c. The results of a linear regression revealed that current relationship status did not affect expectations about the timing of having a steady romantic relationship ($p = .70$).

Educational track

Educational track is a proxy for adolescent socioeconomic status as it is a strong predictor of adolescents' future socioeconomic status (Research Centre for Education and Labour Market, 2009). In the Netherlands, four types of secondary school exist, ranging from pre-vocational training to higher academic education. Although adolescents' enrolment in a specific educational track is influenced by factors such as parents' socioeconomic status (Herweijer, 2010) and access to social capital (Eriksson, Dahlgren, Janlert, Weinshall, & Emmelin, 2010), adolescents are placed in a specific educational track primarily based on their achievement at primary school (expressed both in the results of a battery of tests that are used nationwide in most schools and in the advice of the teacher). As many secondary schools are specialized in teaching either vocational or academic education, the two vocational tracks were combined and the two academic tracks were combined for the purpose of the present analyses.

Analytical strategy

First, a preliminary analysis was conducted to explore adolescent conceptions of adulthood. The main goal of this analysis was to examine to what extent adolescents mention adult-like behaviors such as substance use and sexual activity when they respond to the open question 'Please indicate three things you typically associate with adulthood'. As previous studies (Arnett, 2001; Nelson & Barry, 2005; Westberg, 2004) paid only limited attention to this specific association (e.g., although sexual activity is a distinct category in Arnett's (2001) measure of conceptions of adulthood, substance use is not included in this measure), we conducted this qualitative analysis. We classified adolescent answers using standard qualitative methods (a full description of the procedure is available from the first author) and presented the results by gender, age and educational track.

Next, we present the descriptive statistics of our quantitative data on adolescent substance use and sexual activity, adolescent expectations of the timing of social role transitions, and the extent to which adolescents perceived substance use and sexual activity as adult behaviors. Statistics were presented separately for gender, age, and educational track. Differences between subgroups were calculated by means of chi square tests and ANOVAs in SPSS.

Finally, we performed a number of regression analyses by means of structural equation modeling in Mplus version 6.11 (Muthén & Muthén, 1998-2010). First, we tested the direct association between educational track and adolescent substance use and sexual activity.

Second, a mediation model was tested, investigating whether adolescent transition intentions and conceptions of substance use and sexual intercourse as adult behaviors mediated the relationship between educational track and adolescent substance use and sexual activity. Mediation was tested by means of the Delta method (Bollen, 1989; MacKinnon, 2008), which is the default way of mediation testing in Mplus. This method calculates the significance and relevance of indirect (mediation) paths. A mediation effect was concluded to be present when the direct path from educational track to substance use and sexual activity became insignificant after the addition of the mediators to the model.

All analyses were corrected for cluster effects of pupils within the same school (primary sampling unit) by using the 'cluster is' option in Mplus. Also, they were controlled for gender (boy versus girl), age (ranging from 13 to 17), and the way respondents participated in the study (i.e. by filling in the Internet questionnaire or by answering the questions over the phone). The range from missing values per variable ranged from 0% to 12.1% (How old do you think you will be when you will have a steady relationship?). In the analyses, missing values were dealt with by using the full information maximum likelihood estimator.

RESULTS

Preliminary analyses

Table 3.1 summarizes the results of our qualitative analysis, i.e., the answers adolescents gave to the open question 'Please indicate three things you typically associate with adulthood'. 6.1% of the respondents did not answer this question. This was more often the case among vocational (7.9%) compared to academic (4.6%) students ($p = .005$). Nine codes were mentioned by less than 3% and were therefore not included in the table. They were: having a stable self-concept (2.8%), being capable of running own household (2.8%), finishing education (2.3%), having a long-term orientation (2.5%), being socially and/or politically involved (2.1%), being able to control one's own emotions (.8%), negative associations (i.e., boring, stress; .8%), having authority (.7%), and having an active/busy life (.7%).

The most prevalent answers (> 28%) adolescents gave to our open-ended question were individualistic criteria (i.e., becoming an independent decision-maker; taking care of yourself; being responsible and trustworthy) and norm compliance (e.g., stick to the rules, be a role model for young people, have good manners). The next most prevalent codes included being employed full-time and developing consideration for others (e.g., having

Table 3.1 Results of the qualitative analysis, stratified by age, gender, and educational track ($N = 1,568$, %)
 'Please indicate three things you typically associate with adulthood'

	Total	Gender		Age ¹			Educational track			
		Boys	Girls	13	14	15	16	17	Vocational	Academic
N	1,568	694	874	365	427	371	300	105	698	870
Individualism										
Become independent decision-maker	31.3	23.1	37.9**	26.0	27.9	34.2	35.0	42.9**	26.8	34.9**
Take care of yourself	30.8	22.6	37.3**	23.6	26.2	35.6	36.0	42.9**	27.4	33.6*
Being responsible and trustworthy	34.3	31.7	36.4†	25.2	30.2	36.9	44.0	45.7**	25.9	41.0**
Norm compliance										
Compliance with social norms	28.3	32.1	25.3*	29.0	30.4	26.7	27.7	24.8	31.9	25.4*
Biological / physical transitions										
Physical changes	7.1	8.8	5.7†	8.2	9.6	4.9	6.0	3.8*	6.7	7.4
Legal/chronological transitions										
Being legally allowed to do more things	11.4	14.8	8.6**	12.6	12.9	11.1	8.3	10.5	10.3	12.2
Role transitions										
Leaving the parental home	7.2	7.8	6.8	10.7	7.0	6.5	3.3	8.8*	6.4	7.8
Being financially independent	10.8	10.5	11.0	7.9	12.6	11.1	10.0	14.3	12.9	9.1*
Employed full-time	18.6	20.5	17.2	21.4	20.4	18.3	15.3	12.4	21.2	16.6†
Getting married / living together with partner	4.6	5.2	4.1	5.5	4.9	3.3	1.0	4.3	4.8	
Having children	3.9	3.9	3.9	5.8	5.4	3.2	1.7	0.0*	4.2	3.7
Other										
Developing consideration for others	20.8	19.6	21.7	17.3	20.4	19.7	24.7	27.6†	22.6	19.3
Hedonism	6.8	7.9	5.9	8.2	8.2	6.5	4.7	3.8	8.3	5.6†
Being treated as an adult by others	3.2	3.9	2.6	3.0	4.0	3.0	2.7	2.9	3.3	3.1
Being wise / having much knowledge	10.1	8.4	11.6†	8.5	6.8	11.3	15.0	11.4*	7.9	12.0*
Being able to communicate better and express your own opinion	6.6	7.1	6.2	4.7	4.9	7.8	9.3	7.6†	6.9	6.3

¹Values are statistically different from each other at $p < .001$ (**), $p < .01$ (*), $p < .05$ (†) (separately for gender, age and educational track).

respect towards other people, being helpful, taking care of other people). Substance use and sexual activity, sometimes mentioned in the context of going out at night, were mentioned by 7% of the respondents. This category was labeled as hedonism. Vocational students were more likely to mention hedonism as a marker for adulthood than academic students. Further, academic students were more likely to mention individualistic norms and wisdom as markers for adulthood, while vocational students more often mentioned norm compliance, full-time employment, and financial independence.

Descriptive statistics

The prevalence rates of daily smoking, recent binge drinking, recent cannabis use and sexual activity among the adolescents in our sample are presented in Table 3.2. The prevalence of all four behaviors increased with age. Boys more often indicated using or having used substances compared to girls, while girls more often had experience with sexual intercourse. Finally, vocational students engaged significantly more often in smoking tobacco, binge drinking, and sexual intercourse. There was no significant educational difference with respect to lifetime cannabis use, although the prevalence was slightly higher among vocational students.

Table 3.2 also presents the mean age at which adolescents expected to experience social role transitions. Girls generally expected to experience major life transitions about one or two years earlier than boys. There were no significant differences across age groups, but there were clear group differences with respect to educational track. Vocational students expected all major life transitions earlier compared to academic students. There was especially a large difference in their expectations of when they would have their first full-time job (21.7 years old vs. 24.0 years old).

Finally, Table 3.2 presents the percentage of adolescents who indicated to perceive substance use and sexual activity as adult behaviors. Adolescents especially perceived sexual intercourse (68%) and drinking alcohol (46%) as adult behaviors. Although boys were more likely to perceive all four behaviors as adult behaviors, compared to girls, this gender difference was only significant with respect to drinking alcohol and smoking. Moreover, younger adolescents perceived all behaviors more often as adult behaviors compared to older adolescents, with the exception of smoking tobacco. Finally, and most importantly, vocational students perceived all behaviors more often as adult behaviors compared to academic students.

Table 3.2 Prevalence of adolescent risk behavior, transition intentions, and perceptions of risk behaviors as adult behaviors, stratified by age, gender, and educational track (N = 1,568)

N		Total		Gender ¹		Age ¹			Educational track ¹	
		Boys	Girls	13	14	15	16	17	Vocational	Academic
Adolescent risk behavior ²										
Daily tobacco smoking	6.8	8.1	5.8†	1.1	4.4	8.9	11.6	15.2**	10.5	3.9**
Binge drinking in previous month	24.5	26.7	22.7†	6.0	11.7	28.6	51.3	43.8**	27.8	21.9*
Cannabis use in previous month	3.1	4.3	2.2**	0.8	1.4	4.0	6.0	6.7**	3.4	2.9
Sexual activity	14.5	12.2	16.4†	2.7	4.7	16.4	29.0	47.6**	17.9	11.8**
Transition expectations: Expected age at [...] ³										
Having a full-time job	22.9	23.0	23.0	22.7	22.7	23.1	23.3	23.4	21.7	24.0**
Being financially independent	22.3	22.7	22.0*	22.4	22.2	22.1	22.5	22.5	21.9	22.6**
Having a steady (romantic) relationship	21.5	22.2	21.0*	21.9	21.6	21.3	21.1	21.1	21.1	21.8**
Being able to take care financially for one's own family	27.1	27.7	26.6*	27.3	27.3	26.8	27.0	26.6	26.5	27.5**
Getting married / living together with a partner	26.9	27.9	26.1*	27.1	27.0	26.8	26.8	26.4	26.5	27.2**
Having a first child	28.7	29.8	27.8*	28.8	28.8	28.4	28.7	28.5	28.0	29.2**
Perception of [...] as adult behaviors ⁴										
Smoking tobacco	11.0	11.6	10.4†	11.4	13.2	10.3	9.7	6.7	13.6	8.8*
Drinking alcohol	46.3	51.4	42.2*	50.4	49.4	44.7	42.1	37.1†	48.6	44.4†
Using cannabis/ soft drugs	9.6	10.6	8.8	13.4	9.1	8.4	8.4	6.7†	12.2	7.6**
Having sexual intercourse	68.2	71.0	65.9	68.9	72.5	67.5	64.5	61.0†	69.1	67.4**

¹Values are statistically different from each other at $p < .001$ (**), $p < .01$ (*), $p < .05$ (†) (separately for gender, age and educational track).

²Percentage of adolescents who indicated engagement in these behaviors.

³Results indicate the mean age across subgroups.

⁴Percentage of adolescents who considered risk behaviors to be adult behaviors (yes, a bit/yes, absolutely).

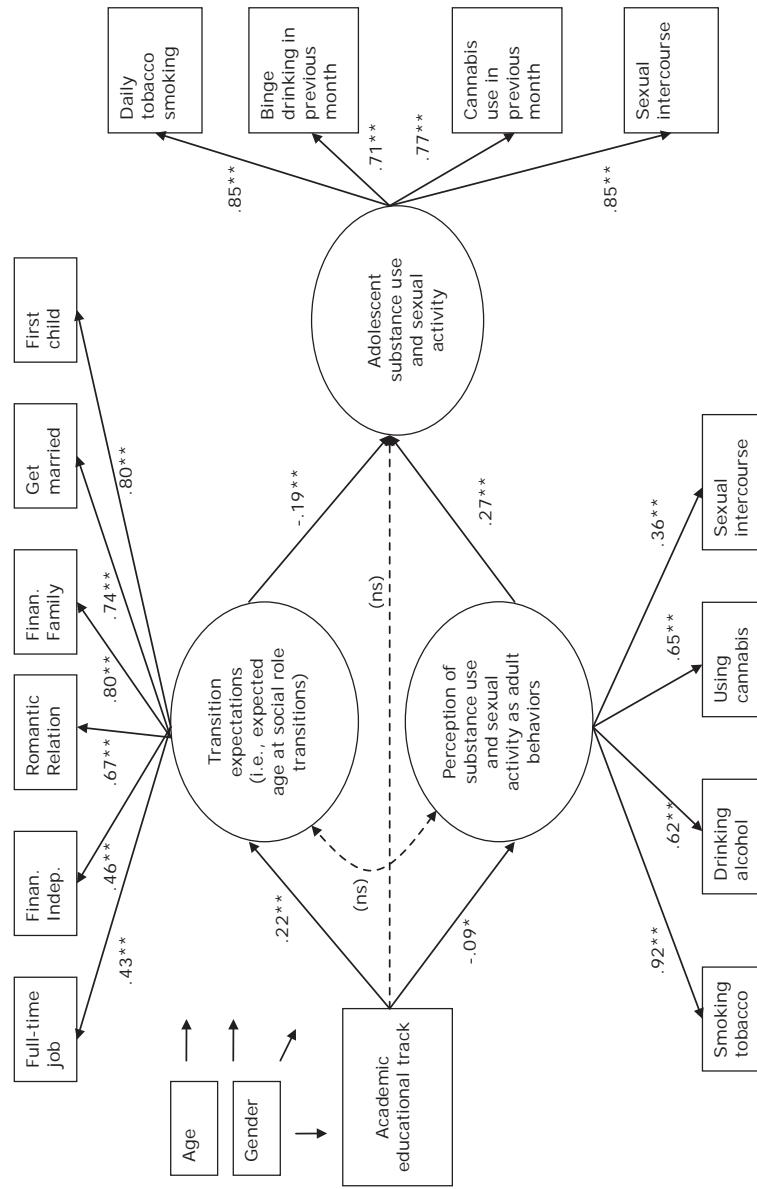


Figure 3.1 Mediation model. Model fit statistics: $\chi^2(115) = 366.21, p = .00, CFI = .92, TLI = .90, RMSEA = .04$. ** $p < .001$; * $p < .01$.

Full names of indicators of the factor 'transition intentions': Full-time job = having a full-time job; Finan. indep. = being financially independent; Romantic relation = having a steady romantic relationship; Finan. family = being able to take care financially for one's own family; Get married = getting married or living together with a partner; First child = having a first child. For readability reasons, correlations between items and residual error terms were not presented. They are available from the authors. For the factor 'perception of substance use and sexual activity as adult behaviors', the factor loading of sexual intercourse was considerably lower than that of the three types of substance use. Therefore, we also tested the model without this indicator and without sexual intercourse as an outcome. This model yielded comparable results (data not presented).

The mediation model

Before testing the hypothesized mediation effects, the direct association between educational track and adolescent substance use and sexual activity (controlled for age, gender, and the way respondents participated in the study) was tested. This model ($\chi^2(22) = 91.64, p = .00, CFI = .91, TLI = .87, RMSEA = .05$) showed a direct, negative association between educational track and adolescent substance use and sexual activity ($\beta = -.13, p < .001$).

Next, the mediation model (see Figure 3.1) was tested. This model fitted the data well: $\chi^2(115) = 366.21, p = .00, CFI = .92, TLI = .90, RMSEA = .04$. The results confirm that vocational students expected to experience major life transitions earlier in life, and that they more often perceived substance use and sexual intercourse as adult behaviors compared to academic students. Further, both factors were found to predict adolescent engagement in substance use and sexual activity. Tests of indirect effects showed that both transition intentions ($\beta = -.04, p < .001$) and the perception of substance use and sexual intercourse as adult behaviors ($\beta = -.02, p < .01$) mediated the association between educational track and adolescent substance use and sexual activity. The direct association between educational track and adolescent substance use and sexual activity disappeared ($\beta = -.06, p = .08$) in this model. In total, our model explained 43% of the variance in adolescent substance use and sexual activity.

DISCUSSION

The aim of this study was to investigate whether adolescent conceptions and expectations of adulthood mediated the association between educational track and adolescent substance use and sexual activity. The preliminary, qualitative analyses showed that vocational and academic students had different conceptions of adulthood. Vocational students were not only more likely to mention social role transitions as markers of adulthood, but they also perceived substance use and sexual activity more often as adult behaviors, compared to academic students. Our quantitative analysis confirmed the latter finding. Further, it showed that vocational students expected social role transitions, such as getting married and having children, earlier in life compared to academic students. Both the perception of substance use and sexual activity as adult behaviors and expectations of the timing of social role transitions were positively related to adolescent substance use and sexual activity. Consequently, both factors mediated the association between educational track and adolescent substance use and sexual activity.

The categories resulting from our qualitative analysis were largely consistent with those of Arnett's (2001) quantitative measure of conceptions of adulthood. However, our findings added that a small but relevant proportion of adolescents associated adulthood with overt, adult-like behaviors such as substance use and sexual intercourse. Vocational students were more likely to report this than academic students. This difference may be explained by the fact that vocational students have fewer educational resources to acquire status among peers and are more oriented towards overt adult-like behaviors to obtain status. Vocational students' belief that substance use and sexual activity are mature behaviors may be confirmed by the fact that they more often have older peers in their direct surroundings (i.e., at school) who go out at night, use substances, and are sexually active, compared to academic students (Van Dorsselaer et al., 2010). This perception may consequently trigger younger adolescents' engagement in these behaviors as older, popular peers function as a role model for them (Moffitt, 1993; 2006).

Our finding that vocational students were more likely to mention traditional markers of adulthood, while academic students were more likely to mention individualistic markers, can be explained by Donoghue and Stein's (2007) notion that adolescents tend to attach value to those markers of adulthood that they think they have already mastered, or will master in the near future, so that they strengthen their own status as a mature individual. Further, the qualitative analyses also showed that vocational students more often mentioned norm compliance as a marker for adulthood, compared to academic students. Potentially, this finding may reflect the fact that vocational students are being prepared for jobs in which the boundaries for creativity and initiative-taking are relatively small. In contrast, academic students are more likely to get an executive job which demands innovative thinking and personal initiative-taking to a higher extent. Consequently, vocational students may perceive that compliance with social norms results in stability and safety, while academic students may learn that one has to be creative and original, and should sometimes question or go against accepted norms, to become a successful adult.

Our finding that vocational students expected to experience social role transitions earlier in life than academic students is consistent with the historical fact that vocational students have a shorter youth and experience social role transitions earlier in life than academic students (Beets et al., 2001; Berzin & De Marco, 2010; Gillis, 1981; Raymore et al., 2001; Scherger, 2009). Our findings revealed that vocational students, from age 13 onwards, already have different expectations about the timing of social role transitions, compared to their peers in academic tracks. The differences were generally about one year, except for

'having a full-time job', which vocational students expected 2.3 years earlier than academic students. Based on the actual age that vocational and academic students experience social role transitions (e.g., Beets et al., 2001), the differences in transition expectations were hypothesized to be larger. The relatively small group differences in our data may be attributable to the fact that it is hard for adolescents to estimate their age at future transitions or events they are not (yet) consciously thinking about in their current everyday life.

Transition expectations mediated the association between educational track and adolescent substance use and sexual activity. This can be explained by theories of human behavior scaffolded by a life history framework (Roff, 1992; Stearns, 1992). According to these theories, individuals who expect a higher pace of life (in this instance, vocational students) are more likely to prioritize short-term goals, including fun and direct satisfaction, while individuals expecting a slower pace of life (in this instance, academic students) are more likely to prioritize the attainment of long-term goals (McDade et al., 2011). Our findings may thus reflect the fact that vocational students are more likely to be present-time oriented and adopt a fun morality, while academic students are more focused on attaining long-term goals.

Study strengths and limitations

The present study is one of the first studies trying to explain the association between educational track and adolescent substance use and sexual activity by looking at factors reflecting adolescents' unique social context and development. Whereas previous studies were limited to either *describing* this association without explaining it, or explaining it by pointing at elevated social emotional problems among vocational students (Schrijvers & Schuit, 2010), the present study was able to explain educational differences in substance use and sexual activity by pointing at factors related to adolescents' normative development, thereby using a life course perspective. This was an important gap in the literature.

Our findings must however be interpreted with knowledge of some limitations. First, our data are based on self-report. We chose this method as it outweighed the limitations associated with alternative methodologies for simultaneously collecting large amounts of data. By stressing the anonymity of the study, including the fact that neither parents nor teachers would find out about respondents' individual answers, a bias due to self-reporting was limited (Brener, Billy, & Grady, 2003).

A second limitation is that our data are cross-sectional, which impedes us from making any causal inferences. Mediation models assume a specific temporal sequence and

presume that there are no unaccounted confounders and that the model is correctly specified (MacKinnon, 2008; Muthén, submitted for publication). Although our model specification has a strong theoretical basis, future research may examine whether our findings can be replicated in a longitudinal design. This type of study may provide more insight in the potential causal nature of the paths that were identified in the present study.

Third, although the large dataset was an advantage for our quantitative analyses, it was a limitation with respect to our qualitative analyses. Due to the large sample, it was not possible to ask follow-up questions or further interview the respondents of the study in order to get more insight into their conceptions of adulthood.

A final limitation of this study was that our sample is not fully representative of Dutch youth aged 13–17. Adolescents in our 2010 sample were higher educated, more often female, and engaged less often in substance use and sexual activity compared to the nationally representative sample from 2009. When interpreting our findings, it is thus important to note that our results are conservative in estimates of adolescent substance use and sexual activity.

Implications

The current study lends support to the importance of examining adolescents' expectations and conceptions of adulthood with respect to their engagement in adult-like behaviors such as substance use and sexual activity. Not only do vocational students expect social role transitions at an earlier age and are they more likely to perceive substance use and sexual activity as adult behavior compared to academic students, these two factors also explain the higher rates in substance use and sexual activity in vocational students. These findings suggest that research in the field of adolescent risk behavior may benefit from a life course perspective. Also, they suggest that adolescent engagement in substance use and sexual behaviors may be interpreted as normative behavior that occurs in the context of young people's transition to adulthood.

This study's findings may have implications for emerging adulthood theory. According to this theory, emerging adulthood is a phase of the life span between adolescence and full-fledged adulthood (Arnett, 2000; 2007). It has generally been applied to individuals in their twenties in developed countries who are becoming more independent and explore various life possibilities. Having left the dependency of childhood, and having not yet entered the enduring responsibilities that are normative in adulthood, emerging adults often explore a variety of possible life directions in love, work, and worldviews (Arnett, 2000). Our findings

suggest that the earlier transition to adulthood for vocational students may lead them to experience the developmental stage of emerging adulthood at an earlier age. Future mixed-method research may investigate the relation between vocational track, emerging adulthood theory, and adolescent engagement in substance use and sexual activity in more detail.

"[My parents] do not say: "You are not allowed to [smoke, drink, do drugs]." They know: if kids want to do it, they will do it anyway. I am free to do it. They give me a lot of information about what drugs, alcohol and smoking do to you. Not to disapprove, but... to reach your own conclusion that it is bad for you."

*Dutch girl interviewed by
Amy Schalet (Schalet, 2011, pp. 148-149).*

Part II

The role of parents in adolescent substance use and sexual activity

Chapter 4

Trends in alcohol-specific parenting practices and adolescent alcohol use between 2007 and 2011 in the Netherlands

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ABSTRACT

Background: Following the recently increased attention of academic research and policy to the harmful effects of alcohol use among adolescents and the implementation of prevention programs aimed at reducing adolescent alcohol use, this study examined whether alcohol-specific parenting practices have become stricter and whether adolescent alcohol use has declined between 2007 and 2011 in the Netherlands. **Method:** Data were derived from the Dutch National School Survey on Substance Use in 2007 and 2011, and the Health Behaviour in School-aged Children study in 2009, which were three nationally representative cross-sectional studies of 12- to 16-year-old adolescents. Data were obtained using self-report questionnaires in the classroom (adolescents, $M_{age} = 13.8$ years, $SD = .04$) and at home (parents). **Results:** Between 2007 and 2011, Dutch parents increasingly adopted strict alcohol-specific practices, except for parents of 16-year-old adolescents. Furthermore, adolescent reports of lifetime and last month alcohol use decreased, except for 16-year-olds. The quantity of alcohol consumed by adolescents did not change between 2007 and 2011. Alcohol-specific parenting practices were associated with lower adolescent alcohol use. These associations were generally stable over time. **Conclusion:** Our findings are consistent with the recently increased awareness in research, policy and the media of the harmful effects of alcohol on young people. Specifically, they are consistent with the focus of recent prevention efforts aimed at parents to postpone alcohol use of their child at least until the age of 16. Future prevention programs should also target older age groups (i.e., age 16 and older) and address the quantity of alcohol consumed by adolescents when they drink.

INTRODUCTION

Adolescence is a peak period for the initiation and use of substances, and many adolescents experiment with or consume alcohol regularly. Although some experimentation is normative (Engels & Ter Bogt, 2001), prevention of early and excessive alcohol use among adolescents is important, particularly because it is associated with adverse psychological, social and physical health consequences, including brain damage, academic failure, violence, injuries, and unprotected sexual intercourse (Gmel, Rehm, & Kuntsche, 2003; Perkins, 2002).

Parents are important socialization agents when it comes to whether and how adolescents start or develop their alcohol use. Besides general parenting practices, such as providing support and control (for a review see Ryan, Jorm, & Lubman, 2010), alcohol-specific parenting practices have shown to be important deterrents of adolescents' drinking behaviors. Specifically, parental attitudes (i.e., disapproval of alcohol use among adolescents) have been related to later initiation of adolescent alcohol use (Koning, Engels, Verduren, & Vollebergh, 2010) and lower levels of adolescent alcohol use (Bahr, Hoffmann & Yang, 2005; Koning et al., 2010; 2012; Ryan et al., 2010). In addition, the quality of alcohol-specific communication (i.e., conversations about alcohol between parents and children in which parents can express their thoughts, rules and concerns about alcohol to their children) has been found to correlate with reduced prevalence and intensity of adolescent alcohol use (Miller-Day & Kam, 2010; Spijkerman, van den Eijnden, & Huiberts, 2008; Van der Vorst, Burk & Engels, 2010). Finally, alcohol-specific rules, which entail that parents actively impose rules on their children regarding their alcohol use inside and outside the house, have been found to be one of the strongest parenting practices associated with later initiation (Van der Vorst, Engels, Deković, Meeus, & Vermulst, 2007) and a lower intensity of adolescent alcohol use (Mares, Lichtwarck-Anschoff, Burk, van der Vorst, & Engels, 2012).

Until 2005/06, the Netherlands was among the European countries with the highest percentage of alcohol-using adolescents (Currie et al., 2008; Hibell et al., 2009). In the 1990s and early 2000s, adolescent alcohol use increased substantially, especially among younger age groups (12–14 years old) and girls (Geels et al., 2011; Monshouwer, 2008; Poelen, Scholte, Engels, Boomsma, & Willemse, 2005). At that time, alcohol-specific parenting practices were, overall, lenient among many Dutch parents (Monshouwer, 2008). These lenient parental attitudes have partly been explained by the fact that the generation of parents whose children were adolescents in 2003 was among the first generations raised during a period of growing alcohol consumption and a relatively liberal (national) alcohol policy (Van Laar, Cruts, Verduren, & van Ooyen, 2005).

Since 2005/06, a socio-cultural change seems to have taken place with respect to adult attitudes towards adolescent alcohol use. As scientific knowledge of the potentially hazardous effects of early alcohol use has accumulated (i.e., early alcohol use has been found to be associated with abnormal brain functioning and development, and related learning, retention, and attention difficulties; Hiller-Sturmöhfel & Swartzwelder, 2004; Tapert, Granholm, Leedy, & Brown, 2002), concerns were raised about the high rates of alcohol use among Dutch adolescents. As a result, the reduction of adolescent alcohol use became a priority in Dutch social policy (Klink, Rouvoet, & Ter Horst, 2007). A number of mass media campaigns and prevention programs aimed at reducing alcohol use among adolescents was developed and implemented. Since the scientific literature showed a strong link between alcohol-specific parenting and adolescent alcohol use (Van der Vorst, 2007), and since family interventions were shown to be effective in delaying adolescent drinking (Koning, van den Eijnden, Engels, Verdurnen, & Vollebergh, 2011; Koutakis, Stattin, & Kerr, 2008; see review: Smit, Verdurnen, Monshouwer, & Smit, 2008), these campaigns and programs targeted specifically parents, with an aim to influence alcohol-specific parenting practices.

In the first few years (2006-2009), mass media campaigns especially aimed to raise awareness among parents about the harms of early drinking and the importance of strict rule setting. In subsequent years (2009-2012), messages about more complex alcohol-specific parenting practices, including supportive parent-child communication skills around alcohol, were added to those on strict rule setting. Parents were advised to postpone alcohol use of their child as long as possible, at least until the age of 16, the legal age limit for the purchase of alcohol at that time. These prevention messages reached many parents, as they were disseminated via national and regional media, including television, radio, print media, and school prevention programs (Dienst Publiek en Communicatie, 2007-2011). Since combined prevention efforts (in multiple settings) have been found to be effective in reducing adolescent substance use (Carson et al., 2011; Foxcroft & Tsirtsadze, 2011; Koning et al., 2011), it was expected that the campaigns and programs would be successful in increasing alcohol-specific parenting and decreasing adolescent alcohol use.

In the present study, we examined changes over time in alcohol-specific parenting practices and adolescent drinking behaviors between 2007 and 2011 in the Netherlands. Specifically, we aimed to investigate whether there were any changes in adolescent alcohol use and parenting practices as they relate to the contemporaneous mass media campaigns. We further tested whether these changes differed across demographic subgroups, such as gender, age, and educational track. We aimed to answer the following research questions:

1. Have alcohol-specific parenting practices changed between 2007 and 2011 and are these changes similar for parents of adolescents from different socio-demographic groups (adolescent gender, age, educational track)?
2. Have adolescent drinking behaviors changed between 2007 and 2011 and are the changes similar for different socio-demographic groups (adolescent gender, age, educational track)?
3. Are alcohol-specific parenting practices associated with adolescent drinking behaviors and are the associations similar for different socio-demographic groups (adolescent gender, age, educational track)?
4. Are the associations between alcohol-specific parenting practices and adolescent alcohol use stable over time?

4

We expected that, compared to 2007, parents in 2009 and 2011 would be more likely to perceive alcohol use as harmful for adolescents, report high-quality alcohol-specific communication with their child, and set rules with respect to their child's alcohol use. We also expected a decrease in adolescent alcohol use during this period. As prevention programs after 2006 targeted especially (parents of) adolescents under the age of 16, it was expected that parents of 12- to 15-year-olds would become stricter and that alcohol use would decrease more in this age group, compared to 16-year-olds. We did not have a hypothesis on the moderating effect of gender or educational track. With respect to the association between alcohol-specific parenting practices and adolescent drinking behaviors, we expected a negative association, which was equally strong across adolescent demographic groups and stable across survey years.

METHOD

Study procedures

Data were derived from the Dutch National School Survey on Substance Use in 2007 and 2011 and from the Health Behaviour in School-aged Children study in 2009. The sampling and survey procedures for the different surveys were identical and the present examination had a repeated cross-sectional design. The present study included data from adolescents aged 12 to 16 years old attending the first four classes of general secondary education and one of their parents.

The samples were obtained using a two-stage random sampling procedure. First, schools were stratified and drawn proportionally according to the level of urbanization. Second, within

each school two to five classes (depending on school size) were selected randomly from a list of all classes provided by each participating school. Within the selected classes, all students were drawn as a single cluster. The response rate of schools was 57% (2007), 48% (2009) and 48% (2011). The reasons for non-response were mainly related to (being approached for) participation in other research.

Research assistants administered self-complete questionnaires in the classroom (lasting usually 50 minutes) in October/ November of the corresponding year. Anonymity of the respondents was explained when introducing the questionnaire. Collecting all questionnaires in one envelope and sealing the envelope in the presence of the respondents further emphasized anonymity. Adolescent non-response was rare (7%), mainly because of illness.

Parental data were also collected using paper questionnaires in October/ November of the corresponding year. During the data-collection at the schools, adolescents were given a sealed envelope with the 'parent-questionnaire' and an accompanying letter. The students were instructed to hand over the envelope to one of their parents the same afternoon. Three weeks later, a written reminder was sent. The adolescent and parent questionnaires were linked by means of a bar code. To prevent matching errors, we further checked whether gender and birth date of the adolescent on the parent and adolescent questionnaire corresponded. Incentives were used to promote parent response (e.g., ten 100 euro's vouchers were raffled in 2011), resulting in response rates of 55% (2007), 52% (2009) and 49% (2011).

Study sample

In total, we received 3,615 (2007), 2,953 (2009) and 3,229 (2011) questionnaires from both adolescents and their parents. Demographics of the total sample of adolescents and of those with a responding parent are presented in Table 4.1. Compared to non-responding parents, parents who returned the questionnaire had adolescents who were younger (mean age 13.7 versus 14.0, $ts = -8.53$ to -4.59 , $ps < .001$); more often in academic tracks, $\chi^2 = 51.1$ – 238.0 , $ps < .01$, less likely to have an ethnic minority background, $\chi^2 = 251.7$ – 360.6 , $ps < .001$, and more likely to live with both biological parents, $\chi^2 = 41.2$ – 80.3 , $ps < .001$. No differences were found with respect to adolescent gender. Finally, adolescent alcohol use was generally lower among adolescents of responding parents, compared to non-responding parents. With respect to the lifetime and last month prevalence of alcohol use, this effect emerged in 2007 and 2011, $\chi^2 = 16.3$ – 68.6 , $ps < .01$, but not in 2009. For the number of drinks during weekends, this effect emerged in all three survey years, $ts = -6.31$ to -4.51 , $ps < .001$.

Table 4.1 Basic characteristics of the adolescent and parent samples (weighted %)

Sample Survey year	All participating adolescents						Adolescents with parent report ²											
	2007			2009			2011			2007			2009			2011		
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Total	6,524	100.0	5,626	100.0	6,624	100.0	3,615	100.0	2,953	100.0	3,229	100.0						
Gender																		
Boy	3,376	51.8	2,866	50.9	3,433	51.8	1,895	52.4	1,510	51.1	1,681	52.1						
Educational track																		
Academic	2,816	43.2	2,649	47.1	3,029	45.9	1,635	45.2	1,533	51.9	1,595	49.5						
Vocational	3,708	56.8	2,977	52.9	3,572	54.1	1,980	54.8	1,420	48.1	1,629	50.5						
Age																		
12	1,041	16.0	992	17.6	1,153	17.4	609	16.8	556	18.8	598	18.5						
13	1,681	25.8	1,414	25.1	1,662	25.1	952	26.3	751	25.4	816	25.3						
14	1,579	24.2	1,280	22.8	1,594	24.1	869	24.0	666	22.6	784	24.3						
15	1,501	23.0	1,354	24.1	1,498	22.6	839	23.2	722	24.5	725	22.4						
16	722	11.1	586	10.4	717	10.8	347	9.6	258	8.7	306	9.5						
Ethnicity																		
Minority background	799	13.1	870	16.2	864	13.9	250	7.4	256	9.0	213	7.0						
Family structure																		
Incomplete family ¹	1,305	20.2	1,137	20.2	1,623	24.6	604	16.8	520	17.6	647	20.1						
Lifetime-prevalence alcohol																		
Last month alcohol use	4,929	76.1	3,655	65.7	4,253	64.4	2,704	75.3	1,991	68.1	2,037	63.2						
Number of glasses during weekends (M, SE)																		
	3.39	0.24	2.26	0.20	2.81	0.23	2.86	0.25	1.85	0.22	2.41	0.23						

¹ Not living with both biological parents.² All analyses were based on this sample.

To control for the selective response, and to make it possible to generalize the results to the Dutch school going population aged 12 to 16, a weighting procedure was applied to all three datasets. As statistics on parental demographics were not available, both adolescent and parent data were weighted using adolescent demographics. Post-stratification weights were calculated by comparing the joint sample distributions and known population distributions of the child's school type, grade, gender, and level of urbanization of the corresponding year (national statistics were obtained from Statistics Netherlands, CBS).

Measures

In the three study waves, identical questions on alcohol-specific parenting were posed to parents, and identical questions on alcohol use and background characteristics were posed to adolescents.

Alcohol-specific parenting: Parent report

Perceived harmfulness of drinking. The degree of perceived harm of alcohol use was measured by a scale representing the mean of three items: "How harmful (physically or in other ways) do you think it is for adolescents under 16 (the legal age of drinking in the Netherlands) to drink 1) one or two glasses every weekend; 2) one or two glasses every day; and 3) five or more glasses every weekend". Response categories ranged from 1 = *not harmful* to 4 = *very harmful*. Cronbach's alphas were .75, .67, and .71 for 2007, 2009, and 2011, respectively.

Perceived quality of alcohol-specific communication. Parents were asked about the quality of communication about alcohol with their child using three items: 1) "My child and I talk easily about our opinions regarding drinking"; 2) "When my child and I talk about drinking, we both feel comfortable"; 3) "When my child and I talk about drinking, he or she feels taken seriously / understood" (Spijkerman et al. 2008). Response categories ranged from 1 = *completely untrue* to 5 = *completely true*. A high mean score reflected a high perceived quality of parent–adolescent communication about alcohol. Cronbach's alphas were .84, .92, and .91 for 2007, 2009, and 2011, respectively.

Alcohol-specific rules. Parent reports on parental rule-setting regarding alcohol use of the adolescent were measured using four items, two of them referring to alcohol use while parents or supervisors are present and the other two referring to alcohol use while parents or supervisors are absent. The items were: "Would you allow/Is your child allowed to drink: 1) one glass of alcohol at home with parent(s); 2) several glasses at home with parent(s); 3)

alcohol at a party with friends; and 4) alcohol during weekends" (based on the scale developed by Van der Vorst, Engels, Meeus, Deković, & van Leeuwe, 2005). Adolescent alcohol use during weekends typically occurs on a Friday or Saturday night in a bar or pub with friends. Response categories ranged from 1 = *definitely not* to 5 = *definitely*. Responses were reverse scored so that a higher mean on this scale reflected more restrictive alcohol-specific rules. Cronbach's alphas were .88, .91, and .92 for 2007, 2009, and 2011, respectively.

Adolescent alcohol use: Adolescent report

Lifetime prevalence of adolescent alcohol use was measured by asking adolescents how often they had drunk alcohol in their lifetime. Response categories ranged from 0 to 40 or more times on a 14-point scale (O'Malley, Bachman & Johnston, 1983). In order to establish lifetime prevalence the answers were re-coded into 0 and 1 (answers 1–40 or more).

Last month prevalence of adolescent alcohol use was measured by asking adolescents how often they had drunk alcohol during the last four weeks using the aforementioned 14-point scale. Answers were re-coded likewise into 0 and 1 (answers 1–40 or more).

Number of glasses consumed during a weekend (quantity of drinking) was measured using a Quantity-Frequency Scale (Knibbe, Oostveen, & Van de Goor, 1991; Koning et al., 2010). This scale measures the average number of alcoholic drinks consumed during a weekend. Quantity-frequency was computed by multiplying the number of drinking days during the weekend (Friday to Sunday) and the number of usual drinks on a weekend day. We chose to measure quantity frequency during a weekend, as adolescents generally drink during the weekends, rather than on weekdays.

Covariates

All analyses controlled for gender (boy vs. girl), age (ranging from 12 to 16), ethnicity (ethnic minority vs. native Dutch background), family structure (living with both biological parents or not) and educational track (vocational vs. academic).

Strategy for analyses

The analyses considered two characteristics of the data. 1) Students from the same class were drawn as a single cluster and 2) weights were applied to obtain a representative sample of Dutch secondary school students. In order to obtain correct 95% CI and *p*-values for a re-weighted and clustered sample, robust standard errors were obtained using the Huber-

White Sandwich estimation implemented in Stata. All analyses were performed using Statistic software package Stata-V12 (Stata Corp., College Station, TX).

To answer research questions 1 and 2, the weighted (raw) prevalence estimates for alcohol-specific parenting and adolescent alcohol use in 2007, 2009 and 2011 were calculated for the total sample. Multivariate (logistic) regression analyses were performed to test the significance of the time trends. Survey year, the predictor of interest, was included as a dummy variable, using the year 2007 as the reference year. To test for linear trends, we repeated this analysis with time as a continuous variable. To correct for possible differences in the demographic composition across the waves, demographic covariates (gender, age, ethnicity, family structure and educational track) were also included in these analyses.

To test whether the time-trends in both alcohol-specific parenting and adolescent drinking differ across demographic groups (adolescent gender, age and educational track), prevalence estimates for alcohol-specific parenting and adolescent alcohol use were calculated separately for different subgroups. Per subgroup, multivariate (logistic) regression analyses were performed to test the significance of the time trends. In addition, interaction analyses were performed to test whether differences between groups were statistically significant. The interaction term (demographic factor * survey year) was added to the regression analyses.

To investigate the association between alcohol-specific parenting and adolescent drinking (research questions 3 and 4), four multiple (logistic) regression analyses predicting adolescent alcohol use (controlled for demographic factors) were performed. In the first model, time was entered as a dummy variable. In Model 2, alcohol-specific parenting practices were added. In Model 3, interactions between demographic subgroup and alcohol-specific parenting practices were added to Model 2 consecutively. Finally, in Model 4, interactions between survey year and alcohol-specific parenting practices were entered consecutively.

To correct for the large datasets and the large amount of tests we conducted, associations and interaction effects were considered significant if $p < .01$. Interaction effects were interpreted based on post hoc graphical (margin) plots.

RESULTS

Trends in alcohol-specific parenting practices between 2007 and 2011

Table 4.2 presents changes in parental perceptions of the harmfulness of adolescent alcohol use, the quality of alcohol-specific communication, and parental rule setting between 2007

Table 4.2 Trends in alcohol-specific parenting practices between 2007 and 2011 ($N = 3,615$ for 2007, $N = 2,953$ for 2009, $N = 3,229$ for 2011)

Survey year	Perceived harmfulness of drinking ¹				Quality of alcohol-specific communication ²				Alcohol-specific rules ²						
	M^3		Adjusted B^4		M^3		Adjusted B^4		M^3		Adjusted B^4				
	2007	2009	2011	2009	2011	2007	2009	2011	2007	2009	2011	2009	2011		
Total	3.33	3.54	3.47	0.21**	0.15**	4.00	4.29	4.38	0.28**	0.37**	4.25	4.39	4.42	0.12*	0.16**
Gender															
Girls	3.34	3.52	3.46	0.18**	0.11**	4.01	4.32	4.42	0.31**	0.41**	4.28	4.34	4.43	0.07	0.14**
Boys	3.31	3.57	3.49	0.25**	0.18**	4.00	4.26	4.34	0.25**	0.33**	4.21	4.43	4.42	0.15**	0.18**
Age															
12–13	3.42	3.56	3.53	0.14**	0.12**	4.04	4.35	4.46	0.31**	0.43**	4.66	4.73	4.76	0.07*	0.11**
14–15	3.22	3.50	3.39	0.28**	0.18**	3.98	4.25	4.33	0.26**	0.34**	4.10	4.29	4.39	0.18*	0.29**
16	— ¹	— ¹	— ¹	— ¹	— ¹	3.96	4.19	4.21	0.24*	0.23**	3.09	3.18	3.00	-0.03	-0.13
Educational track															
Academic	3.37	3.56	3.51	0.19**	0.13**	4.06	4.35	4.42	0.29**	0.36**	4.27	4.45	4.50	0.11	0.19**
Vocational	3.29	3.52	3.44	0.24**	0.16**	3.96	4.22	4.34	0.27**	0.38**	4.22	4.32	4.34	0.13*	0.14**

¹ Parents were asked about the harmfulness of drinking under the age of 16 (legal drinking age in the Netherlands). Only parents of adolescents under the age of 16 are included in these analyses (scale range: 1–4).

² Scale range: 1–5.

³ M = raw mean.

⁴ B = unstandardized result of multivariate regression analysis adjusted for gender, age, educational level, ethnicity, and family structure (ref. 2007).

p for trend analysis: significant for all parenting practices for all groups ($p < .001$), except for alcohol-specific rules for 16-year-olds ($p = .18$).

To ensure that trend patterns with respect to the parenting scales were not driven by single items, we repeated all analyses with the single items. The trend patterns of the single items were overall identical to the trend patterns of the corresponding scales.

* $p < .01$; ** $p < .001$.

and 2011. For conceptual reasons, perceived harmfulness of adolescent alcohol use under the age of 16 was reported only for parents whose child had not yet reached the age of 16. Besides the raw means across different (adolescent) demographic groups, the results of the regression analyses that controlled for demographic background characteristics are also presented. The *ps* for trend (testing linear trends) are reported in a footnote below the table. They confirm the results of the main analysis.

Perceived harmfulness of adolescent drinking increased among parents in all subgroups. In 2007, parents scored 3.33 on average on the scale (1–4). This increased to 3.54 in 2009 and stabilized at 3.47 in 2011. The increase was not equally strong across adolescent age groups. Among parents of 14- to 15-year-olds, the increase between 2007 and 2009 was stronger compared to parents of 12- to 13-year-olds ($B = .14, p < .001$). There were no other significant interactions.

The perceived quality of alcohol-specific communication also increased among parents in all subgroups. In 2007, parents scored 4.00 on average on the 5-point scale. In 2009, they scored 4.29 and in 2011 4.38. A significant interaction effect between age and survey year was identified. The increase across years was stronger among parents of 12- to 13-year-olds compared to parents of 16-year-olds (2011 vs. 2007; $B = -.19, p = .004$). There were no other significant interactions.

Finally, parent reports of alcohol-specific restrictive rule setting increased from 2007 to 2011. In 2007, parents scored 4.25 on average on the 5-point scale. In 2009, they scored 4.39 and in 2011, they scored 4.42. One exception involved parents of 16-year-olds (compared to adolescents of younger age groups) who did not report more rule-setting over time. Further, when comparing 12- to 13-year-olds with 14- to 15-year-olds, the increase in alcohol-specific rules was stronger among 14- to 15-year-olds (2011 vs. 2007) compared to 12- to 13-year-olds. This resulted in a significant interaction effect (2011 vs. 2007; $B = .18, p < .001$). There were no other significant interactions.

Trends in adolescent alcohol use between 2007 and 2011

Time trends in adolescent lifetime and last month alcohol use are presented in Table 4.3. In 2007, 75.3% of the adolescents reported having ever drunk alcohol. In 2009, this percentage decreased to 68.1% and in 2011, 63.2% of the adolescents reported having ever drunk alcohol. However, lifetime prevalence among 16-year-olds did not decrease, but this did not result in any significant interaction effects.

The prevalence of last month alcohol use also decreased, from 42.1% in 2007 to 32.7% in 2011. These decreases occurred to a similar degree in all subgroups of adolescents, except for the 16-year-olds. Among 16-year-olds, the prevalence of last month alcohol use did not decrease. Accordingly, significant interaction effects of age group (12- to 13-year-olds versus 16-year-olds) and survey year were identified ($OR = 2.35, p = .004$ in 2009; $OR = 3.41, p < .001$ in 2011).

Table 4.3 presents time trends concerning the average number of glasses of alcohol that adolescents reported drinking during a weekend. Overall, in 2007, adolescents reported drinking an average of 2.86 glasses on weekends. In 2009, this number decreased to 1.85. In 2011, however, it increased again to 2.41 glasses per weekend. The trends were similar for boys and girls and for adolescents in different educational tracks. With respect to age group, one significant interaction effect was identified. In 2009, compared to 2007, the decrease in the number of glasses was stronger among 14- to 15-year-olds compared to 12- to 13-year-olds ($B = -1.06, p = .008$).

In an additional analysis, we repeated the trend analyses concerning the average number of glasses consumed on the weekend for drinkers (i.e., adolescents who reported to have drunk alcohol in the past month) only. Overall, drinkers reported consuming an average of 6.58 glasses on weekends in the 2007 survey, 4.89 glasses on weekends in the 2009 survey, and 7.56 glasses on weekends in the 2011 survey. Thus, among drinkers the number of glasses consumed decreased between 2007 and 2009 ($p = .004$), but increased between 2009 and 2011 ($p < .001$). The increase between 2007 and 2011 was not significant ($p = .09$).

Are alcohol-specific parenting practices associated with adolescent alcohol use?

Table 4.4 presents the results of the multiple (logistic) regression analyses predicting adolescent alcohol use. In accordance with the aforementioned results, significant time effects were observed for all three alcohol outcomes (Model 1).

The results of Model 2 show that perceived harmfulness was negatively related to last month alcohol use, but not to lifetime alcohol use (although $p = .01$) and the quantity of alcohol consumed. Quality of alcohol-specific communication and alcohol-specific rule setting were negatively associated with all three outcomes of adolescent alcohol use. In Model 2, the association between survey year and adolescent alcohol use generally decreased in strength due to the addition of the alcohol-specific parenting variables. This may indicate that increasing trends in alcohol-specific parenting practices may in part account for the decreasing trends in adolescent alcohol use.

Table 4.3 Trends in adolescent alcohol use between 2007 and 2011 ($N = 3,615$ for 2007, $N = 2,953$ for 2009, $N = 3,229$ for 2011)

Survey year	Lifetime-prevalence of alcohol use						Last month prevalence of alcohol use						Number of glasses during a weekend					
	% ¹			Adjusted OR ²			% ¹			Adjusted OR ²			M^3			Adjusted B^4		
	2007	2009	2011	2007	2009	2011	2007	2009	2011	2007	2009	2011	2007	2009	2011	2007	2009	2011
Total	75.3	68.1	63.2	0.72**	0.51**	42.1	37.3	32.7	0.84	0.62**	2.86	1.85	2.41	-0.85*	-0.26			
Gender																		
Girls	72.8	66.4	58.9	0.72*	0.47**	40.6	37.4	31.9	0.82	0.62**	2.44	1.69	1.99	-0.80*	-0.35			
Boys	77.6	69.7	67.2	0.71*	0.55**	43.6	37.3	33.5	0.86	0.61**	3.24	2.01	2.79	-0.81	-0.18			
Age																		
12–13	61.0	50.4	43.4	0.69**	0.48**	20.7	14.5	11.2	0.71*	0.47**	0.61	0.20	0.28	-0.035**	-0.30*			
14–15	84.7	79.9	75.8	0.73	0.54**	54.6	50.6	42.9	0.87	0.62**	3.74	2.36	2.87	-1.33**	-0.78			
16	93.3	94.2	92.2	1.34	0.83	75.7	80.5	82.3	1.83	1.68	8.61	7.31	10.2	0.04	2.21			
Educational track																		
Academic	73.7	64.7	58.4	0.70*	0.46**	40.0	32.2	30.4	0.78	0.63**	2.24	1.34	2.02	-0.62	-0.02			
Vocational	76.6	71.8	67.9	0.76	0.58**	43.9	42.9	35.0	0.92	0.60**	3.37	2.41	2.80	-1.09*	-0.49			

¹ % = raw percentage² OR = odds ratio; result of multivariate logistic regression analysis adjusted for gender, age, educational level, ethnicity, and family structure (ref. 2007).³ M = raw mean⁴ B = unstandardized result of multivariate regression analysis adjusted for gender, age, educational level, ethnicity, and family structure (ref. 2007).

p for trend analysis: for lifetime and last month prevalence of alcohol use, p for trend was significant for all groups ($p < .001$), except for 16-year-olds. For the number of glasses during a weekend, p for trend was not significant, except for 12–13-year-olds ($p < .01$).
* $p < .01$; ** $p < .001$.

The results of Model 3a reveal that the associations between alcohol-specific parenting and adolescent alcohol use were similar for boys and girls, with one exception: the association between alcohol-specific rules and the number of glasses consumed was stronger for boys than for girls. Model 3b shows that the strength of associations between alcohol-specific parenting and adolescent alcohol use in some instances differed across age group. First, the association between perceived harmfulness and the number of glasses consumed was stronger for 14- to 15-year-olds, compared to 12- to 13-year-olds. Second, the association between parental perceptions of the quality of alcohol-specific communication and the number of glasses consumed by adolescents was stronger for older age groups (14–15- and 16-year-olds) compared to the youngest age group (12- to 13-year-olds). Finally, the association between alcohol-specific rules and adolescent alcohol use (lifetime and last month alcohol use and the number of glasses consumed) was also stronger for older age groups. Model 3c showed that associations between alcohol-specific parenting practices and adolescent alcohol use were similar for adolescents attending vocational and academic educational tracks.

Model 4 revealed no significant interactions of survey year by alcohol-specific parenting practices on adolescent alcohol use, implying that the associations between alcohol-specific parenting and adolescent alcohol use are stable over time. There was one exception: the association between the parental perceptions of the quality of alcohol-specific communication and adolescent lifetime alcohol use changed over time in that the association was not significant in 2007, but it was significant and negative in 2009 and 2011.

DISCUSSION

This study aimed to identify trends in alcohol-specific parenting practices and adolescent alcohol use between 2007 and 2011. We had three main findings. First, compared to 2007, parents in 2009 reported greater awareness of the harm of alcohol use by their children, better quality of communication with their child about alcohol use, and increased likelihood of setting rules with respect to their child's alcohol use. These increases stabilized or continued in 2011. The only exception was that parents of 16-year-olds did not report increasing their rule setting about alcohol use. Second, adolescent reports of both lifetime and last month prevalence of alcohol consumption decreased considerably between 2007 and 2011, while the reports of the number of glasses consumed during a weekend fluctuated. Reports of alcohol use did not decrease among 16-year-olds. Third, alcohol-specific parental attitudes

Table 4.4 Results of multiple (logistic) regression analysis examining alcohol-specific parenting, time, and their interaction as possible determinants of adolescent alcohol use ($N = 3,615$ for 2007, $N = 2,953$ for 2009, $N = 3,229$ for 2011)

	Time	Lifetime alcohol use		Number of glasses consumed
		OR (CI 95%)	OR (CI 95%)	
Model 1: Time				
	2009 (ref 2007)	0.72** (0.61–0.85)	0.84 (0.70–1.01)	-0.85* (0.24)
	2011 (ref 2007)	0.51** (0.44–0.59)	0.62** (0.52–0.73)	-0.26 (0.23)
Model 2: + alcohol-specific parenting ¹	Time			
	2009 (ref 2007)	0.83 (0.70–0.97)	1.03 (0.85–1.24)	-0.35* (0.22)
	2011 (ref 2007)	0.60** (0.52–0.70)	0.78* (0.65–0.92)	-0.42 (0.22)
	Perceived harmfulness			
		0.88 (0.80–0.97)	0.84* (0.76–0.93)	-0.13 (0.16)
	Quality of alcohol-specific communication	0.80** (0.73–0.88)	0.72** (0.66–0.78)	-0.95** (0.13)
	Alcohol-specific rules	0.67*** (0.61–0.73)	0.62** (0.57–0.67)	-1.75** (0.15)
Model 3a: + interactions alcohol-specific parenting x gender	Perceived harmfulness x male gender	0.99 (0.82–1.21)	1.05 (0.86–1.27)	-0.30 (0.20)
	Alcohol-specific communication x male gender	0.99 (0.82–1.21)	0.94 (0.81–1.11)	-0.33 (0.23)
	Alcohol-specific rules x male gender	1.17 (1.00–1.37)	1.04 (0.92–1.19)	-1.35** (0.26)

Model 3b: + interactions alcohol-specific parenting x age group	Perceived harmfulness x 14–15-year-olds Perceived harmfulness x 16-year-olds Alcohol-specific communication x 14–15-year-olds Alcohol-specific communication x 16-year-olds Alcohol-specific rules x 14–15-year-olds Alcohol-specific rules x 16-year-olds	0.80 (0.64–1.00) — 1.05 (0.87–1.26) 0.86 (0.50–1.48) 0.72** (0.61–0.84) 0.33*** (0.22–0.49)	0.95 (0.76–1.18) — 1.10 (0.94–1.30) 0.86 (0.64–1.15) 0.75** (0.64–0.88) 0.59*** (0.45–0.78)	-1.13** (0.18) — -1.09** (0.20) -2.37** (0.67) -1.60** (0.18) -4.02** (0.45)
Model 3c: alcohol-specific parenting x educational track	Perceived harmfulness x vocational track Alcohol-specific communication x vocational track Alcohol-specific rules x vocational track	0.94 (0.76–1.16) 1.11 (0.91–1.35) 0.99 (0.84–1.17)	0.92 (0.76–1.11) 1.12 (0.94–1.33) 1.03 (0.90–1.18)	-0.39 (0.23) -0.24 (0.25) -0.41 (0.32)
Model 4: + interactions alcohol-specific parenting x time	Perceived harmfulness x 2009 Perceived harmfulness x 2011 Alcohol-specific communication x 2009 Alcohol-specific communication x 2011 Alcohol-specific rules x 2009 Alcohol-specific rules x 2011	0.98 (0.75–1.29) 1.05 (0.83–1.32) 0.68** (0.55–0.83) 0.66** (0.55–0.80) 0.97 (0.78–1.19) 1.12 (0.91–1.37)	0.87 (0.69–1.10) 0.87 (0.67–1.12) 0.80 (0.65–0.99) 0.79 (0.65–0.96) 0.96 (0.81–1.15) 1.01 (0.85–1.21)	-0.15 (0.32) 0.09 (0.27) -0.01 (0.31) -0.14 (0.34) 0.59 (0.38) -0.31 (0.39)

Note. All models adjusted for gender, age, educational level, ethnicity, and family structure.

In model 2 all parenting variables were entered simultaneously. In models 3 and 4 all interactions were entered separately.

In models 3 and 4 interaction terms including 'perceived harmfulness of drinking under the age of 16' were analyzed including only parents of adolescents under the age of 16.

¹ (Changed) estimates for the time trends in Model 2 give insight into the potential influence of trends in adolescent alcohol use.

* $p < .01$; ** $p < .001$.

and practices were negatively associated with adolescent alcohol use. Associations tended to be stronger for older age groups and were generally stable across survey waves.

The increased prevalence rates of strict alcohol-specific parenting practices and the decrease in lifetime and last month alcohol use among adolescents suggest a decreased risk of experiencing the negative effects of alcohol use among Dutch adolescents, especially those in the younger age groups. It is noteworthy that these developments occurred in all age, gender and educational subgroups (except for the 16-year-olds). This may reflect the fact that national prevention efforts aimed at postponing alcohol use at least until the age of 16 have been successful. Yet, while our results are compelling and consistent with an effect of the mass media campaigns, it needs to be noted that similar changes in adolescent alcohol use have also been observed in other European countries, meaning that the observed decrease in alcohol use among Dutch adolescents may have derived from other, more general cultural shifts in Europe. The prevention programs targeting alcohol-specific parenting practices and their potential effects on adolescent alcohol use should be interpreted in the context of these changing cultural and societal developments.

There were two main exceptions to the general increase in alcohol-specific parenting and the decrease in adolescent alcohol use. First, the number of glasses of alcohol consumed during a weekend was the only alcohol use outcome that did not decrease from 2007 to 2011. Second, the results for 16-year-olds indicated a lack of an increase in parental rule setting and a lack of a decrease in adolescent alcohol use. The average number of glasses reported as being consumed on a weekend by 16-year-olds remained high, dramatically higher than younger age groups., and they even appeared to increase among 16-year-old drinkers in 2011. These two exceptions may possibly reflect the messages conveyed in Dutch prevention programs from 2006 onwards. Specifically, parents were advised to postpone their children's alcohol use at least until they reached the age of 16. Although prevention programs also stressed the harmful effects of alcohol on young people in general (including adolescents aged 16 and over) and underlined that *if* adolescents drink, they should drink limited amounts of alcohol, the straightforward message of 'no drinking before the age of 16' may have been picked up by most parents. Parents may have found it difficult to continue their practices after their child turned 16, as they had already communicated the message that their child would have more freedom with respect to drinking from age 16 onwards. Furthermore, parents may have focused more on the *moment* at which their adolescent started drinking rather than the *quantity* they drank.

As expected, overall, alcohol-specific parenting practices and adolescent alcohol use were negatively associated. However, perceived harmfulness was related neither to lifetime

alcohol use nor to the quantity (number of glasses) consumed. While the results revealed no direct association, parental perceived harmfulness may be a condition for the adoption of strict and effective parenting practices that reduce the amount of alcohol consumed by adolescents. It is important to note that different alcohol-specific parenting practices can increase each other's effectiveness (Stigler, Perry, Komro, Cudeck, & Williams, 2006). Parent-based alcohol interventions should therefore not be limited to encouraging single parenting practices; they should aim for simultaneous improvement of various components within the parenting context (Koning, van den Eijnden, Verdurmen, Engels, & Vollebergh, 2012).

The associations between alcohol-specific parenting and adolescent alcohol use were stronger for older age groups (14- to 16-year-olds) compared to younger age groups (12- to 13-year-olds). This may reflect the fact that alcohol use among younger adolescents is infrequent, which makes it more difficult to identify a strong association between alcohol use and parenting behaviors in these age groups. Our findings imply that while parents of older adolescents may believe that they have less influence on their adolescent's behavior compared to parents of younger adolescents, their influence may be just as substantial. This may entail an important prevention message for future years, suggesting that it may be fruitful to concentrate on parents of older adolescents by stressing their continued influence on their children's drinking behaviors.

The associations between adolescent alcohol use and alcohol-specific parenting practices were stable over time, except for the association between the parental perceptions of the quality of alcohol-specific communication and lifetime alcohol use. This association became stronger over time. This may be explained by the fact that prevention programs in 2009 explicitly started to educate parents about how to communicate effectively with their adolescents about alcohol. As a result, parental definitions of high-quality alcohol-specific communication may have changed over time. For example, parents may have increasingly conceptualized high-quality communication as communication in which they can be strict about what is allowed and not allowed while initially believing that a more lenient approach is the best.

Strengths and limitations

This study has a number of strengths, such as the use of large datasets, a standard protocol for the data collection across the three study waves, and a semi-experimental design. However, it is limited by its use of repeated cross-sectional surveys meaning that causality cannot be inferred. While the increase in alcohol-specific parenting practices coincided

with a decrease in adolescent alcohol use, and the parenting practices related negatively with adolescent alcohol use, this is not sufficient evidence to conclude that the decrease in adolescent alcohol use was *caused* by an increase in alcohol-specific parenting practices. To make such a conclusion, future longitudinal and experimental research should investigate whether adolescent alcohol use increases less over time if their parents adopt stricter alcohol-specific parenting practices.

A second limitation is that the observed increases in alcohol-specific parenting practices are relatively small. This is likely to reflect a ceiling effect, as the initial (2007) scores were already high (i.e., 3.33 out of 4; 4.00 out of 5; and 4.25 out of 5).

The high initial scores in 2007 may be explained by the fact that prevention programs aimed at reducing adolescent alcohol use started already in 2006, which may have influenced parents in 2007. Our finding that all of the three parenting scales showed a significant increase from 2007 to 2011 suggests that the increases, albeit small, are meaningful and important.

A third limitation is the selective response of parents. For each study wave, about 50% of the parents who were approached responded to our invitation to participate in the study. As a result, adolescents in our sample were younger, more often enrolled in academic tracks, less likely to have an ethnic minority background, more likely to live with both biological parents, and less likely to drink alcohol. We corrected for this selective response by weighting our data for adolescents' educational track, grade, gender, and level of urbanization. However, as weighting procedures cannot completely compensate for non-response biases, the effect sizes in our study may be slightly inflated.

Fourth, we used self-report data on alcohol-specific parenting practices (parent report) and adolescent alcohol use (adolescent report), which entails the risk of socially desirable answers. Parent and adolescent perceptions of alcohol-specific rules differ considerably, with parents reporting stricter rules compared to adolescents (Van Dorsselaer et al., 2010; Verdurnen, Smit, van Dorsselaer, Monshouwer, & Schulten, 2008; Verdurnen, Vermeulen-Smit, van Dorsselaer, Monshouwer, & Schulten, 2012). Our parent data may thus be biased towards higher scores (reporter bias). Further, adolescent perceptions are stronger predictors of their own alcohol use compared to parent perceptions (Koning et al., 2011). Our estimates of the associations between alcohol-specific parenting practices and adolescent alcohol use should therefore be considered conservative. To ensure that adolescents would complete our questionnaire honestly, research assistants stressed anonymity before administering the questionnaires.

Finally, in this study, we did not investigate several possible determinants of adolescent alcohol use, including personality factors, such as sensation seeking and disinhibition, family factors, such as birth order and behaviors of older siblings, and biological or genetic markers. Although we included an important set of social and individual factors as confounders in our models, a more elaborate model of adolescent alcohol use should include additional personality, family, and biological factors, as well as their interactions.

Implications

The present study shows that the recent change in social policy and in societal perspectives on adolescent alcohol use may have resulted in stricter alcohol-specific parenting practices and a decrease in adolescent alcohol use in the Netherlands. This study can be perceived as a test case for countries that recently experienced similar socio-cultural changes. Our findings are consistent with the national policy on adolescent alcohol use in the Netherlands between 2007 and 2011. As alcohol use among 16-year-olds and the quantity of alcohol consumed did *not* show a decrease over time, future policy efforts might pay more attention to the quantity of alcohol consumed by adolescents and to alcohol prevention among adolescents aged 16 years and over. The large quantities of alcohol consumed by 16-year-olds are especially worrisome and deserve more attention.

Chapter 5

Parenting practices and adolescent risk behavior: Rules on smoking and drinking also predict cannabis use and early sexual debut

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ABSTRACT

Previous research has provided considerable support for the idea that increased parental support and control are strong determinants of lower prevalence levels of adolescent risk behavior. Much less is known on the association between specific parenting practices, such as concrete rules with respect to smoking and drinking and adolescent risk behavior. The present paper examined whether such concrete parental rules (1) have an effect on the targeted behaviors and (2) predict other, frequently co-occurring, risk behaviors (i.e., cannabis use and early sexual intercourse). These hypotheses were tested in a nationally representative sample of 12- to 16-year-old adolescents in the Netherlands. We found that both types of rules were associated with a lower prevalence of the targeted behaviors (i.e., smoking and drinking). In addition, independent of adolescent smoking and drinking behaviors, parental rules on smoking predicted a lower prevalence of cannabis use and early sexual intercourse, and parental rules on alcohol use also predicted a lower prevalence of early sexual intercourse. This study showed that concrete parental rule setting is more strongly related to lower levels of risk behaviors in adolescents compared to the more general parenting practices (i.e., support and control). Additionally, the effects of such rules do not only apply to the targeted behavior but extend to related behaviors as well. These findings are relevant to the public health domain and suggest that a single intervention program that addresses a limited number of concrete parenting practices, in combination with traditional support and control practices, may be effective in reducing risk behaviors in adolescence.

INTRODUCTION

In many Western countries, adolescent risk behaviors are among the top priorities in the public health domain. Specifically, numerous prevention and intervention programs have been developed to reduce young people's engagement in smoking tobacco, drinking alcohol, using cannabis, and early sexual intercourse. In recent years, researchers have observed two trends in the development of such programs. First, public health programs aiming to reduce adolescent risk behaviors have increasingly focused on the role of parents (e.g., Koning, van den Eijnden, Engels, Verduren, & Vollebergh, 2011; Koning et al., 2009; Sigfúsdóttir, Thorlindsson, Kristjánsson, Roe, & Allegrante, 2009). While, prior to 2004, most programs targeted adolescents directly, parents have recently been acknowledged more often as effective agents to affect young people's behaviors. Second, there is a trend toward developing prevention practices that target multiple risk behaviors simultaneously, rather than targeting behaviors individually. Such broad programs may be beneficial for three reasons. First, research has shown that risk behaviors cluster together (Willoughby, Chalmers, & Busseri, 2004), which increases the likelihood of youth who engage in different risk behaviors simultaneously. Second, from an economic perspective, the implementation of broad programs that target multiple risk behaviors is more cost effective compared to the implementation of separate risk behavior-specific programs. Third, a single program that focuses on multiple risk behaviors, simultaneously, requires less effort from parents and increases their willingness to participate compared to implementing a variety of programs that each focus on a single behavior.

The present study aimed to provide insight into the association between parenting practices and a variety of risk behaviors that cluster together during adolescence. We thereby specifically focused on the following behaviors: smoking tobacco, drinking alcohol, using cannabis and having sexual intercourse. These four behaviors frequently co-occur during adolescence (Willoughby et al., 2004). Their interrelatedness may be explained by the fact that they are all adult-like behaviors that become increasingly attractive to young people as they grow up, while society does not (yet) accept young people's engagement in these behaviors (Moffitt, 1993; 2006). The role of parents to guide their children through this phase, by providing adequate parenting practices, is tested in this study. We examined to what extent general parenting practices (i.e., providing parental support and control) and specific parenting practices (i.e., setting concrete rules) predicted adolescent engagement in these behaviors. Furthermore, we examined whether concrete parental rules on smoking and drinking did not only predict adolescent smoking and drinking behaviors, but also engagement in cannabis use and early sexual intercourse.

Parenting practices and adolescent risk behaviors

Previous research on parenting practices and adolescent risk behaviors can be divided into two categories: (1) studies that have focused on general parenting practices, most notably parental support and control (Baumrind, 1966) and (2) studies that have focused on concrete parenting practices that target specific behaviors, such as parental rules on adolescent smoking and drinking (e.g., van der Vorst, Engels, Deković, Meeus, & Vermulst, 2007). With respect to general parenting practices, a combination of parental support and control (i.e., warm, caring parenting with appropriate supervision and control) is considered to contribute to the best mental health outcomes for young people. It has been related to lower degrees of adolescent alcohol use (Roche, Ahmed, & Blum, 2008; Ryan, Jorm, & Lubman, 2010), smoking (Castrucci & Gerlach, 2006; Harakeh, Scholte, Vermulst, de Vries, & Engels, 2010), cannabis use (Chen, Storr, & Anthony, 2005) and delay of sexual debut (de Graaf et al., 2010; de Graaf, Vanwesenbeeck, Woertman, & Meeus, 2011; Roche et al., 2008).

With respect to specific parenting practices, most research has focused on practices that target adolescent smoking and drinking. Among specific parenting practices aimed at reducing adolescent alcohol use, the strongest predictor is concrete parental rules on adolescent drinking behavior (van der Vorst et al., 2007). The association between concrete parental rules on smoking and adolescent smoking behavior has also been assessed; however, findings are mixed (Emory, Saquib, Gilpin, & Pierce, 2010). While some studies found a strong association (Pennanen, Vartiainen, & Haukkala, 2012), other studies found a weak association (Huver, Engels, & de Vries, 2006; Andersen, Leroux, Bricker, Rajan, & Peterson, 2004) or no association at all (Harakeh, Scholte, de Vries & Engels, 2005; den Exter Blokland, Hale III, Meeus, & Engels, 2006; de Leeuw, Scholte, Vermulst, & Engels, 2010). The differences in outcomes are likely to be related to the use of different definitions of smoking rules. While some studies focused on house rules in general (Andersen, Leroux, Bricker, Rajan, & Peterson, 2004; de Leeuw et al., 2010; Henriksen & Jackson, 1998; den Exter Blokland et al., 2006; Harakeh et al., 2005), other studies focused on whether adolescents themselves were allowed to smoke at home (Huver, Engels, & de Vries, 2006; Pennanen, Vartiainen, & Haukkala, 2012). Anti-smoking rules specifically aimed at the adolescent appear to be more strongly related to adolescent smoking behavior compared to the more general house rules. To the knowledge of the authors, to date, no study has included a measure on whether adolescents are allowed to smoke by their parents, independent of the context (i.e., also outside their home, such as at a party with friends). Such rules can be expected to be even more relevant in predicting adolescent smoking behavior as they are applicable

to the different environments in which adolescents find themselves (i.e., not limited to the parental home).

While most previously conducted studies are based on cross-sectional or longitudinal data which do not necessarily include an intervention, and while the nature of parent-adolescent relationships is bi-directional (Keijsers, Branje, Van der Valk, & Meeus, 2010), intervention studies suggest that family interventions focusing on increasing parental support, control, and rule setting, are effective in reducing adolescent alcohol use (Smit, Verdurnen, Monshouwer, & Smit, 2008) and tobacco smoking (Thomas, Baker, & Lorenzetti, 2008), and that family interventions focusing on parental support and control are effective in reducing cannabis use (Bender, Tripodi, Sarteschi, & Vaughn, 2011; Soper, Wolchik, Tein, & Sandler, 2010) and delaying sexual debut (Downing, Jones, Bates, Sumnall, & Bellis, 2011). These findings suggest that associations between parenting practices and adolescent risk behaviors at least partly reflect an effect of parenting practices on adolescent substance use and early sexual debut.

While previous studies linked parental support and control to different types of adolescent risk behaviors, their relative effects, compared to concrete parental practices, are not clear. Moreover, concrete parental rules on smoking and drinking have only been related to the targeted behaviors, while their effects may extend to other risk behaviors due to high co-occurrence rates. Keeping in mind the recent developments of broad intervention programs involving parents, it would be relevant, from both a practical and conceptual point of view, to investigate to what extent general versus concrete parenting practices are important in predicting adolescent risk behaviors, and to determine whether concrete parental rules that target a specific risk behavior (e.g., smoking) also have an effect on other, related risk behaviors (e.g., cannabis use).

The present study

In the present study, we examined these research questions based on a large, nationally representative sample of Dutch adolescents in secondary education. Consistent with existing literature, we hypothesized that parental support would be negatively associated with adolescent smoking, drinking, cannabis use, and early sexual debut. Furthermore, we expected parental control to be negatively associated with all four risk behaviors; however, this association would be mediated by concrete parental rules on smoking and drinking (as per existing precedents, e.g., van Zundert, van der Vorst, Vermulst, & Engels, 2006). Finally, we expected that concrete parental rules on smoking and drinking would not only

be negatively related to smoking and drinking behaviors, but also to cannabis use and early sexual intercourse. To explore whether our results applied similarly to different subgroups of youth, we tested whether the associations found were similar for boys and girls, youth from different age groups (early vs. mid-adolescence), and youth with different educational levels (low vs. high). These analyses were relevant to determine the potential effectiveness of a broad intervention program for different subgroups of youth.

METHOD

The current sample was drawn from the Dutch Health Behaviour in School-aged Children (HBSC) survey. The HBSC study is a World Health Organization collaborative cross-national study on the health, health-related behaviors, and the social context of young people's health. Consistent with the international study protocol (Griebler et al., 2010; Roberts et al., 2009), data from Dutch students in the first through fourth years of secondary education (12–16-year-olds) were collected via an anonymous self-report questionnaire at secondary schools from October to November 2009. Schools were randomly selected from a governmental list of all secondary schools in the Netherlands after stratification based on urbanicity. In total, 68 schools participated in the study. Per school, three to five classes were randomly selected from a list of all classes in the first through fourth years. As the secondary education system consists of four educational levels that range from pre-vocational training to higher academic education, students from all educational levels were included, and the final sample was nationally representative in terms of the educational level of adolescents aged 12 to 16. Only students whose parents did not object to their child's participation in the study were included in the study. The response rate within classes was 93%, with the most important reason of nonparticipation in the study being illness.

The final sample included 5,642 students, who were representative of Dutch youth aged 12–16 years ($M = 13.8$; $SD = 1.3$) in the first four years of secondary education. 51% of the respondents were boys, and 15% had an ethnic minority background. With respect to educational level, 46% of the respondents were classified as having a high educational level (i.e., they attended one of the two highest levels).

Measures

Adolescent risk behaviors

Risk behaviors included in our study were three different types of substance use and early sexual intercourse. We dichotomized smoking, binge drinking and cannabis use because the aim of our paper was to identify high risk involvement in risk behaviors among adolescents.

Daily tobacco smoking. With respect to tobacco smoking, adolescents were asked: 'How often do you smoke at present?' The original answer categories (never, less than weekly, weekly but not daily, daily) were recoded into 'no daily smoking' and 'daily smoking'. As daily smoking is a crucial aspect of nicotine dependence (Jarvis, 2004), daily smoking adolescents have an increased likelihood of smoking in the future and developing smoking-related health problems leading to premature deaths (Hublet et al., 2006).

Binge drinking in the previous month. With respect to alcohol use, adolescents were asked: 'How often have you, in the previous month, drunk five or more alcoholic drinks on one occasion (for example at a party or a night out)?' Original answer categories (ranging from 'never' to 'nine times or more') were recoded into 'never' and 'at least once.' Regular binge drinking is considered an indicator of excessive alcohol use (as per Lammers et al., 2011) and has been related to a wide range of negative outcomes, including brain damage and neurocognitive deficits (Tapert, Granholm, Leedy, & Brown, 2002; Zeigler et al., 2005), poor educational attainment (Hill, White, Chung, Hawkins, & Catalano, 2000), and adult alcohol dependence, illicit drug use, and psychiatric morbidity (Viner & Taylor, 2007).

Lifetime cannabis use. Lifetime cannabis use was measured by the item 'How often, in your entire life, have you smoked cannabis?' The original answer categories (ranging from never to 40 times or more) were recoded into 'never' and 'at least once.' Cannabis use is rare among adolescents aged 12–16; if adolescents at this age already have experience with cannabis use, this is generally interpreted as an (extreme) risk behavior. Early cannabis use has been found to affect neurocognitive functioning (Schweinsburg, Brown, & Tapert, 2008) and has been associated with an increased risk for problems later in life, including substance abuse and dependence (Lynskey et al., 2003; Agrawal, Neale, Prescott, & Kendler, 2004), depression (Patton et al., 2002), and psychosocial adjustment problems (Fergusson, Horwood, & Swain-Campbell, 2002).

Early sexual intercourse. Students were asked whether they had ever had sexual intercourse. Answer categories were either 'yes' or 'no.' Early sexual intercourse was considered a risk behavior as it has been related to long-term negative sexual health outcomes, including increased sexual risk taking (de Graaf et al., in press; Sandfort, Orr, Hirsch, & Santelli, 2008).

Parenting practices

The parenting variables in our model were included as latent constructs, which consisted of a number of categorical items as indicators. To describe the quality of these constructs, we will report the model fit of each latent construct separately in this section. Because the sample size was large and the chi square statistic is sensitive to sample size, we specifically focused on the Comparative Fix Index (*CFI*), Tucker-Lewis Index (*TLI*), and the Root Mean Square Error of Approximation (*RMSEA*) as indicators of model fit. The *CFI* and *TLI* are related to the total variance accounted for in the model; values greater than .90 are accepted and values greater than .95 are desired (Kline, 2010). The *RMSEA* is related to the residual variance; values smaller than .10 are accepted and values smaller than .05 are desired (Kline, 2010). For an acceptable model fit, at least two of the three indices need to be adhered to.

Parental support. This construct was based on six indicators: (1) My parents show me that they admire me; (2) In my parents' eyes, I do everything wrong; (3) My parents show me that they love me; (4) My parents often make me look ridiculous; (5) My parents support me in my activities; and (6) My parents treat me aggressively. Answer categories ranged from 'definitely true' to 'definitely not true' (Scholte, van Lieshout, & van Aken, 2001). A confirmatory factor analysis revealed acceptable model fit statistics: $\chi^2(9) = 728.59, p = .00$, *CFI* = .96, *TLI* = .94, *RMSEA* = .12.

Parental control. The construct parental control was based on three indicators: (1) Before you leave the house, do your parents want to know with whom or where you are going?; (2) Do you need your parents' permission to go out at night?; and (3) If you go out at night, do your parents want to know afterward with whom or where you were? (adapted from Kerr & Stattin, 2000). A confirmatory factor analysis revealed good model fit statistics: $\chi^2(1) = 42.45, p = .00$, *CFI* = .99, *TLI* = .97, *RMSEA* = .09.

Alcohol-specific rules. The construct alcohol-specific rules was based on four indicators: (1) I am allowed to drink one glass of alcohol when my father or mother is home, (2) I am allowed to drink several glasses of alcohol when my father or mother is home, (3) I am allowed to drink alcohol at a party with friends, and (4) I am allowed to drink alcohol on the weekends. Answer categories ranged from 'definitely not true' to 'definitely true' (adapted from Van der Vorst et al., 2005). A confirmatory factor analysis revealed acceptable fit statistics: $\chi^2(2) = 330.37, p = .00$, *CFI* = 1.00, *TLI* = .98, *RMSEA* = .17.

Smoking-specific rules. As previous research mainly focused on house rules with respect to smoking, new indicators for smoking-specific rules were developed. These indicators included: (1) I am allowed to try out smoking a cigarette, (2) I am allowed to smoke now

and then, (3) I am allowed to smoke regularly. Answer categories ranged from ‘definitely not true’ to ‘definitely true.’ A confirmatory factor analysis revealed acceptable fit statistics: $\chi^2(1) = 274.52, p = .00, CFI = 1.00, TLI = .99, RMSEA = .22$.

Covariates

All analyses controlled for gender (boy vs. girl), age (ranging from 12 to 16), and educational level (low vs. high). Educational level, which is a strong predictor of adolescents’ future socioeconomic status (ROA, 2009), was included as a dummy variable. While the Dutch educational system consists of four educational levels, many secondary schools are specialized in teaching either pre-vocational training and lower academic education or medium and higher academic education. Therefore, pre-vocational training and lower academic education were combined (i.e., low educational level) and medium and higher academic education were combined (i.e., high educational level) for the purpose of the current analyses.

Statistical analyses

First, we provide descriptive statistics to identify the prevalence of adolescent risk behaviors and the amount of parental support, control, and concrete rules on adolescent smoking and drinking behaviors for male and female adolescents, youth from the different age groups, and students with high or low educational level.

Second, we designed a structural equation model in Mplus version 6.11 (Muthén & Muthén, 1998–2010). In this model (see Figure 5.1), adolescent risk behaviors were predicted by the four parenting practices. Because concrete parental rules on alcohol use and smoking are a way to assert parental control, these variables were included as mediators in the association between parental control and adolescent risk behaviors, thereby following the example of previous studies (e.g., van Zundert et al., 2006).

Third, three moderation analyses were performed to examine whether the effects found in the final model were equally present for (1) boys and girls, (2) adolescents from different age groups (early vs. mid adolescents), and (3) adolescents with a low versus high educational level. For each moderation analysis, the model fit of two models was compared: (1) a model in which all paths were freely estimated for the two groups (i.e., boys and girls, early and mid-adolescents, and students with a low and high educational level) and (2) a model in which the paths from the parenting practices to the risk behaviors were constrained to be equal across groups. The model fit comparison was based on two criteria, which both

needed to be met in order to conclude that there was a significant difference between the models. These criteria were (1) the chi square difference test, a traditional test that indicates whether the fit of two models differs significantly but which is sensitive to sample size and (2) Chen's criteria, which are not sensitive to sample size (i.e., models differ significantly in fit if $\Delta CFI > .01$, $\Delta TLI > .01$, or $\Delta RMSEA > .005$) (Chen, 2007). If the freely estimated model had a significantly better fit based on both criteria, then this model would be preferred. If not, then the most parsimonious model (i.e., the constrained) model would be preferred.

Data were weighted for educational level, grade, gender, and urbanicity with poststratification weights. All analyses were corrected for cluster effects of pupils within the same school (primary sampling unit). The range from missing values per variable ranged from 0% to 3% (early sexual intercourse). Missing values were model estimated in Mplus. Because the N of our sample was large, we used significance criteria of $\alpha = .001$ and $\alpha = .01$.

RESULTS

Descriptive statistics

The prevalence rates of adolescent risk behaviors and parenting practices as reported by adolescents are presented in Table 5.1. No gender differences existed with respect to risk behavior and parenting practices, except for parental control; girls experienced more parental control than did boys. Furthermore, older adolescents experienced less parental control and concrete rules and engaged more in all risk behaviors compared to younger adolescents. Finally, youth with a low educational level engaged more in smoking tobacco, early sexual intercourse ($p < .001$), and binge drinking ($p < .01$), and experienced less parental support and control compared to youth with a high educational level.

To what extent do parenting practices predict adolescent risk behaviors?

Our model, which aimed to predict adolescent risk behaviors, by the four parenting practices, had a good fit: $\chi^2(184) = 875.42$, $p = .000$, $CFI = .99$, $TLI = .99$, $RMSEA = .03$. The model estimates of the final model are illustrated in Figure 5.1.

Parental support was negatively associated with all four risk behaviors. There was no direct association between parental control and risk behavior; however, via the mediator parental rules on smoking, parental control had an indirect effect on adolescent daily smoking

Table 5.1 Prevalence of adolescent risk behavior and parenting practices stratified by adolescent age, gender, and educational level ($N = 5,642$; %)

	Total	Gender ¹		Age ¹				Educational level ¹	
		Boys	Girls	12	13	14	15	16	Low
Adolescent risk behavior									
Daily tobacco smoking	6.8	7.0	6.6	0.1 ^a	2.6 ^b	5.2 ^b	12.2 ^c	19.2 ^c	10.2 ^a
Binge drinking in the previous month	27.5	28.0	26.9	8.0 ^a	14.2 ^a	25.3 ^b	44.8 ^c	56.6 ^c	32.3 ^a
Lifetime cannabis use	11.8	13.6	9.9	0.5 ^a	3.5 ^b	10.6 ^c	22.2 ^d	28.9 ^d	12.6 ^a
Early sexual intercourse	11.7	12.3	11.0	1.0 ^a	3.3 ^a	8.5 ^b	20.6 ^c	33.6 ^d	14.9 ^a
Parenting practices									
Much parental support ²	88.3	88.0	88.6	91.1	90.4	87.3	86.6	84.8	85.9 ^a
Much parental control ³	35.4	26.4 ^a	44.6 ^b	46.0 ^a	39.3 ^a	31.3 ^b	30.4 ^b	28.1 ^b	31.3 ^a
Strict parental rules on adolescent alcohol use ⁴	38.2	39.7	36.6	65.4 ^a	51.6 ^b	34.7 ^c	17.8 ^d	14.0 ^e	39.5
Strict parental rules on adolescent smoking ⁵	70.6	70.2	71.0	85.8 ^a	81.5 ^a	68.4 ^b	57.3 ^c	53.7 ^d	68.5

¹ In rows, values with different superscripts are statistically different from each other at $p < .01$ (separately for gender, age, and educational level).² % scoring > 3.5 on the parental support scale (1–5)³ % scoring > 4.5 on the parental control scale (1–5)⁴ % scoring > 4.5 on the parental rules on adolescent alcohol use scale (1–5)⁵ % scoring > 4.5 on the parental rules on adolescent smoking scale (1–5)

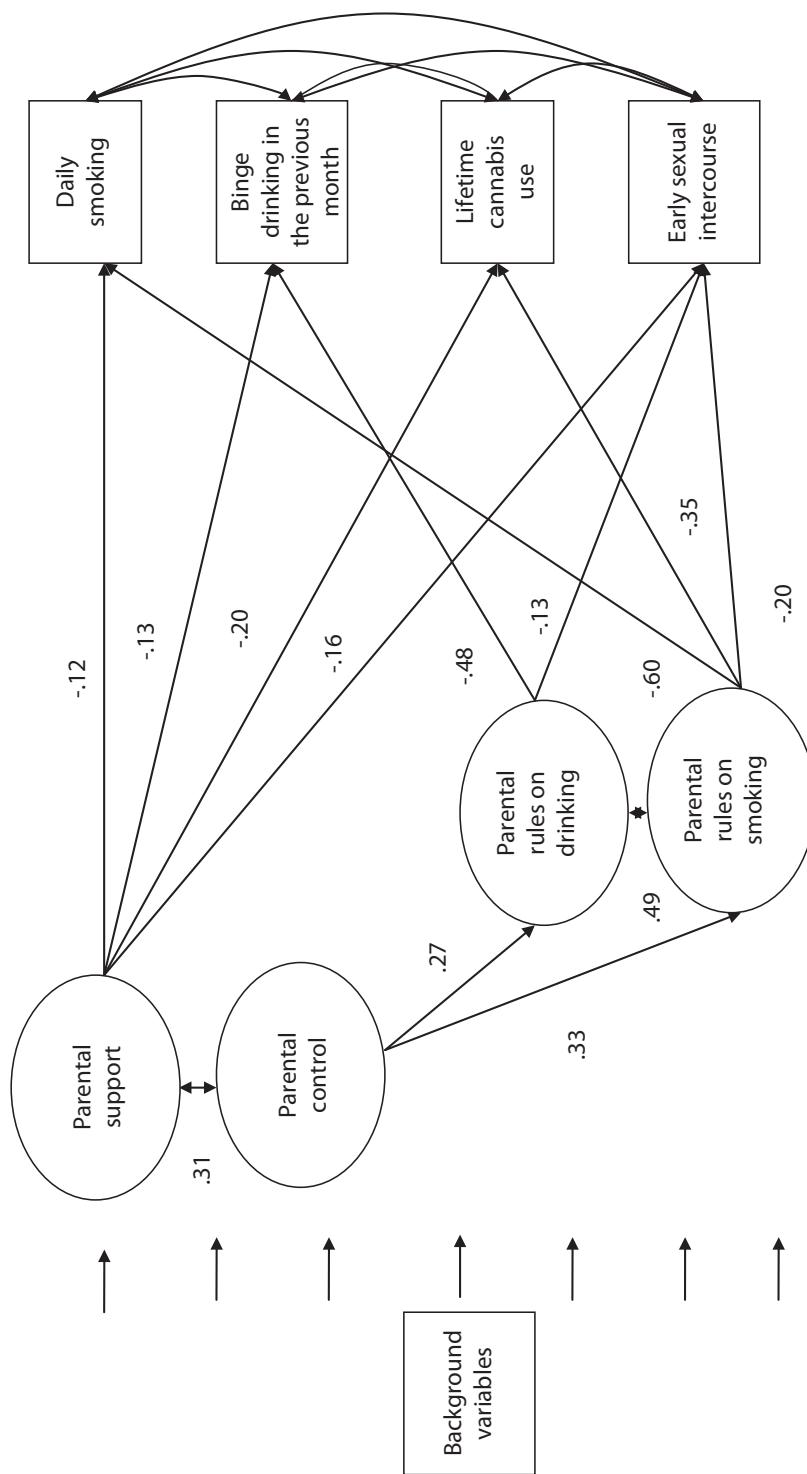


Figure 5.1 General and specific parenting practices predicting adolescent risk behavior.

Note. Model fit statistics of this model: $\chi^2(184) = 875.42, p = .000, CFI = .99, TLI = .99, RMSEA = .03$. Indicators of the four latent constructs representing parenting practices were not presented for readability reasons; these can be found in the methods section. Information on factor loadings and residual error terms is available from the authors.

($\beta = -.20, p < .001$), lifetime cannabis use ($\beta = -.12, p < .001$), and early sexual intercourse ($\beta = -.07, p < .001$). In addition, via the mediator parental rules on alcohol use, parental control had an indirect effect on adolescent binge drinking ($\beta = -.13, p < .001$) and early sexual intercourse ($\beta = -.03, p < .01$).

The direct associations between parental rules on smoking and drinking were especially high with the targeted behaviors: $\beta = -.48$ (alcohol rules and adolescent binge drinking) and $\beta = -.60$ (smoking rules and adolescent smoking behavior). Interestingly, the associations with other behaviors were also quite strong and ranged from $\beta = -.13$ (alcohol rules and adolescent early sexual intercourse) to $\beta = -.35$ (smoking rules and adolescent cannabis use).

Furthermore, parental support and parental control were strongly correlated, as were parental rules on adolescent smoking and drinking. The four risk behaviors were all correlated and ranged from $r = .31$ (binge drinking and early sexual intercourse) to $r = .45$ (smoking and cannabis use) ($p < .001$).

In total, this model explained 47.3% of the variance in binge drinking, 61.5% of the variance in daily tobacco smoking, 44.0% of the variance in lifetime cannabis use, and 39.4% of the variance in early sexual intercourse.

Moderation by adolescent age, gender, and educational level

To test whether the results of our model applied similarly to different subgroups of youth, three moderation analyses were conducted. For each analysis, the model fit of the model in which all regression paths were constrained across the groups, was compared with the freely estimated model. In the analysis that compared early versus mid adolescents, both the chi square difference test ($\Delta\chi^2(16) = 22.09, p = .14$) and Chen's criteria ($\Delta CFI = .001, \Delta TLI = .001, \Delta RMSEA = .002$) showed that the fit of the freely estimated model ($\chi^2(400) = 1148.97, p < .001, CFI = .99, TLI = .99, RMSEA = .03$) was not significantly better than the fit of the constrained model ($\chi^2(416) = 1106.70, p < .001, CFI = .99, TLI = .99, RMSEA = .02$), which indicates that the associations between parenting practices and adolescent risk behaviors were similar for early and mid adolescents.

In the gender analysis, the chi square difference test ($\Delta\chi^2(16) = 21.37, p = .16$) indicated that the freely estimated model had a better fit; however, Chen's criteria ($\Delta CFI = .000, \Delta TLI = .001, \Delta RMSEA = .001$) did not support this finding. The fit of both models was good: $\chi^2(400) = 1194.10, p < .001, CFI = .99, TLI = .99, RMSEA = .03$ for the freely estimated model and $\chi^2(416) = 1189.12, p < .001, CFI = .99, TLI = .99, RMSEA = .03$ for the constrained model. Based on the fact that the chi square test is sensitive to sample size and, on the observation

that the more robust fit indices were hardly different (Chen's criteria), we concluded that the constrained model was preferred, which indicates that the associations in our model did not differ for boys and girls.

Finally, in the analysis that compared adolescents with a low and high educational level, the model fit of the constrained ($\chi^2(416) = 983.83, p < .001, CFI = 1.00, TLI = .99, RMSEA = .02$) and freely estimated model ($\chi^2(400) = 1023.57, p < .001, CFI = .99, TLI = .99, RMSEA = .03$) did not significantly differ based on the chi square difference test ($\Delta\chi^2 (16) = 18.64, p = .29$) or Chen's criteria ($\Delta CFI = .001, \Delta TLI = .000, \Delta RMSEA = .002$), which indicates that the associations were also similar for students with a low and high educational level.

In conclusion, the associations in our model were similar in strength for all subgroups of youth.

DISCUSSION

The present study yielded four main findings. First, it shows that both parental support and control (via concrete parental rules) were associated negatively with adolescent smoking, drinking, cannabis use, and early sexual activity. Second, concrete parental rules on smoking were associated with a lower likelihood of adolescent smoking and concrete parental rules on alcohol use were associated with a lower likelihood of adolescent drinking. These effects were stronger than the effects of parental support and control. Third, parental rules also had an effect on other risk behaviors: rules on alcohol use predicted a lower likelihood of early sexual intercourse and rules on smoking predicted a lower likelihood of adolescent cannabis use and early sexual intercourse. Finally, the abovementioned associations were equally strong for early and mid adolescents, boys and girls, and students with low and high educational levels.

The first finding, that adolescent smoking, drinking, cannabis use, and sexual activity were negatively influenced by parental support and control, confirmed our hypothesis and is consistent with previous research (Roche et al., 2008; Ryan et al., 2010; Castrucci & Gerlach, 2006; Harakeh et al., 2010; Chen et al., 2005; de Graaf et al., 2010; de Graaf et al., 2011; van Zundert et al., 2006). As general and specific parenting practices were both present in our model, it was possible to identify the relative strength of associations of both types of practices. Compared to parental support and control, concrete parental rules that target specific risk behaviors clearly had a stronger association with (1) the targeted behaviors (i.e., smoking and drinking) and (2) related risk behaviors that were not directly targeted (i.e., cannabis use and early sexual intercourse). This finding may be explained by concrete rules being

conceptually closer to the risk behaviors compared to parental support and control. It is important to stress, however, that parental support and control (via the mediation of rules) both had significant associations with all risk behaviors.

In accordance with previous studies, we found that concrete rules that target adolescent alcohol use were related to a lower likelihood of adolescent drinking (e.g., van Zundert et al., 2006). Interestingly, while previous studies have found modest or contradictory effects of parental rules on smoking, the present study revealed a strong association with adolescent smoking behavior. This difference in outcome is likely to be caused by the fact that we used a different definition of smoking rules than did most previous studies. Specifically, previous studies have focused on general house rules (Andersen, Leroux, Bricker, Rajan, & Peterson, 2004; de Leeuw et al., 2010; Henriksen & Jackson, 1998; den Exter Blokland, Hale, Meeus, & Engels, 2006; Harakeh et al., 2005) or rules which were targeted specifically at the adolescent, but which were still limited to the home context (Huver, Engels, & de Vries, 2006; Pennanen, Vartiainen, & Haukkala, 2012), while parental smoking rules in the current study were defined as the adolescent being allowed to smoke by his or her parents in general (i.e., not restricted to the home). Rules aimed directly at the behavior of the adolescent, independent of context, can be expected to be more relevant than are general rules about smoking at home.

Our finding that concrete parental rules that target adolescent smoking and drinking behaviors are also related to other types of risk behaviors is innovative and may be explained by the fact that the four risk behaviors under study are closely interrelated and often occur in a similar context. For example, alcohol use and sexual intercourse are both related to a context of going to bars and pubs at night. If youth are allowed to drink alcohol, then they are more likely to find themselves in such a context; therefore, they are not only more likely to drink alcohol, but also to meet peers, date, and have sexual intercourse. A different explanation could be that adolescents experience parental rules on smoking and drinking in a broader context; they expect their parents to be consistent (i.e., if they are not allowed to smoke, they are definitely not allowed to use cannabis). A final explanation is that parents who set rules with respect to adolescents' smoking and drinking behaviors, generally tend to monitor their children more so compared to parents who do not set such rules. This would explain why, for example, parental rules on smoking and adolescent delay in sexual debut are associated, even though they are not very close conceptually.

The finding that the parenting practices under study were related to a reduction in adolescent risk behaviors similarly for early and mid adolescents, boys and girls, and youth with different educational levels, was somewhat surprising. Specifically, the findings show that, in subgroups of youth who experience less parental support, control, and concrete

rules (e.g., boys, mid adolescents, adolescents with a low educational level), the effects of these parenting practices are similar. Similarly, for subgroups of youth who may spend less time with their parents and more time with peers (most notably older youth and youth from lower educational levels; Currie et al., 2008; De Looze et al., 2012), parental rule setting may be a powerful practice to prevent youth from engagement in substance use. The results of the present study underline that parental influence remains of major importance, also when youth begin to spend less time at home and experience less physical influence, support or control from their parents.

Strengths and limitations

The present study has several strengths. First, our analyses were based on a national representative sample of adolescents; therefore, our conclusions can be generalized to the entire adolescent population (aged 12 to 16) in the Netherlands. Second, our model explained a relatively large part of the variance in adolescent risk behavior, which indicates that our predictors (i.e., parenting practices) contribute substantially to explaining adolescent engagement in risk behaviors. Finally, this study does not only have implications for academia, but also for the public health domain. It is our hope that the current results can guide prevention workers toward the development of effective and efficient prevention programs.

Our paper also has a few limitations. First, this study was based on cross-sectional data; therefore, we cannot make any causal inferences. Based on our findings, it is not clear whether parenting practices influence adolescent behaviors, whether adolescent behaviors influence parenting practices, or whether there is a third variable that influences both parenting practices and adolescent risk behaviors. Factors that may impact both parental support, control, and rule setting and adolescents' propensity for risk behavior include genetics (McGue, Elkins, & Iacono, 2000; Pagan et al., 2006; Rose & Kaprio, 2008), parental substance use (Barnes, Reifman, Farrell, & Dintcheff, 2000; Koopmans & Boomsma, 1996; Latendresse et al., 2008), parental attitudes on substance use (Denton & Kampfe, 1994), and familial mental health concerns (Repetti, Taylor, & Seeman, 2002). As intervention studies have convincingly demonstrated an effect of parenting practices on adolescent risk behaviors (e.g., Koning, van den Eijnden, Engels, Verduren, & Vollebergh, 2011), it is likely that our findings (at least partly) represent an effect of parenting practices on adolescent substance use and early sexual debut. Yet, future intervention research is needed to clarify these mechanisms in more detail.

A second limitation is that our data were based on adolescent self-report, which entails the risk of socially desirable answers. To counter this potential bias, anonymity was stressed

by interviewers before youth completed the questionnaires. Furthermore, it is important to stress that we only used adolescent reports of parenting practices, not parental perceptions.

Finally, the present study focused on parental rules with respect to adolescent smoking and drinking behaviors; however, no rules on cannabis use and early sexual intercourse were included. Of note, such rules have rarely been the subject of investigation, probably because they are generally implicit. Yet, parents who set boundaries regarding alcohol use and smoking may be likely to set rules about other risk behaviors, such as cannabis use, as well. Unfortunately, for the present study, data on such rules were not available. Future research may investigate the effects of cannabis-specific parenting practices on adolescent cannabis use. Additionally, the association between parenting practices regarding adolescent sexual behaviors and actual adolescent sexual activity may be investigated in more detail. As many parents find it hard to discuss sexual behaviors with their children (de Graaf et al., 2005; van Dorsselaer et al., 2010) and may therefore not set explicit rules with respect sexual behaviors, indirect rules are more likely to be set. For example, concrete rules may address sexual behaviors indirectly by setting rules with respect to going out at night, sleeping over at friends' houses, and the use of internet (e.g., to protect children from unwanted sexual solicitation or harassment by setting the rule that they should never react to sexual solicitations by strangers or people they do not know very well) (Ybarra & Mitchell, 2008).

Implications

The findings of the present study have implications for the public health domain. Our results indicate that the four risk behaviors under study are related to parental behavior in similar ways. This suggests that a broad intervention program focusing on a limited number of parenting practices (i.e., general as well as specific) may be effective in simultaneously reducing adolescent substance use and early sexual intercourse among 12- to 16-year-old youth. Such broad programs would be more cost efficient and probably have higher rates of parental compliance compared to the implementation of separate programs that target a single risk behavior.

It is important to note that an intervention study is necessary to actually conclude that such a program would be beneficial. Currently unknown factors may play a role in causing both parents to adopt certain parenting practices and adolescents to engage less in risk behaviors. Additionally, based on the current data, we do not know how parents who do not engage in certain practices would react if they were encouraged to adopt these practices. If an intervention study succeeds in demonstrating that parenting practices can be modified

and that this has a desired effect on adolescents, only then could such a program be deemed as evidence-based and be implemented. Therefore, the current study should be perceived as a modest step toward exploring the possibility of designing broader intervention programs that reduce adolescent smoking, drinking, drug use, and early sexual intercourse.

Chapter 6

Parent–adolescent sexual communication and its association with adolescent sexual behaviors: A nationally representative analysis in the Netherlands

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ABSTRACT

Sexual communication is a principal means of transmitting sexual values, beliefs, expectations, and knowledge from parents to children. Although this area has received considerable research attention, more studies with representative samples are needed to assure that findings are reflective of populations of interest. A nationally representative sample of parent–adolescent dyads ($N = 2,965$; mean adolescent age = 13.8 years) in the Netherlands was employed to examine the frequency of parent–adolescent sexual communication and its association with adolescent sexual behaviors (defined as sexual initiation, condom use, and contraceptive pill use). Nine communication topics in the areas of anatomy, relationships and rights, and protection and contraception were examined. Seventy-five percent of parents reported having discussed at least one topic multiple times with their adolescents, and 15% reported having discussed all topics multiple times. Romantic relationships were discussed most frequently. Hierarchical logistic regression analyses indicated that parent–adolescent sexual communication on protection and contraception was positively associated with adolescent sexual initiation and contraceptive pill use, but not condom use. This may reflect that adolescents, when they become sexually active, are more likely to discuss sexuality with their parents. Findings are interpreted within the context of Dutch culture, which is generally accepting of adolescent sexuality and characterized by open sexual communication.

INTRODUCTION

Adolescence is a period marked by sexual development and discovery. The role of parents in adolescents' sexual socialization and education has been widely recognized. Parent–adolescent sexual communication is considered an important part of this socialization and education process (Shtarkshall, Santelli, & Hirsch, 2007). Through sexual communication, parents convey knowledge, values, beliefs, and expectations about sex and sexuality to their children.

Parent–adolescent sexual communication is an important topic of investigation because it may have a positive influence on adolescent sexual behavior and development. For example, it may contribute to a delay in sexual initiation and to the use of condoms and the contraceptive pill among sexually active adolescents. Yet, empirical studies have shown mixed results with respect to the association between parent–adolescent sexual communication and adolescent sexual behaviors (DiIorio, Pluhar, & Belcher, 2003; Markham et al., 2010). These inconsistencies could result from the use of different methodologies across studies (Jaccard, Dodge, & Dittus, 2002). To illustrate, studies have operationalized parent–adolescent sexual communication in many different ways, including frequency and content of communication (DiIorio et al., 2002; Jerman & Constantine, 2010; Martino, Elliott, Corona, Kanouse, & Schuster, 2008), perceived comfort, knowledge, and openness of communication (DiIorio et al., 2000; Jerman & Constantine, 2010), style of communication (Pluhar & Kuriloff, 2004), and timing of communication (Clawson & Reese-Weber, 2003). Albeit the conveyance of specific messages (e.g., remaining abstinent is an effective way to protect yourself from unwanted pregnancy and sexually transmitted diseases [STDs]) has been found to be associated with later adolescent sexual initiation (Shtarkshall et al., 2007; Whitaker, Miller, May, & Levin, 1999; Wight, Williamson, & Henderson, 2006), the overall frequency of parent–adolescent sexual communication has been associated with earlier sexual initiation (Schalet, 2011). The latter association might reflect an increased willingness or need by adolescents and their parents to discuss sexual topics with each other when adolescents become involved in romantic relationships or situations that might lead to initiating sexual activity (Eisenberg, Sieving, Bearinger, Swain, & Resnick, 2006; Schalet, 2011).

When investigating the role of parent–adolescent sexual communication in adolescent sexual behavior, it is important to also consider the quality of the parent–adolescent relationship (DiIorio et al., 2003; Jaccard et al., 2002; Lefkowitz, 2002; Pluhar & Kuriloff, 2004). Consistent with Baumrind's (1966) theory of parenting styles, a high quality parent–adolescent relationship (characterized by high levels of parental support and control) has

been associated with both parent–adolescent sexual communication and adolescent sexual behaviors (Henrich, Brookmeyer, Shrier, & Shahar, 2006). Specifically, adolescents who experience high levels of parental support and control are more likely to engage in parent–adolescent sexual communication (Henrich et al., 2006) and less likely to engage in sexual risk behaviors (for a review see Markham et al., 2010).

Although research on parent–adolescent sexual communication in the past decades has resulted in increased knowledge on the topic, this area remains understudied as few published studies on this topic are based on a representative sample, and a majority of such studies are conducted in the United States (Blitstein, Evans, Davis, & Kamyab, 2012; Deptula, Henry, & Schoeny, 2010; Eisenberg et al., 2006; Jerman & Constantine, 2010; Lam, Russell, Tan, & Leong, 2008; Regnerus, 2005). Additional studies with representative samples from different parts of the world are needed to assure that the accumulated knowledge is reflective of varied populations of interest. Unlike the United States, the Netherlands has a liberal culture toward sexuality. Dutch parents are generally inclined to frame adolescent sexuality as a normative activity in the context of an intimate relationship, rather than as a dramatic force in need of control, as is often the case among parents in the United States (Santelli, Sandfort, & Orr, 2008; Schalet, 2000; 2004; 2011). Studies based in the United States tend to focus on parent–adolescent communication about abstinence and the prevention of STDs and pregnancy (Lefkowitz & Stoppa, 2006; Jerman & Constantine, 2010). Comprehensive parent–adolescent sexual communication, however, entails more than the discussion of abstinence and the use of protection and contraception; it also encompasses the discussion of nonsexual relationships, anatomy, love, respect, sexual pleasure, and decision making (Jerman & Constantine, 2010; Lefkowitz, 2002; Schalet, 2011; World Health Organization [WHO], 2012). In a qualitative study, Schalet (2011) observed that Dutch parents tend to discuss issues related to romantic relationships and sexual decision making more frequently with their adolescents than U.S. parents do, and that they tend to take adolescents' feelings of love seriously. The extent to which these qualitative findings can be generalized to the entire Dutch adolescent population, and the extent to which this type of communication is associated with adolescent sexual behaviors in a country with relatively liberal sexual values, is not clear, however.

The aim of the present study was to examine the frequency and content of parent–adolescent sexual communication during the past year in a nationally representative sample of Dutch adolescents and their parents, and to investigate their associations with adolescent sexual behaviors. We distinguished between parent–adolescent sexual communication on (a)

anatomy, (b) relationships and rights, and (c) protection and contraception. We addressed the following research questions:

1. To what extent did Dutch fathers and mothers communicate, in the past year, with their 12- to 16-year-old sons and daughters about our selection of sexual topics?
2. Is parent–adolescent sexual communication associated with adolescent sexual behaviors (defined as sexual initiation, condom use, and contraceptive pill use) after controlling for potential demographic and parent–adolescent relationship confounders?

On the basis of the tendency toward open discussion of adolescent sexuality in the Netherlands, we hypothesized that a majority of Dutch parents would have discussed at least one topic multiple times with their adolescents in the past year. In line with previous research (Dilorio et al., 2003; Jerman & Constantine, 2010; Schouten, van den Putte, Pasmans, & Meeuwesen, 2007; Swain, Ackerman, & Ackerman, 2006), we expected that mothers would talk about all sexual topics more often with their children than would fathers, and that both parents would talk about sexual topics more often with daughters than with sons. In addition, as per the findings of previous studies (Byers, Sears, & Weaver, 2008; Eisenberg et al., 2006), we expected that parent–adolescent sexual communication would occur more frequently with older adolescents than younger adolescents, except for topics related to anatomy. In addition, we expected parent–adolescent sexual communication to be positively associated with adolescent sexual initiation, condom use, and contraceptive pill use. This expectation was based on the assumption that parents and adolescents are willing or have a need to discuss sexuality to a higher extent when adolescents become involved in romantic relationships or when situations arise that might lead to sexual activity and the consequent use of protection and contraception (Eisenberg et al., 2006; Schalet, 2011). Specifically, with respect to sexual initiation, we expected a positive association with communication about relationships and rights and communication about protection and contraception. With respect to condom and pill use among sexually active adolescents, we expected a positive association with communication about protection and contraception.

METHOD

Sample

The sample was drawn from the Dutch Health Behavior in School-aged Children (HBSC) survey, which is a World Health Organization collaborative, cross-national study on young people's health and health-related behaviors, as well as the social context of young people's health (Currie et al., 2012). Data from Dutch students in the first through fourth year of secondary education (12–16 year olds) were collected via an anonymous self-report questionnaire at secondary schools from October to November, 2009. Schools were randomly selected from a governmental list of all secondary schools in the Netherlands after stratification based on urbanicity. In total, 68 schools (47% of the schools that were approached) participated in the study. Per school, four classes were randomly selected from a list of all classes in the first through fourth year (one class per grade). The questionnaires were administered in these classes by research assistants during a lesson (usually 50 minutes). Only students whose parents did not object to their child's participation in the study, and who volunteered to participate, were included in the study. Students who were absent on the day of administration did not get a second chance to complete the survey. In addition to the adolescents, their parents were also invited to participate in the study. Each adolescent received a sealed envelope for their parents (either mother or father), which contained a parent questionnaire and an accompanying letter. The adolescents were instructed to deliver the envelope to one of their parents the same afternoon. Three weeks later, adolescents were given a written reminder to deliver to their parents. The adolescent and parent questionnaire were linked by a bar code. To prevent matching errors, researchers checked whether the gender and birth date of the adolescent on the parent and adolescent questionnaire corresponded.

In total, 5,719 adolescents and 2,991 parents completed the questionnaires (the response rate was 93% for adolescents and 53% for parents). Illness was the main reason for absence among adolescents. Of the 2,991 parent–adolescent dyads in our sample, 26 adolescents were outliers in terms of their age (i.e., 17 or 18 years old). The final sample consisted of 2,965 dyads. Table 6.1 presents the demographic characteristics of the adolescents and parents who participated in the survey. Compared with nonresponding parents, the parents who returned the questionnaire had children who were (a) younger, $t(5,717) = 10.05, p < .001$; (b) more often in academic educational tracks, $\chi^2(1, N = 5,719) = 209.77, p < .001$; (c) less likely to have an ethnic minority background, $\chi^2(1, N = 5,716) = 320.34, p < .001$; and (d) more likely to be from two parent families, $\chi^2(1, N = 5,714) = 41.07, p < .001$. With respect to child's gender, no

Table 6.1 Demographic characteristics of adolescents and parents who participated in the survey

Demographic characteristic	<i>n</i>	%
Adolescents		
Gender		
Male	1,510	51.1
Female	1,443	48.9
Age		
12	556	18.8
13	751	25.4
14	666	22.6
15	722	24.5
16	258	8.7
Race and ethnicity		
Native Dutch	2,695	91.3
Ethnic minority	256	8.7
Missing	1	0.0
Educational track		
Vocational	1,420	48.1
Academic	1,533	51.9
Family structure		
Living with both biological parents	2,427	82.2
Not living with both biological parents	520	17.6
Missing	6	0.2
Parents		
Gender		
Male	504	17.1
Female	2,439	82.6
Missing	10	0.3
Age		
Under 30	7	0.2
30–39	301	10.3
40–49	2,198	74.4
50 and over	441	14.9
Missing	7	0.2
Race and ethnicity		
Native Dutch	2,651	89.8
Ethnic minority	184	6.2
Missing	118	3.9
Education		
Elementary school	45	1.5
High school (vocationally oriented)	654	22.2
High school (academically oriented)	292	9.9
College	864	29.3
Graduate school	986	33.4
Missing	112	3.8

Note. *N* = 2,965. Numbers and percentages are weighted for adolescent gender, age, grade, and level of urbanization and are, therefore, representative of Dutch youth in the first four grades of secondary education.

differences between adolescents of nonresponding and responding parents were found: $\chi^2(1, N = 5,719) = 4.83, p = .028$. Furthermore, adolescents of responding parents were less likely to be sexually active, $\chi^2(1, N = 5,378) = 82.61, p < .001$, but we found no differences between sexually active adolescents of nonresponding and responding parents with respect to condom use, $\chi^2(1, N = 591) = .45, p = .570$, and contraceptive pill use, $\chi^2(1, N = 540) = 1.65, p = .207$.

Measures

Parent–adolescent sexual communication (parent report). The HBSC survey included a series of closed-ended questions about sexual communication, completed by the parents: “During the past year, have you spoken with your child about the following topics related to romantic relationships and sexuality . . . (a) being in love and having a romantic relationship, (b) physical differences between boys and girls, (c) physical changes during puberty, (d) physical contact you do and do not feel comfortable with, (e) pregnancy and contraceptives, (f) the use of condoms to prevent STDs, (g) the fact that you should not do sexual things you do not want to do, (h) the fact that you should not do sexual things that your partner does not want to do, and (i) homosexuality?” Response options were no; yes, once; and yes, multiple times. On the basis of these nine items, we constructed three scales for the present study by taking the mean of a subset of items. The first scale, measuring parent–adolescent communication on topics related to autonomy, included Items b and c (Cronbach’s alpha = .81). The second scale, measuring parent–adolescent communication on topics related to relationships and rights, included Items a, d, g, h and i (Cronbach’s alpha = .85). The third scale, measuring parent–adolescent communication on topics related to protection and contraception, included Items e and f (Cronbach’s alpha = .88).

Adolescent sexual behaviors (adolescent report). The HBSC survey included a series of closed-ended questions completed by the adolescents about their sexual behavior. The first question was, “Have you ever had sexual intercourse (*some people call it ‘having sex,’ ‘going all the way’ or ‘sleeping together?’*)?” Response options were yes and no. The second and third questions were, “The last time you had sexual intercourse, did you or your partner use the pill to prevent pregnancy?” and “The last time you had sexual intercourse, did you use a condom?” Response options were yes, no, and I never had sex.

Quality of the parent–adolescent relationship (adolescent report). Three indicators of the quality of the parent–adolescent relationship were included in our model: (a) parental support; (b) parental knowledge of adolescents’ friends, activities, and whereabouts; and (c) parental monitoring.

Perceived parental support was measured by six items, reflecting the subscale on emotional support from the Relational Support Inventory (Scholte, van Lieshout, & van Aken, 2001): (a) "My parents show me that they admire me"; (b) "In my parents' eyes, I do everything wrong"; (c) "My parents show me that they love me"; (d) "My parents often make me look ridiculous"; (e) "My parents support me in my activities"; and (f) "My parents treat me aggressively." Answer categories ranged from 1 (*definitely not true*) to 5 (*definitely true*). For the present study, we constructed a scale based on these six items (Cronbach's alpha = .84).

Perceived parental knowledge of adolescents' friends, activities, and whereabouts was measured by four items (shortened version of Rispens, Hermanns, and Meeus' (1996) measure): "How well do your parents know... (a) who your friends are, (b) how you spend your money, (c) where you go after school, and (d) how you spend your free time?". Response categories ranged from 1 (*they know little*) to 3 (*they know much*). For the present study, we constructed a scale based on these four items (Cronbach's alpha = .76).

Perceived parental monitoring was measured by three items (shortened version of Stattin and Kerr's (2000) measure of behavioral control): (a) "Before you leave the house, do your parents want to know with whom or where you are going?"; (b) "Do you need your parents' permission to go out at night?"; and (c) "If you go out at night, do your parents want to know afterward with whom or where you were?" Response categories ranged from 1 (*never*) to 5 (*always*). For the present study, we constructed a scale based on these three items (Cronbach's alpha = .73).

Covariates (adolescent report). Adolescent gender, age (12–16 years), ethnicity (ethnic minority vs. native Dutch background), educational track (vocational vs. academic), and family structure (living with both biological parents vs. not) were used as covariates in the analyses predicting adolescent sexual behaviors.

Analyses

To address our first research question, on the extent to which Dutch mothers and fathers communicate about sexuality with their adolescent sons and daughters, descriptive analyses were conducted on the nine sexual communication topics by parent and adolescent gender and adolescent age. Analyses were performed using SPSS 20.0. For each communication topic, cross-tabulations were used to assess the hypothesized subgroup differences according to adolescent age and gender; statistical significance was determined by Pearson's chi-square test. The overall effect of parental gender on parent–adolescent sexual communication was

assessed by means of a *t* test. To control for Type I errors due to the large amount of tests, we only considered subgroup differences statistically significant at $p < .01$.

To address our second research question, on the association between parent–adolescent sexual communication and adolescent sexual behaviors, descriptive analyses of adolescent sexual behaviors were performed in SPSS 20.0 by adolescent gender and age. For each sexual behavior, cross-tabulations were used to assess subgroup differences according to adolescent age and gender; statistical significance was determined by Pearson's chi-square test. Next, the association with parent–adolescent sexual communication was tested for each behavior (i.e., sexual intercourse, condom use, and pill use) by means of hierarchical regression analysis in SPSS 20.0. In each model, adolescent sociodemographic factors were entered first, followed by the three constructs reflecting the quality of the parent–adolescent relationship in the second step, and parent–adolescent sexual communication in the third step.

As the data used for this study were collected in a cluster randomized trial, design effects were estimated to decide on accounting for nonindependence due to cluster sampling. As the design effect (based on possible cluster effects at the classroom level, which is more conservative than at the school level) was smaller than 2, accounting for cluster sampling was not imperative (Muthén & Satorra, 1995).

To better enable us to generalize the results to the Dutch school-going population of this age, a weighting procedure was applied. Poststratification weights were calculated by comparing the joint sample distributions and known population distributions of the child's educational track, grade, gender, and level of urbanization in 2009 (national statistics were obtained from Statistics Netherlands, <http://www.cbs.nl/en-GB/menu/home/default.htm>). There were no missing data on sociodemographic indicators. Missing data on parenting ranged from 3.2% (parental support and parent–adolescent sexual communication) to 4.3% (parental knowledge).

Missing data on adolescent sexual behaviors ranged from 6.8% (sexual initiation) to 14.3% (pill use, among sexually active adolescents). Listwise deletion for missing values was employed for all variables. Indices of multicollinearity (eigenvalues, condition indices, and variance proportions) were examined, and no problems were identified.

RESULTS

Research question 1

Overall, 97% of parents discussed with their adolescents at least one of the nine sexual topics at least once in the past year, and 63% discussed all topics at least once in the past year. A lower, but still considerable proportion of parents discussed the sexual topics multiple times: 75% of parents discussed at least one of the nine sexual topics multiple times, and 15% of parents discussed all topics multiple times in the past year. The mean number of topics discussed was 6.6 (at least once) and 2.7 (multiple times), out of 9 topics.

With respect to the discussion of specific topics (multiple times in the past year), romantic relationships were discussed by the greatest proportion of parents (60.2%). Other topics were discussed by a smaller, but still considerable proportion of parents: 53.1% of the parents indicated having discussed with their children not doing anything sexually they do not want to do; 43.6% talked with their children about not doing anything sexually their partner does not want to do; 47.5% discussed the use of contraception, and 46.1% discussed the use of protection. Physical changes during puberty and physical gender differences were discussed by 44.7% and 37.7% of the parents, respectively. Physical contact you do and do not feel comfortable with and homosexuality were discussed least often, yet still almost one third of parents indicated that they discussed these topics multiple times with their adolescents in the past year.

Table 6.2 presents the prevalence of parent–adolescent sexual communication by parent gender and by adolescent age and gender. With respect to parental gender, we found that mothers talked about a greater number of topics with their adolescents than did fathers, $t(728) = 3.83, p < .001$. With respect to adolescent gender, we found that parents were more likely to communicate about sexual topics with daughters than with sons. For mothers, this was true for all communication topics, $\chi^2(1) = 6.44\text{--}19.47, ps < .01$, except romantic relationships, $\chi^2(1) = 3.36, p = .07$, not doing any sexual things one's partner does not want to do, $\chi^2(1) = 23.25, p = .08$, and the use of condoms to prevent STDs, $\chi^2(1) = 5.08, p = .03$.

Differences according to adolescent age were also pronounced, especially among mothers. Mothers were more likely to talk with older sons and daughters, as compared with younger sons and daughters, about romantic relationships and the use of contraceptives and condoms, $\chi^2(4) = 14.62\text{--}57.43, ps < .01$. In addition, with respect to daughters only, mothers were more likely to discuss not doing any sexual things one or one's partner does not want to do with older daughters as compared with younger daughters, $\chi^2(4) = 21.41\text{--}27.28, ps <$

Table 6.2 Percentage of fathers and mothers who have discussed selected sexual topics multiple times in the past year with their adolescent, by adolescent gender and age

Parent gender by adolescent gender and age	Physical gender differences	Sexual topics in parent-adolescent communication					
		Anatomy	Physical changes during puberty	Romantic relationships	Saying "No"	Respecting "No"	Homo-sexuality
Fathers							
Sons							
12-year-olds (<i>n</i> = 70)	23.7	20.9	30.4	11.5	13.3	14.7	11.2
13-year-olds (<i>n</i> = 78)	20.4	31.5	25.1	6.2	21.0	21.6	14.7
14-year-olds (<i>n</i> = 68)	20.7	33.2	40.9	11.4	31.4	29.0	21.7
15- to 16-year-olds (<i>n</i> = 57)	18.0	29.9	31.7	6.9	22.1	22.1	13.2
χ^2 (adolescent age differences—sons)	0.90	2.69	3.78	1.72	6.51	4.28	3.15
Daughters							
12-year-olds (<i>n</i> = 41)	32.4	48.8	20.2	22.2	28.7	26.2	5.3
13-year-olds (<i>n</i> = 52)	38.9	49.4	40.6	24.8	39.8	22.6	4.6
14-year-olds (<i>n</i> = 54)	27.5	43.1	41.9	14.1	34.1	28.2	17.7
15-year-olds (<i>n</i> = 55)	40.8	42.0	50.0	26.9	64.0	40.4	8.5
16-year-olds (<i>n</i> = 29)	20.6	41.2	40.4	17.9	37.2	20.2	41.3
χ^2 (adolescent age differences—daughters)	4.71	0.82	9.49	3.21	15.02**	5.38	6.80
χ^2 (adolescent gender differences—fathers)	9.91**	14.06***	3.36	15.33***	23.25***	3.23	7.56**
							8.27
							23.20***
							5.08

Mothers							
Sons							
12-year-olds (<i>n</i> = 225)	30.2	40.0	23.7	13.6	24.1	22.9	20.7
13-year-olds (<i>n</i> = 326)	29.9	38.5	32.3	13.0	24.6	23.1	24.0
14-year-olds (<i>n</i> = 264)	30.2	37.8	30.5	14.3	25.5	26.1	23.6
15-year-olds (<i>n</i> = 317)	21.7	33.2	26.8	13.1	26.9	28.9	19.8
16-year-olds (<i>n</i> = 102)	28.0	29.5	45.8	14.8	30.0	31.8	22.8
χ^2 (adolescent age differences—sons)	7.91	5.50	18.61**	0.39	1.72	5.71	2.48
Daughters							
12-year-olds (<i>n</i> = 220)	38.5	59.9	38.6	20.0	33.3	21.8	29.0
13-year-olds (<i>n</i> = 293)	35.3	61.1	47.0	26.3	44.8	31.1	33.8
14-year-olds (<i>n</i> = 278)	40.8	56.7	50.1	26.0	48.8	31.0	31.3
15-year-olds (<i>n</i> = 300)	35.2	47.6	50.9	31.0	52.4	36.9	29.9
16-year-olds (<i>n</i> = 116)	31.8	45.8	60.9	31.0	59.2	44.2	27.8
χ^2 (adolescent age differences—daughters)	4.05	17.14**	16.77***	8.55	27.28***	21.41***	2.40
χ^2 (adolescent gender differences—mothers)	22.35***	82.14***	85.32***	64.04***	116.71**	11.13**	23.24***
χ^2 (parent gender differences)							
							68.18***
							29.72***
							3.83***

Note. STDs = sexually transmitted diseases. The *n* for fathers who participated in the survey and had 16-year old sons was only 12; therefore, the 16-year old sons were combined with the 15-year old sons (*n* = 45; *n* = 57 in total). Exact formulation of the items: 'During the past year, have you spoken with your child about the following topics related to relationships and sexuality: physical differences between boys and girls; physical changes during puberty; being in love and having a romantic relationship; physical contact you do and do not feel comfortable with; the fact that you should not do sexual things you do not want to do; homosexuality; pregnancy and contraceptives; the use of condoms to prevent STDs. ** *p* < .01. *** *p* < .001.

.001. Among fathers, a greater proportion discussed not doing any sexual things one does not want to do with older daughters than with younger daughters, $\chi^2(4) = 15.02, p = .005$. In addition, a greater proportion of fathers discussed the use of condoms to prevent STDs with older sons as compared with younger sons, $\chi^2(3) = 11.31, p = .010$. The only topic discussed more often with younger adolescents than with older adolescents was physical changes during puberty, and we found this only for mothers discussing the topic with daughters, $\chi^2(4) = 17.14, p = .002$.

Research question 2

Descriptive data. To examine the association between parent–adolescent sexual communication and adolescent sexual behaviors, we first conducted descriptive analyses of adolescent sexual behaviors.

Table 6.3 presents the percentage of adolescents who engaged in sexual intercourse, and the percentage of sexually active adolescents who used a condom or the contraceptive pill at

Table 6.3 Descriptive statistics of adolescent sexual behaviors

Adolescent gender and age	Sexual initiation %	Condom use at last sexual intercourse ¹ %	Contraceptive pill use at last sexual intercourse ¹ %
Boys			
12 (<i>n</i> = 294)	2.0	2	2
13 (<i>n</i> = 405)	1.3	2	2
14 (<i>n</i> = 332)	6.3	2	2
15 (<i>n</i> = 365)	13.9	90.6	38.2
16 (<i>n</i> = 114)	36.4	71.8	61.5
χ^2 (age differences—boys)	169.91***	5.38*	4.33
Girls			
12 (<i>n</i> = 261)	0.0	2	2
13 (<i>n</i> = 346)	1.1	2	2
14 (<i>n</i> = 334)	5.5	2	2
15 (<i>n</i> = 357)	20.4	75.8	57.8
16 (<i>n</i> = 144)	25.9	49.7	83.7
χ^2 (age differences—girls)	149.57***	6.96*	7.36**
χ^2 (gender differences)	0.61	5.26*	5.24*

Note. *N* = 2,965.¹ Among adolescent who are sexually active, *n* = 206.² The *n* for the subgroup is too small to produce meaningful estimates. If the *n* was too small for 12-, 13-, and 14-year-olds, chi square tests are based on 15- and 16-year-olds only. * *p* < .05. ** *p* < .01. *** *p* < .001.

their last sexual intercourse. Sexual initiation was more prevalent among older adolescents, ranging from only 2% (boys) and 0% (girls) at age 12 to 36% (boys) and 26% (girls) at age 16. There were no statistically significant gender differences in sexual initiation.

Among sexually active students, prevalence rates of condom use at last sexual intercourse averaged 74%. With respect to pill use, 56% of sexually active adolescents indicated that they or their partner used it at their last sexual intercourse. Boys were more likely to report condom use, whereas girls were more likely to report contraceptive pill use. Furthermore, 16-year-old boys and girls were less likely to report condom use compared with 15-year-old boys and girls. Finally, 16-year-old girls were more likely to report contraceptive pill use than 15-year-old girls. For boys, there were no significant age differences in contraceptive pill use.

Regression analyses

Before conducting a hierarchical regression analysis predicting sexual initiation, and – among sexually active adolescents – condom and contraceptive pill use, we conducted zero-order correlation analyses between parent–adolescent sexual communication, adolescent sexual behaviors, and parent–adolescent relationship quality (see Table 6.4). All three types of parent–adolescent sexual communication were positively correlated. Sexual initiation was positively associated with parent–adolescent communication about relationships and rights and protection and contraception. Among sexually active adolescents, pill use was positively associated with parent–adolescent sexual communication about protection and contraception, but condom use was not. Furthermore, parental support, knowledge, and monitoring were negatively associated with sexual initiation, but not with condom and pill use.

Table 6.5 presents the results of a series of hierarchical regression analyses. With sexual initiation as the dependent variable, in Step 1, only adolescent age, adolescent educational track, and living with both parents were statistically significant predictors, $\chi^2(5) = 295.59, p < .001$, Nagelkerke $R^2 = .24$. In Step 2, after controlling for the demographic covariates, high parental support and knowledge of adolescents' friends, activities, and whereabouts were each negatively predictive of adolescent sexual initiation, but parental monitoring was not, $\chi^2(8) = 341.76, p < .001$, Nagelkerke $R^2 = .27$. In Step 3, after controlling for demographic covariates and parent–adolescent relationship quality factors, only parent–adolescent sexual communication about protection and contraception was positively predictive of adolescent sexual initiation, $\chi^2(11) = 382.88, p < .001$, Nagelkerke $R^2 = .30$. Comparison of log-likelihood ratios for the different models showed significant improvement with the addition of parent–adolescent relationship quality as well as parent–adolescent sexual communication.

Table 6.4 Zero-order correlations between parent-adolescent sexual communication, adolescent sexual behaviors, and parent-adolescent relationship quality

Sexual communication			Sexual behaviors			Relationship quality		
Anatomy	Love	Protection	Sexual initiation	Condom use ¹	Pill use ¹	Parental support	Parental knowledge	Parental monitoring
Sexual communication								
Anatomy	—	.65***	.51***	-.00	.07	.06	.11***	.07***
Love	—	—	.74***	.11***	-.00	.12	.01	.00
Protection	—	—	—	.19***	-.01	.28***	-.02	-.01
Sexual behaviors								
Sexual initiation	—	—	—	n/a	n/a	-.15***	-.13***	-.09***
Condom use ¹	—	—	—	—	-.29***	.05	.02	.03
Pill use ¹	—	—	—	—	—	.12	.08	-.07
Relationship quality								
Parental support	—	—	—	—	—	—	.39***	.21***
Parental knowledge	—	—	—	—	—	—	—	.24***
Parental monitoring	—	—	—	—	—	—	—	—

Note. N = 2,965.

¹ Among sexually active adolescents.
*** p < .001.

Table 6.5 Summary of hierarchical logistic regression analyses predicting adolescent sexual initiation and condom and contraceptive pill use among sexually active adolescents

Model	Adolescent sexual initiation ¹			Condom use among sexually active adolescents ²			Contraceptive pill use among sexually active adolescents ²		
	B	SE B	OR (95% CI)	B	SE B	OR (95% CI)	B	SE B	OR (95% CI)
Step 1									
Adolescent male gender	0.11	0.15	1.12 (0.84–1.49)	0.48	0.31	1.61 (0.87–2.97)	-0.89	0.31	0.41 (0.22–0.75)**
Adolescent age	0.99	0.08	2.70 (2.33–3.13)***	-0.19	0.19	0.83 (0.57–1.21)	0.59	0.20	1.81 (1.24–2.66)***
Academic educational track	-0.35	0.07	0.71 (0.62–0.81)***	0.08	0.16	1.08 (0.79–1.47)	-0.13	0.16	0.88 (0.64–1.20)
Native Dutch ethnicity	-0.35	0.25	0.71 (0.43–1.16)	-0.52	0.63	0.59 (0.17–2.03)	1.47	0.64	4.36 (1.26–15.14)*
Living with both parents	-0.46	0.18	0.63 (0.45–0.89)**	0.22	0.36	1.25 (0.62–2.51)	-0.61	0.37	0.55 (0.27–1.12)
Step 2									
Parental support	-0.50	0.25	0.41 (0.25–0.67)***	-0.09	0.25	0.99 (0.96–3.50)	0.27	0.25	1.30 (0.80–2.13)
Parental knowledge of adolescents' friends, activities, and whereabouts	-0.89	0.25	0.41 (0.25–0.67)***	0.17	0.45	1.18 (0.49–2.88)	-0.03	0.44	0.97 (0.41–2.32)
Parental monitoring	-0.04	0.09	0.96 (0.81–1.14)	0.22	0.19	1.25 (0.86–1.82)	-0.27	0.20	0.76 (0.52–1.12)
Step 3									
Parent-adolescent sexual communication									
Anatomy	-0.15	0.08	0.86 (0.74–1.00)	0.15	0.15	1.17 (0.87–1.57)	0.13	0.15	1.14 (0.84–1.54)
Relationships and rights	0.03	0.05	1.03 (0.94–1.13)	-0.04	0.10	0.97 (0.80–1.17)	-0.15	0.10	0.87 (0.71–1.06)
Protection and contraception	0.37	0.08	1.45 (1.24–1.70)***	0.07	0.18	1.07 (0.75–1.52)	0.44	0.20	1.56 (1.06–2.29)*

Note. Model fit for adolescent sexual initiation: $\chi^2(5) = 295.59$ for Step 1 ($p < .001$), $\Delta\chi^2(3) = 46.18$ for Step 2 ($p < .001$), $\Delta\chi^2(3) = 41.12$ for Step 3 ($p < .001$).

Model fit for condom use among sexually active adolescents: $\chi^2(5) = 5.34$ for Step 1 ($p = .38$), $\Delta\chi^2(3) = 1.77$ for Step 2 ($p = .62$), $\Delta\chi^2(3) = 1.79$ for Step 3 ($p = .62$). Model fit for contraceptive pill use among sexually active adolescents: $\chi^2(5) = 28.95$ for Step 1 ($p < .001$), $\Delta\chi^2(3) = 3.21$ for Step 2 ($p = .36$), $\Delta\chi^2(3) = 7.04$ for Step 3 ($p = .07$).

¹ N = 2,965. ² n = 206.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Among sexually active adolescents, with condom use as the dependent variable, in Step 1, none of the demographic variables was associated with condom use, $\chi^2(5) = 5.34, p = .38$, Nagelkerke $R^2 = .04$. In Step 2, after controlling for the demographic covariates, none of the variables reflecting the quality of the parent–adolescent relationship was associated with condom use, $\chi^2(8) = 7.11, p = .53$, Nagelkerke $R^2 = .05$. In Step 3, after controlling for demographic covariates and parent–adolescent relationship quality factors, none of the sexual communication scales was predictive of adolescent condom use, $\chi^2(11) = 8.90, p = .63$, Nagelkerke $R^2 = .06$. Comparison of log-likelihood ratios for the different models showed no significant improvement with the addition of parent–adolescent relationship quality or parent–adolescent sexual communication.

Among sexually active adolescents, with pill use as the dependent variable, in Step 1, female gender, age, and a native Dutch ethnicity were associated with contraceptive pill use, $\chi^2(5) = 28.95, p < .001$, Nagelkerke $R^2 = .18$. In Step 2, after controlling for the demographic covariates, none of the variables reflecting the quality of the parent–adolescent relationship was associated with pill use, $\chi^2(8) = 32.16, p < .001$, Nagelkerke $R^2 = .20$. In Step 3, after controlling for demographic covariates and parent–adolescent relationship quality factors, only parent–adolescent sexual communication about protection and contraception was positively associated with contraceptive pill use, $\chi^2(11) = 39.20, p < .001$, Nagelkerke $R^2 = .24$. Comparison of log-likelihood ratios for the different models showed no significant improvement with the addition of parent–adolescent relationship quality or parent–adolescent sexual communication.

DISCUSSION

Adolescence is a developmental period marked by sexual discovery and often by sexual risk. Sexual communication is a principal means for parents to transmit sexual values, beliefs, expectations, and knowledge to their adolescents to help them grow in sexually healthy adults. In parent–adolescent sexual communication, parents can educate and help socialize their adolescents, and adolescents can raise questions and concerns related to sexuality. This study examined the frequency of parent–adolescent communication on a variety of sexual topics in a nationally representative sample of Dutch adolescents and their parents, and tested whether this communication – after controlling for adolescents’ demographics and the quality of the parent–adolescent relationship – was associated with adolescent sexual behaviors.

Three main findings emerged. First, as expected, the majority (75%) of Dutch parents had communicated multiple times about at least one of the presented topics related to sexuality

with their adolescents in the past year. Romantic relationships were the most frequently discussed topic, followed by topics related to respecting your own and your partner's wishes, and the use of protection and contraception. The high prevalence of parent–adolescent sexual communication among Dutch parents and their adolescents are consistent with Schalet's (2011) observation that adolescent sexuality is generally accepted by Dutch parents, meaning that they do not typically object to their adolescents' becoming sexually active. Consequently, their concerns are focused not only on abstinence and prevention, but also on their adolescents' being securely and steadily attached to their partner and feeling ready before they become sexually active. The most intimate aspects of sexuality, such as physical contact that is considered pleasant and unpleasant, were discussed least often, potentially due to greater embarrassment with these topics, which is also consistent with Schalet's (2011) research.

In line with previous research (DiIorio et al., 2003; Swain et al., 2006), we found that, overall, mothers were more likely to talk with their adolescents than were fathers, and both mothers and fathers were more likely to talk with their daughters as compared with their sons. In addition, parent–adolescent sexual communication occurred more frequently with older adolescents, although findings differed across topics. With increasing sexual communication, various challenges arise for parents, often tied to their less-than-optimal knowledge and comfort levels, including what is appropriate to cover at what age (Jerman & Constantine, 2010; Schalet, 2011). To become or remain effective sexual communicators, education and support should be widely available for parents.

The second main finding of this study was that, as hypothesized, parent–adolescent communication on protection and contraception was positively associated with adolescent sexual initiation. Although causal inferences cannot be confirmed in this study due to the observational nature of our data, this finding may reflect that as adolescent sexual debut "moves from the hypothetical to the real" (Schalet, 2011, p. 140), sexual communication between parents and adolescents intensifies. Parents who suspect or know that their child is becoming sexually active may be more inclined to point out to him or her the necessity of using protection and contraception. At the same time, sexually active adolescents may approach their parents with questions or concerns about the use of condoms and the contraceptive pill. The identified positive association does, thus, not necessarily reflect a risk association nor imply that, if parents talk to their adolescents about sex, their adolescents will have sex sooner.

The third main finding of this study was that condom use among sexually active adolescents was not associated with any type of parent–adolescent sexual communication,

whereas contraceptive pill use was associated with sexual communication about protection and contraception. The nonsignificant results with respect to condom use may be explained by the widespread public health safe-sex campaigns and easy access to condoms in the Netherlands. As a Dutch interviewee in Schalet's (2011) research said, "It's like they're stoning you to death with all the safe-sex messages" (p. 172). This makes adolescents less dependent on their parents with respect to information on or access to protection and contraception. Naturally, this does not mean that parents cannot have a protective influence on adolescents' condom use. Their influence may, however, be embedded in a sociocultural context that is already supportive of the use of protection. A Dutch boy interviewed by Schalet (2011) illustrated how safe sex and condom use messages are so widespread in the media that talking about condom use with parents is not necessary: [I heard so much about protection and contraception from the] "papers, television, and stories [that] it goes without saying that you use them. You really do not need to talk about it" (p. 172). With respect to pill use, the situation is different, as girls may discuss pill use with their mother before or while using it, in part because they are concerned about the health consequences and because they need to visit a doctor to get a subscription (Schalet, 2011).

An additional finding of interest from this study is that, although parental support and knowledge were associated with a lower likelihood of adolescent sexual initiation, parental monitoring was not. This finding is consistent with some previous findings (Sieverding, Adler, Witt, & Ellen, 2005), but it contrasts with others (DiClemente, Crosby, & Wingood, 2002; Wight et al., 2006). The nonsignificant results for parental monitoring in the present study might be explained by the measure of parental monitoring we relied upon, which reflects adolescents' reporting of parental solicitation (i.e., parents asking their adolescent where he or she is going and with whom). Recent research has shown that adolescent disclosure (adolescents' willingness to tell their parents where they go and with whom) is more reflective of a high-quality parent–adolescent relationship than parental solicitation and, consequently, also more predictive of adolescent behavioral outcomes (Kerr, Stattin, & Burk, 2010; Stattin & Kerr, 2000). As such, our findings that parental support and knowledge were associated with adolescent sexual behaviors, while parental solicitation was not, confirm previous research (see Markham et al., 2010 for a review) underlining the importance of parent–adolescent connectedness in adolescent sexual health.

The present study has several unique strengths, such as the use of a large, nationally representative dataset in a country known for its liberal sexual standards and open discussion on sexuality, and the examination of a wide range of sexual communication topics and their

independent associations with adolescent sexual behaviors. Its findings, however, must be interpreted within a number of limitations. First, our study was based on cross-sectional observational data, which impedes the development of causal inferences. Second, our operationalization of parent–adolescent sexual communication was limited to the frequency of communication, and adolescent sexual behaviors included in this study were limited. Although the repeated discussion of sexual topics has been related to greater openness of parent–adolescent sexual communication (Martino et al., 2008), our study did not include measures related to the quality of the communication, the comfort and openness with which parents and adolescents discussed the sexual topics, and the way in which information was conveyed. Furthermore, we were constrained in our study of adolescent sexual behaviors by the items included in the HBSC survey, which is a large-scale, quantitative survey that focuses on wide variety of adolescent health topics. A third limitation is that we only had parental reports of parent–adolescent sexual communication. Research suggests that parents and their children often have different perceptions of frequency and extent of sexual communication, with gaps in agreement on whether discussions even occurred let alone on what was discussed (e.g., see DiIorio et al., 2003; Jaccard, Dittus, & Gordon, 1998). Moreover, adolescent perceptions and reports have been found to be more predictive of adolescent sexual behavior than parent reports (Jaccard et al., 1998). As such, our estimates of parent–adolescent sexual communication may be positively biased, while our estimates of the association between parent–adolescent sexual communication and adolescent sexual behaviors are likely to be attenuated. Finally, while our measure of parent–adolescent sexual communication included a wide range of communication topics, reflecting both positive and negative aspects of sexuality, our measure of adolescent sexual behavior was limited to sexual initiation, condom use, and contraceptive pill use. This was largely due to the limited availability of measures in the HBSC study, which covers many different aspects of adolescent health and well-being. Future studies should also examine positive aspects of sexual behavior, including adolescents' subjective experiences and sexual satisfaction.

This study provides a valuable initial insight into parent–adolescent sexual communication in the Netherlands, a nation that tends to frame adolescent sexuality as a normative activity in the context of intimate relationships. In this sense alone, the societal and cultural environments in Netherlands are quite distinct from those in the United States, where the nation as a whole seems to be “pushing the river” when it comes to adolescent sexuality. In the Netherlands, adolescent sexuality is not about initiation of sexual activity per se (or the delay of such activity as is the focus in the United States as a whole), but rather initiation

of sexual activity with the guidance and support of adults and society as a whole. The high frequency of parent-adolescent sexual communication in our study suggests that even in the context of the Netherlands' liberal culture toward sexuality, widespread public health safe-sex campaigns, and easy access to condoms, parents play an important role in their children's sexual socialization process. With respect to the identified positive association between parent-adolescent sexual communication and adolescent sexual initiation, we propose that this association does not necessarily reflect a risk association, as has been suggested in previous studies. Rather, adolescent sexual development and behavior may influence parent-adolescent sexual communication. Longitudinal research on the potentially bidirectional links between parent-adolescent sexual communication and adolescent sexual behavior is needed to disentangle the causal nature of the identified associations. Finally, this study contributes to the discussion of how the context (i.e., national culture, including the widespread public health safe-sex campaigns) in which parent-adolescent sexual communication takes place may influence the strength of associations between the communication and adolescent sexual behaviors. Future comparative research might investigate the effect of this context in more detail.

“It takes a village to raise a child.”

African proverb.

Part III

**The role of national context
in adolescent substance use
and sexual activity**

Chapter 7

Trends in educational differences in adolescent daily smoking across Europe, 2002–2010

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ABSTRACT

Background: Across Europe, tobacco use is more prevalent among secondary school students attending vocational tracks compared to students attending academic tracks. The purpose of the present study is to describe trends in social inequality in daily smoking among adolescents between 2002 and 2010 by addressing both absolute social inequality (prevalence difference between vocational and academic tracks) and relative social inequality (prevalence ratio) in seven European countries. **Method:** Analyses were based on data from 15-year-olds who participated in the *Health Behaviour in School-aged Children* (HBSC) study in 2002, 2006 and 2010 in Belgium, Croatia, France, Germany, Hungary, Italy, and the Netherlands (total $N = 32,867$). **Results:** Overall, daily smoking decreased between 2002 and 2010 in Belgium, France, Germany and the Netherlands, increased in Croatia and remained stable in Hungary and Italy. Considerable differences in daily smoking according to educational track existed in all countries. Absolute educational inequalities increased dramatically in Croatia and Italy, while relative inequalities showed a tendency to increase in all countries (significant in Belgium and the Netherlands). **Conclusions:** Conclusions on social inequality in adolescent smoking may appear differently when described by absolute and relative measures. Especially the large increase in absolute educational inequalities in daily smoking in Croatia and Italy are worrisome and warrant attention from the public health domain. The findings underline the need for appropriate smoking policies and interventions in vocational schools across Europe.

INTRODUCTION

Previous research in a wide variety of countries demonstrated that adults with a higher educational status are less likely to smoke than adults with a lower educational status (Adler & Ostrove, 1999; Cavelaars et al., 2000; Giskes et al., 2005; Huisman & Kunst, 2005; Mackenbach, Bakker, Kunst, & Diderichsen, 2002; Mackenbach et al., 2008; Schaap, 2010). While the graded relationship between educational level and smoking in adulthood has been the subject of intense research, far less is known about the magnitude and the pattern of educational differences in smoking among adolescents (Richter & Leppin, 2007; Wardle et al., 2003; West, 1997). This is surprising as evidence of such an early life-course relationship would be a matter of concern. Moreover, the study of the development of educational inequalities in smoking during adolescence may provide a better understanding of the origins of socioeconomic differences in adult health and may identify possible pathways by which adult health inequalities are produced and reproduced (Case, Paxson, & Vogl, 2007; Starfield, Riley, Witt, & Robertson, 2002).

A few national studies have provided evidence of a relationship between educational track and adolescent tobacco use in Belgium (Vereecken, Maes, & De Bacquer, 2004), Germany (Richter & Leppin, 2007), Slovakia (Geckova, Van Dijk, Groothoff, & Post, 2002), and Sweden (Hagquist, Sundh, & Eriksson, 2007). Due to different methods of data collection and analysis, international comparative studies have not been performed yet. This is a major gap in the literature as it is unclear whether the findings of existing studies can be generalized to other European countries with different educational systems, health care provision, and levels of welfare.

Moreover, recent studies of adult populations in Europe have demonstrated that the relation between educational status and smoking has changed, with smoking increasingly becoming a phenomenon typical for individuals of lower educational status (Giskes et al., 2005; Pampel & Denney, 2011). It is unclear whether a similar development has occurred among adolescents. Recent studies showing the lower effectiveness of smoking prevention programs among adolescents of lower educational status (Mercken et al., 2012) suggests that the educational gap in smoking may be widening among adolescents as well. A lack of social support (Pampel & Denney, 2011), lower confidence in the ability to quit smoking, and higher nicotine dependence among the lower educated (Monsó, Campell, Tønnesen, Gustavsson, & Morera, 2001) may contribute to this widening gap.

The aims of the present study are (1) to identify educational differences in adolescent smoking in seven European countries and (2) to test whether the relationship between

educational track and adolescent smoking changed over time between 2002 and 2010 in these countries. Educational inequalities can be assessed by both absolute and relative measures. Relative measures (e.g., prevalence ratios, odds ratios, relative index of inequality) are appropriate when answering research questions on aetiology. Absolute measures (e.g., prevalence differences, slope index of inequality) may especially be useful for individual and clinical purposes and for decision-makers on public health issues (Rasmussen, Due, Damsgaard, & Holstein, 2009). In the present study, we present changes in social inequality in daily smoking by both absolute and relative measures of inequality.

METHOD

The analyses were based on data from the Dutch, German, Belgian, Italian, French, Hungarian and Croatian *Health Behaviour in School-aged Children* (HBSC) study. Since 1983/84, cross-sectional surveys of 11-, 13- and 15-year-old adolescents have been carried out every four years in a growing number of countries based on an internationally agreed protocol. A detailed description of the HBSC study can be found elsewhere (Roberts et al., 2009).

The seven countries included in this study were selected because they (1) had an educational system with different educational tracks and (2) had registered the educational track of each respondent within their sample. The analyses of the present study are limited to the data collection waves from 2001/02, 2005/06 and 2009/10 as the Netherlands, Italy, and Croatia only joined the study in 2001/02.

All samples were nationally representative, except for the Belgian sample (i.e., this sample was representative only for the Flemish region) and the German sample; due to the differing school systems across the federal states in Germany the present study could only include German data from the federal states of Northrhine Westphalia and Hesse in 2002 and 2006, and from three additional states (Bayern, Niedersachsen, and Schleswig-Holstein; five states in total) in 2010. In 2010, Germany had a national survey for the first time. The three states were added to the sample in 2010 to have comparable sample sizes across survey years. All five states had a comparable school system. To control for differences in the composition of states in the different samples, all analyses on the German sample were controlled for federal state. Logistic regressions and ANOVAs revealed no differences between the initially included federal states and those that were added to the sample in 2010 with respect to daily smoking ($OR = 1.05 (.73\text{--}1.52)$), gender ($OR = 1.04 (.83\text{--}1.30)$), family affluence ($F(4, 1234) = 1.57, p = .18$), and adolescent academic achievement ($F(4, 1260) = 1.27, p = .28$).

Sample

All surveys used identical protocols considering target group, sampling, and data collection. Samples were drawn by systematic cluster sampling in which the primary sampling units were either school classes or entire schools. The fieldwork took place between Autumn 2001/2005/2009 and Spring 2002/2006/2010. Only students whose parents did not object to their child's participation in the study and who volunteered to participate were included in the study. Participating countries and regions obtained institutional ethics approval. Response rates within classes ranged from 69% (Germany, 2010) to 96% (Hungary, 2010), with the main reasons for absence being illness and a lack of informed consent from parents.

In most countries, adolescents are not allocated to a specific educational track before the age of 15, therefore, the analysis for the present study was limited to 15-year-olds. In total, 32,867 students (15,874 male and 16,993 female) were included in the study. The characteristics of the different samples are presented in Table 7.1.

Instrument and variables

Data were collected by means of a standardized questionnaire ensuring anonymity and confidentiality to the students, and administered in the classroom.

Daily tobacco smoking. Smoking status was defined on the basis of the question 'How often do you smoke tobacco at present?' Original answer categories (*never, less than weekly, weekly but not daily, daily*) were recoded into *no daily smoking* and *daily smoking*. As daily smoking is a crucial aspect of nicotine dependence (Jarvis, 2004), daily smoking adolescents have an increased likelihood of smoking in the future and developing smoking-related health problems leading to premature deaths (Hublet et al., 2006).

Educational track. As the participating countries in this study had different educational systems, we provide a short description of how the educational tracks in the different countries were categorized as either low, medium, or high (see Table 7.2). The choice for a specific educational track or school type generally depends on students' achievement in previous school years, but is also influenced by parents' socioeconomic status (especially its cultural and intellectual aspects (Herweijer, 2010) and access to social capital (Eriksson, Dahlgren, Janlert, Weinehall, & Emmelin, 2010).

Table 7.1 Trends in adolescent weekly alcohol use by country and region

Country	Belgium			Croatia			France			Germany		
	2002	2006	2010	2002	2006	2010	2002	2006	2010	2002	2006	2010
Survey year												
N	1,830	1,424	1,102	1,446	1,601	2,410	2,614	2,222	1,740	1,367	1,892	1,268
Gender												
% boys	49.0	50.9	56.7	43.3	46.7	49.3	49.8	51.3	47.8	47.5	49.3	46.0
Mean age	15.5	15.5	15.5	15.4	15.6	15.5	15.1	15.6	15.5	15.7	15.4	15.4
Educational track												
% Acad (high)	48.7	46.6	34.2	24.3	26.2	29.5	75.9	91.5	91.0	34.1	34.7	42.7
% Acad (medium)	—	—	—	—	—	—	—	—	—	14.3	18.8	9.4
% Acad (low)	33.5	31.6	47.5	45.2	41.1	48.6	—	—	—	26.4	26.3	28.2
% Vocational	17.8	21.8	18.2	30.5	32.6	22.0	24.1	8.5	9.0	25.2	20.3	19.7
Country	Hungary			Italy			Netherlands					
Survey year	2002	2006	2010	2002	2006	2010	2002	2006	2010			
N	1,310	1,117	1,641	1,220	1,255	1,315	1,273	1,363	1,457			
Gender												
% boys	38.0	45.0	45.1	44.3	50.4	51.3	50.0	49.3	50.1			
Mean age	15.5	15.5	15.5	15.9	15.8	15.5	15.5	15.5	15.4			
Educational track												
% Acad (high)	80.6	84.4	90.6	35.7	49.5	45.1	17.4	17.2	21.9			
% Acad (medium)	—	—	—	—	—	—	—	23.8	20.4	20.2		
% Acad (low)	—	—	—	42.3	32.4	40.5	34.8	33.7	36.4			
% Vocational	19.4	15.6	9.4	22.0	18.2	14.4	24.0	28.7	21.6			

Table 7.2 Overview of the classification of educational tracks per country

Country	Educational track	Classification
Belgium / Croatia / Italy	General secondary education / Gymnasium / Lyceum	Academic (high)
	Technical secondary education	Academic (low)
	Professional / vocational secondary education	Vocational
France / Hungary	Academic track	Academic
	Vocational track	Vocational
Germany	Gymnasium (grammar school)	Academic (high)
	Gesamtschule (comprehensive school)	Academic (medium)
	Realschule (intermediate school)	Academic (low)
	Hauptschule (general secondary school)	Vocational
The Netherlands	VWO (high academic education)	Academic (high)
	HAVO (medium academic education)	Academic (medium)
	VMBO-theoretical track (lower academic education)	Academic (low)
	VMBO-basic track (vocational training)	Vocational

Statistical analyses

Analyses were performed for each country separately as it was difficult to directly compare the different national school systems. Overall prevalence rates of adolescent daily smoking and prevalence rates per educational track were presented for each year separately. Absolute time trends were estimated by calculating the difference in raw prevalence between 2002 and 2010. Relative time trends were estimated by means of a logistic regression model in Mplus (version 6.11) (Muthén & Muthén, 1998-2010). Survey year was included in the model as two dummy variables, with 2002 being the reference category. The odds ratio of the year 2010 was presented as an indication of the trends. The analyses were controlled for differences across the years in the distribution of adolescents across educational tracks and for cluster effects (school as primary sampling unit). As no cluster variable was available for the German samples, we used $\alpha = .001$ to be more conservative for these samples.

Gender differences in overall trends were tested through interaction effects by means of a multiple group logistic regression analysis in each country, testing whether the trends in daily smoking were similar for boys and girls. If the model allowing gender differences had a better fit than the model in which trends were fixed to be equal across gender (based on the χ^2 difference test), results were presented separately for boys and girls. Otherwise, the overall trend analyses were controlled for gender.

Differences in daily smoking according to educational track were analysed for each survey year separately. Educational inequality was assessed by means of an absolute measure (i.e., by calculating the prevalence difference in daily smoking between adolescents in vocational and academic tracks) and a relative measure (i.e., by calculating the odds ratio indicating the relative likelihood that vocational students smoke daily compared to academic students). To examine gender differences, interaction effects were tested as described above.

To test whether the absolute differences in daily smoking according to educational track had changed over time, the change in prevalence difference scores between 2002 and 2010 was calculated. To test whether relative differences had increased between 2002 and 2010, a multiple group logistic regression analysis was performed with survey year as grouping variable. Two models were compared: a model in which differences in daily smoking according to educational track were allowed to increase across survey years, and a model in which they were not. If the model allowing an increase in the differences according to educational track had a better fit (based on the χ^2 difference test), it was concluded that differences had increased.

RESULTS

Overall prevalence and trends

Table 7.3 presents the prevalence rates of daily smoking among adolescents in the different educational tracks by country and survey year. In 2002, overall prevalence rates differed considerably across countries. Italian adolescents smoked least (15.8% daily smokers), while German adolescents smoked most (27.5% daily smokers). In 2010, German adolescents smoked least (10.2% daily smokers). Croatia, which scored among the lowest in 2002, had the highest prevalence in 2010 (19.7% daily smokers).

Absolute trend analyses revealed that adolescent daily smoking decreased especially strongly in Germany (-17.3%), but also in the Netherlands (-7.3%), Belgium (-7.2%), and France (-5.2%). In Croatia, adolescent daily smoking increased (+2.8%). Differences in prevalence between 2002 and 2010 in Hungary and Italy were very small. The relative trend analyses confirmed this pattern. The results of the logistic regressions revealed that the prevalence of adolescent daily smoking between 2002 and 2010 decreased significantly in Germany, the Netherlands, Belgium, and France; increased in Croatia; and remained stable in Italy and Hungary.

Table 7.3 Adolescent daily smoking according to educational track by country and survey year (2002–2010)

Country	2002 (%)	2006 (%)	2010 (%)	Trend 2002–2010 Absolute (%) ¹	Trend 2002–2010 Relative (OR, 95% CI) ²
Belgium					
Total	18.1	11.9	10.9	-7.2	0.66 (0.59–0.74)
Educational track					
Academic (high)	9.8	5.4	3.2	-6.6	0.58 (0.45–0.73)
Academic (low)	24.2	11.6	10.9	-13.3	0.59 (0.49–0.71)
Vocational	29.8	26.3	25.5	-4.3	0.89 (0.71–1.10)
Absolute educational difference (OR, 95% CI) (Voc-Acad) ¹	20.0	20.9	22.3	+2.3	
Relative educational difference (OR, 95% CI) (Voc-Acad) ²	2.16 (1.79–2.61)	2.65 (2.05–3.42)	3.29 (2.47–4.38)*		
Croatia					
Total	16.9	20.0	19.7	+2.8	1.17 (1.02–1.35)
Educational track					
Academic (high)	10.3	9.8	9.6	-0.7	0.97 (0.68–1.39)
Academic (low)	18.1	16.7	19.5	+1.4	1.06 (0.88–1.28)
Vocational	20.0	32.3	33.7	+13.7	1.52 (1.22–1.89)
Absolute educational difference (OR, 95% CI) (Voc-Acad) ¹	9.7	22.5	24.1	+14.4	
Relative educational difference (OR, 95% CI) (Voc-Acad) ²	1.53 (1.07–2.20)	2.39 (1.88–3.05)	2.51 (2.01–3.12)		
France					
Total	19.8	14.3	14.6	-5.2	0.89 (0.79–0.99)
Educational track					
Academic	16.3	13.6	13.4	-2.9	0.88 (0.78–1.00)
Vocational	31.0	22.3	29.0	-2.0	0.85 (0.61–1.20)
Absolute educational difference (OR, 95% CI) (Voc-Acad) ¹	14.7	8.7	15.6	+0.9	
Relative educational difference (OR, 95% CI) (Voc-Acad) ²	1.63 (1.38–1.93)	1.44 (1.08–1.91)	1.73 (1.28–2.34)		

Table 7.3 continues on next page

Table 7.3 *Continued*

Country	2002		2006		2010		Trend 2002–2010 Relative (OR, 95% CI) ²	
	(%)	(%)	(%)	(%)	Absolute (%) ¹			
Germany								
Total	27.5	14.9	10.2		-17.3		0.54 (0.47–0.61)	
Educational track								
Academic (high)	14.5	7.7	3.0		-11.5		0.39 (0.30–0.52)	
Academic (medium)	29.5	18.4	13.4		-16.1		0.49 (0.33–0.71)	
Academic (low)	25.6	15.2	12.0		-13.6		0.60 (0.48–0.76)	
Vocational	41.2	24.9	21.8		-19.4		0.55 (0.43–0.72)	
Absolute educational difference (%) (Voc-Acad) ¹	26.7	17.2	18.8		-7.9			
Relative educational difference (OR, 95% CI) (Voc-Acad) ²	2.38 (1.95–2.90)	2.13 (1.75–2.59)	3.00 (2.27–3.95)					
Hungary								
Total	19.0	17.5	18.3		-0.7		1.04 (0.87–1.24)	
Educational track								
Academic	15.5	15.0	16.4		+0.9		1.03 (0.84–1.26)	
Vocational	33.1	31.0	36.4		+3.3		1.11 (0.84–1.45)	
Absolute educational difference (%) (Voc-Acad) ¹	17.6	16.0	20.0		+2.4			
Relative educational difference (OR, 95% CI) (Voc-Acad) ²	1.78 (1.49–2.13)	1.71 (1.28–2.28)	1.87 (1.44–2.43)					

	Absolute educational difference (%) (Voc-Acad) ¹	Relative educational difference (OR, 95% CI) (Voc-Acad) ²		
Italy				
Total	15.8	14.0	15.8	+0.0
Educational track				
Academic (high)	13.6	11.6	11.5	-2.1
Academic (medium)	16.1	12.6	17.2	+1.1
Academic (low)	18.7	22.8	25.4	+6.7
Vocational				
Absolute educational difference (%) (Voc-Acad) ¹	5.1	11.2	13.9	+8.8
Relative educational difference (OR, 95% CI) (Voc-Acad) ²	1.24 (0.94–1.65)	1.57 (1.17–2.10)	1.71 (1.29–2.27)	
Netherlands				
Total	19.2	14.1	11.9	-7.3
Educational track				
Academic (high)	8.6	3.4	1.9	-6.7
Academic (medium)	11.1	7.6	7.1	-4.0
Academic (low)	18.4	14.6	14.0	-4.4
Vocational	34.3	24.6	22.6	-11.7
Absolute educational difference (%) (Voc-Acad) ¹	25.7	21.2	20.7	-5.0
Relative educational difference (OR, 95% CI) (Voc-Acad) ²	2.69 (2.08–3.47)	3.10 (2.10–4.59)	3.83 (2.71–5.44)*	

¹ Absolute differences refer to the differences in raw percentages (2010–2002 for trends and Vocational-Academic for educational differences)

² Relative differences (ORs) were calculated by means of logistic regression models adjusted for gender and cluster effects. To calculate the relative educational differences, educational track was entered as: (a) dummy variable(s) in the model. The highest academic track was the reference category. The OR of the vocational track is presented. ORs gradually increased as tracks become more oriented towards vocational training (data not presented).

* The trend over time in educational differences is statistically significant ($p < .05$).

Overall trends in daily smoking did not differ between boys and girls: $\Delta\chi^2(2) = 1.40, p = .50$ for Belgium; $\Delta\chi^2(2) = 1.12, p = .57$ for Croatia; $\Delta\chi^2(2) = 1.71, p = .42$ for France; $\Delta\chi^2(2) = 1.95, p = .38$ for Germany; $\Delta\chi^2(2) = .66, p = .74$ for Hungary; $\Delta\chi^2(2) = .59, p = .74$ for Italy; and $\Delta\chi^2(2) = 2.72, p = .26$ for the Netherlands.

Differences in daily smoking according to educational track: prevalence and trends

In all countries, a pronounced gradient of educational track in daily smoking was observed. Absolute differences in daily smoking between students in vocational and academic tracks ranged from 5.1% (Italy, 2002) to 26.7% (Germany, 2002). Between 2002 and 2010, absolute differences dramatically increased in Croatia (+14.4%), and Italy (+8.8%), and to a smaller extent in Hungary (+2.4%) and Belgium (+2.3%). They decreased in Germany (-7.9%) and the Netherlands (-5.0%) and fluctuated in France.

Relative differences, as expressed by odds ratios, ranged from 1.44 (France, 2006) to 3.83 (Netherlands, 2010). Only in Italy in 2002, relative differences were not significant. Relative differences had a tendency to increase in all countries. This increase was significant in Belgium ($\Delta\chi^2(4) = 7.72, p = .05$) and the Netherlands ($\Delta\chi^2(6) = 11.70, p = .03$), but not in Croatia ($\Delta\chi^2(4) = 5.82, p = .11$), France ($\Delta\chi^2(2) = .88, p = .32$), Germany ($\Delta\chi^2(6) = 9.29, p = .08$), Hungary ($\Delta\chi^2(2) = .17, p = .46$), and Italy ($\Delta\chi^2(4) = 4.72, p = .16$).

Also with respect to the association between educational track and daily smoking, no gender differences were found: $\Delta\chi^2(2) = 1.24, p = .54$ for Belgium; $\Delta\chi^2(2) = 3.29, p = .19$ for Croatia; $\Delta\chi^2(1) = .48, p = .49$ for France; $\Delta\chi^2(3) = 4.61, p = .20$ for Germany; $\Delta\chi^2(1) = 2.25, p = .13$ for Hungary; $\Delta\chi^2(2) = 5.50, p = .06$ for Italy; and $\Delta\chi^2(3) = 1.43, p = .70$ for the Netherlands.

DISCUSSION

To our best knowledge, this is the first study to examine trends in educational differences in adolescent smoking in a cross-national perspective. The results showed that in all countries, vocational secondary school students were more likely to be daily smokers compared to academic students. Absolute educational differences in daily smoking were especially large (> 20%) in Belgium and the Netherlands. Between 2002 and 2010, they increased dramatically in Croatia and Italy. Relative differences were largest in Belgium, Germany, and the Netherlands.

They showed a tendency to increase in all countries; this increase was significant in Belgium and the Netherlands.

The cross-national consistent association between educational track and adolescent smoking confirms findings from previous national studies (Geckova et al., 2002; Hagquist et al., 2007; Richter & Leppin, 2007; Vereecken et al., 2004). While the strong association between school type and daily smoking might also be the effect of selection processes resulting from differential home environments and reflect different social norms and parental modeling behaviours related to smoking, the specific school environments could also have independent effects on smoking. With increasing age the influence of family background on adolescents decreases while the influence of peers increases (Chen, Matthews, & Boys, 2002; De Looze et al., 2012; West, 1997). Educational track may thus largely represent effects of differential peer clusters and school-related factors such as achievement motivation and school performance. Previous research has suggested a process in which peer clusters with a higher likelihood of performance problems create a ‘school-alienated’ peer climate that might be a considered a risk factor for health-compromising behaviours such as smoking (Richter & Leppin, 2007).

Both the absolute increase in educational differences in daily smoking in Croatia and Italy and the relative increase in educational differences in Belgium and the Netherlands are consistent with Rogers’ theory of diffusion of innovation (Rogers, 1995) and Lopez’ model of the smoking epidemic (Lopez, Collishaw, & Piha, 1994). According to these models, the smoking epidemic in industrialized countries has evolved in four stages (Lopez et al., 1994; Rogers, 1995). In the first stage, smoking pervades the higher educated groups (innovators). During the second stage, smoking spreads to the rest of the population, including the lower educated groups (laggards). The third stage is characterized by the start of cessation in the higher educated groups, male dominance, and a rise in female smoking. Finally, in the fourth stage, smoking declines among the higher educated groups, but remains high among lower educated groups. By the end of the 20th century, most Northern and Western European countries (Belgium, France, Germany, the Netherlands) were classified as stage four, while Southern and Eastern European countries (Croatia, Hungary, Italy) were classified as stage three (Hublet et al., 2006; Huisman et al., 2005; Lopez et al., 1994; Rogers, 1995). The overall decreasing trends identified in Western European countries, the stable or increasing trends in Southern and Eastern European countries, the absolute increase in smoking among especially vocational students in Croatia, Hungary, and Italy, and the increasing relative educational differences in Belgium and the Netherlands identified in the present study are in line with this classification.

Our study extends previous research on adult populations in Europe, which identified increasing (relative) educational inequalities in smoking behaviours in the end of the 20th century (Giskes et al., 2005). This increase among adults was explained by public health initiatives being most effective in stabilizing or cutting down tobacco consumption among the higher educated. Although our findings confirm a similar trend among adolescents in Belgium and the Netherlands, it should be acknowledged that these trends are likely to be a mathematical consequence of the general decrease in smoking prevalence and the low prevalence rates among academic students in these countries. More concerning than these relative increases are the increases in daily smoking among vocational students in Croatia, Hungary and Italy.

To our best knowledge, only three previous studies examined trends in educational differences in smoking among European adolescents. A German study found that between 1994 and 2002, the impact of educational track on smoking remained virtually unchanged in adolescent boys and girls (Richter & Leppin, 2007). A Finnish study found that absolute differences in smoking according to school performance increased among adolescents in Finland between 1977 and 2007 (Doku, Koivusilta, Rainio, & Rimpela, 2010). Finally, a Danish study found that social inequality (according to parental occupational status) in adolescent smoking (both absolute and relative) fluctuated between 1991 and 2006 (Rasmussen et al., 2009). The present study, based on more recent data and a larger number of contrasted countries, provides a comprehensive overview of the development over time in educational differences in adolescent smoking across Europe.

Study strengths and limitations

The HBSC study presents an outstanding opportunity to analyse cross-national trends in tobacco smoking and inequalities in tobacco smoking among young people in industrialized countries. The strengths of this study include the use of a large cross-national dataset and a standardized protocol with respect to the data collection adhered to in all countries. Limitations include the use of self-report of tobacco use. In general, self-reported smoking prevalence has been considered a valid indicator of the actual smoking status (Dolcini, Adler, Lee, & Bauman, 2003; Patrick et al., 1994), especially in epidemiological studies. However, tobacco smoking is a normatively loaded topic and there may be an uneven distribution of social desirability effects among different socioeconomic and cultural groups, which could lead to an overestimation of educational differences in tobacco use. In order to underline the importance of honest responses, before filling in questionnaires, students were assured of

the anonymity of the study and that neither parents nor teachers would find out about their individual answers (Brener, Billy, & Grady, 2003).

A second limitation is that our data were cross-sectional. Therefore, we cannot make any causal inferences. For example, based on the findings of this study, we cannot draw any firm conclusions on the relative importance of school climate and the effect of selection processes in recruitment of students.

Finally, although we controlled the trend analyses for differences across the years in the distribution of students across educational tracks, it is important to note that in six of these seven countries, the proportion of pupils in vocational tracks decreased from 2002 to 2010. This may reflect the context of a vertical social mobility which leaves adolescents from families with few resources in vocational tracks, i.e., vocational tracks may be qualitatively different in 2002 and 2010. Future research may examine to what extent this process influenced the trends in educational inequality in smoking.

Implications

Conclusions on social inequality in adolescent smoking may appear differently when described by absolute and relative measures. The present findings underline the need for appropriate smoking policies and interventions in vocational schools across Europe. While there is an overall trend towards a decrease in adolescent smoking in Western Europe, the stabilizing or increasing general trends in adolescent smoking in Croatia, Hungary and Italy and the accompanying increase in absolute educational inequalities in smoking in these countries are worrisome and warrant attention.

Chapter 8

Decreases in adolescent weekly alcohol use in Europe and North America: Evidence from 28 countries, 2002–2010

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ABSTRACT

This study examined trends in adolescent weekly alcohol use between 2002 and 2010 in 28 European and North American countries. Weekly alcohol use among 11-, 13-, and 15-year-old boys and girls declined in all geographic regions. These trends may be attributable to increased awareness of the harmful effects of alcohol for adolescent development or to changes in social norms and conditions. Although the declining trend was remarkably similar across countries, prevalence rates still differ considerably across countries.

INTRODUCTION

Adolescence is a developmental period marked by discovery and experimentation. Many adolescents experiment with or regularly consume alcohol. Frequent use of alcohol among adolescents consequently has been a widespread behavior in recent decades, especially in North American and Northern and Western European countries (Anderson & Baumberg, 2006; Rehm et al., 2003). Between 1998 and 2006, however, adolescent alcohol use decreased in most of these countries (Kuntsche et al., 2011), potentially due to an increased understanding of known negative effects of alcohol on adolescent development and, consequently, the implementation of associated public health programs. In this same period, substantial increases in adolescent alcohol use have been reported for several Eastern European countries (Kuntsche et al., 2003; Simons-Morton et al., 2009). Explanations for these increases include the rapid increase in wealth and availability of alcohol in Eastern Europe after its transition from communist to market economies in the late 1980s (Demetrovics, 2001). As adolescent alcohol use has recently also gained more attention in the public health domains in these countries (Anderson & Baumberg, 2006), increasing trends observed previously in Eastern European countries may have stabilized after 2006, or even started to decline as well.

The present study aimed to monitor trends in adolescent weekly alcohol use from 2002 to 2010 in 28 countries in Europe and North America, and to describe variations in these trends by gender, age, and geographical region. Focused study of variations in trends in adolescent alcohol use observed by key demographic factors can improve the targeting of preventive interventions at vulnerable groups of young people.

METHOD

We used survey data collected in the three most recent cycles of the Health Behaviour in School-aged Children (HBSC) study. Anonymous surveys were conducted in the classrooms of 11-, 13- and 15-year-olds in the academic years ending in 2002, 2006 and 2010 according to a common research protocol (Currie et al., 2012). A clustered sampling design was used, where the initial sampling unit was either the class or the school. Schools were selected to ensure that samples were representative by regional geography and other demographic characteristics, with variations in sampling criteria permitted to fit country-level circumstances. In some countries, data were weighted to ensure representativeness.

Each of the 28 participating countries (see Table A8.1 in the appendix for an overview of the sample size by country and year) obtained approval to conduct the survey from their ethics review board or equivalent regulatory institution. Responses were treated as confidential and anonymous. School response rates varied by country but were > 70% in most countries. Response rates at the student level were > 70% in almost all countries. Further information about the survey procedures can be found elsewhere (Currie et al., 2012; Roberts et al., 2009).

Measures

Weekly alcohol use

Students were asked how often that they drank beer, wine, and liquor/spirits. For each type, response options were “1 = never,” “2 = rarely,” “3 = every month,” “4 = every week,” and “5 = every day.” This variable was dichotomized by combining options 1 through 3 (indicating less than weekly alcoholic use, coded as “0”) and 4 to 5 (to reflect at least weekly alcohol use, coded as “1”).

Time

Time was included as a categorical variable reflecting the year of study (2002, 2006, 2010). To test our hypothesis that trends in Eastern Europe were stabilizing, a curvilinear time variable (time squared) was also included in the model.

Demographic predictors

Socio-demographic variables included age group (11-, 13-, and 15-year-olds), gender (boys versus girls), and country of residence.

Statistical analyses

To account for potential differences in sample composition across survey years, prevalence estimates for each country and survey year were standardized by age and gender, using the overall study population (all 28 countries combined) for 2010 as the standard. Next, regression analyses were conducted with Mplus (version 6.12) (Muthén & Muthén, 1998-2010). Trends were calculated by means of multiple group logistic regression analyses (with country as a grouping variable) in which a linear and curvilinear time variable were regressed on weekly

drinking. To examine whether trends were similar or different across geographical regions, this analysis was repeated with geographic region as a grouping variable. Group membership was based on geographical location (Northern, Western, Southern, Eastern Europe, and Anglo-Saxon countries). Finally, to test whether the trends within countries and regions differed across age and gender subgroups, we conducted a multiple group analysis with six groups (3 age groups x 2 genders).

Percentages of missing values ranged from 0 (several countries) to a maximum of 2.9 (for Danish respondents). Missing values were model estimated in Mplus.

RESULTS

Table 8.1 presents the prevalence of weekly alcohol use for boys and girls per country, categorized by geographic region. The average of weekly alcohol use ranged from less than 2.4% in Finland to over 19.6% in the Czech Republic.

Across countries, a trend towards decreasing weekly alcohol use was observed. In some countries, this decrease was linear (e.g., Canada). In other countries, the decrease was steepest between 2002 and 2006 (e.g., France) or between 2006 and 2010 (Russia). Notable exceptions to the general decline were found in 8 countries. These countries showed an increase in weekly alcohol use (Croatia), no trend (Austria, Latvia, Portugal, Slovenia) or a fluctuating trend (Czech Republic, Macedonia, Ukraine).

Table 8.1 and Figure 8.1 also present time trends by geographical region. The superscripts in Table 8.1 indicate differences in time trends by region. In all regions, weekly alcohol use decreased over time. The decrease was strongest in Northern European, Southern European and Anglo-Saxon countries, followed by Western European countries. This trend was equally strong across time periods in Anglo-Saxon countries, but especially strong between 2002 and 2006 in the other regions. In Eastern European countries, adolescent alcohol use increased slightly between 2002 and 2006, but decreased substantially thereafter.

Figure 8.1 also presents the results of the multiple group regression analysis by age group and gender. Overall, weekly drinking was most prevalent among boys and older age groups. The multiple group analysis revealed that weekly alcohol use decreased to a similar degree in all gender and age subgroups (i.e., regression coefficients did not significantly differ; data available from first author).

Table 8.1 Trends in adolescent weekly alcohol use by country and region

Region	Country	Age/gender-standardized rate per 100 children				Age/gender-adjusted linear time trend (per year of study)			Age/gender-adjusted curvilinear time trend (per year of study)		
		2002	2006	2010	B	SE	p	B	SE	p	
Anglo-Saxon countries	Canada	12.1	8.6	6.1	-0.26 ^{ab}	0.03	<.001	0.00 ^a	0.01	.001	.932
	Ireland	11.6	7.3	5.5	-0.28	0.07	<.001	0.04	0.03	.03	.215
	UK	5.5	6.4	4.1	0.19	0.09	.029	-0.14	0.04	<.001	<.001
	USA	23.5	15.3	10.2	-0.33	0.03	<.001	0.02	0.02	.02	.139
	USA	7.6	5.4	4.7	-0.22	0.08	.006	0.05	0.04	.04	.182
Western Europe	Austria	11.4	9.3	7.8	-0.18 ^a	0.03	<.001	0.03 ^a	0.01	.01	.025
	Belgium	10.5	12.2	10.8	-0.07	0.07	.318	-0.03	0.03	.03	.417
	France	13.0	11.2	8.2	-0.06	0.05	.220	-0.05	0.02	.02	.057
	Germany	7.2	7.0	6.6	-0.23	0.06	<.001	0.07	0.03	.03	.022
	Netherlands	13.3	7.0	6.5	-0.45	0.06	<.001	0.12	0.03	.03	<.001
	Switzerland	14.1	11.0	6.5	-1.00	0.07	.186	-0.08	0.04	.04	.032
	Switzerland	10.2	7.3	8.1	-1.0	0.08	.009	0.09	0.04	.04	.009
	Eastern Europe	12.2	12.3	10.1	0.06 ^c	0.02	.003	-0.06 ^b	0.01	.01	<.001
Eastern Europe	Croatia	13.6	17.0	15.6	0.23	0.06	<.001	-0.09	0.03	.03	.002
	Czech Republic	19.4	17.8	19.6	-0.13	0.06	.025	0.06	0.03	.03	.020
	Estonia	9.8	7.8	6.0	-0.35	0.08	<.001	0.07	0.04	.04	.062
	Hungary	15.7	11.4	10.4	-0.29	0.07	<.001	0.07	0.04	.04	.037
	Latvia	8.1	9.4	7.2	0.05	0.08	.530	-0.05	0.04	.04	.172
	Lithuania	9.8	6.1	6.9	-0.47	0.07	<.001	0.18	0.03	.03	<.001
	Poland	7.3	5.2	6.0	-0.35	0.07	<.001	0.14	0.04	.04	<.001
	Russia	14.5	11.4	5.5	0.00	0.05	.928	-0.13	0.03	.03	<.001
	Slovenia	12.1	10.9	11.1	-0.02	0.07	.724	0.00	0.03	.03	.818
	Ukraine	17.4	29.2	16.4	1.06	0.06	<.001	-0.54	0.03	.03	<.001
	Macedonia	6.6	8.8	6.5	0.36	0.07	<.001	-0.18	0.04	.04	<.001

Northern Europe								
	Denmark	9.3	5.3	4.1	-0.39 ^b	0.04	< .001	0.07 ^a
	Finland	18.6	11.1	8.5	-0.52	0.07	< .001	0.13
	Norway	5.1	3.7	2.4	-0.16	0.09	.068	-0.00
	Sweden	6.5	3.3	3.1	-0.46	0.09	< .001	0.16
Southern Europe								
	Greece	7.0	3.0	2.5	-0.53	1.00	< .001	0.19
	Italy	16.3	12.7	9.9	-0.24 ^{ab}	0.04	< .001	0.05 ^a
	Portugal	15.9	13.3	14.1	-0.60	0.08	< .001	0.22
		24.1	19.4	12.1	-0.14	0.06	.020	-0.04
		8.9	5.4	3.5	-1.00	0.09	.291	-0.03

Note. Due to the rising popularity of alcopops, in 2006 and 2010, an item 'alcopops' was included in the list of alcoholic drinks. Sensitivity analyses were conducted to check whether the inclusion of alcopops would influence the trends. No substantial differences in the outcomes of the trend analyses were found (results available on request).

Within columns, at the regional level, different subscripts refer to statistically significant differences at $p < .01$.

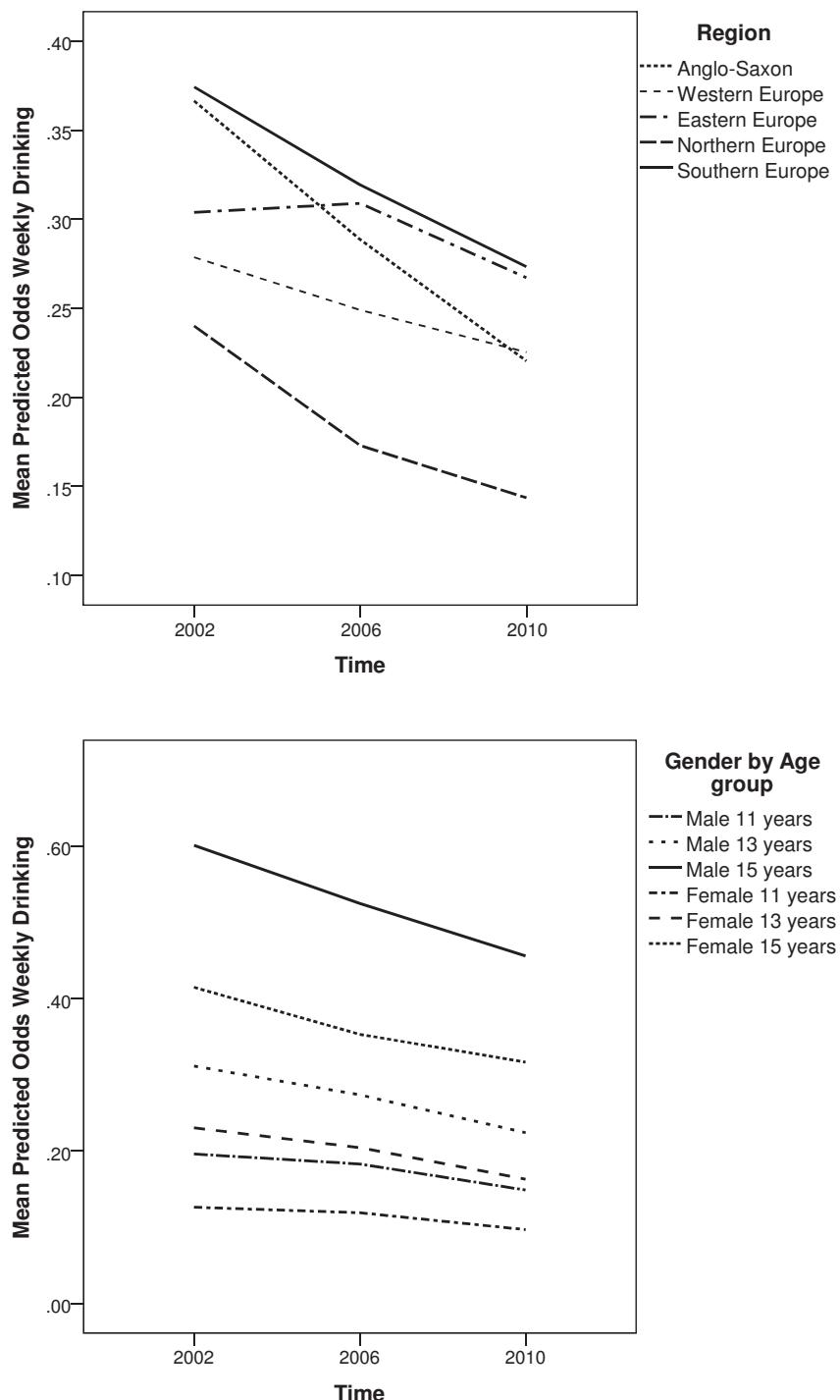


Figure 8.1 Trends in adolescent weekly alcohol use by region and by demographic group.

DISCUSSION

This study of young people from 28 European and North American countries between 2002 and 2010 identified a general decline in adolescent weekly alcohol use in Anglo-Saxon and Northern, Western and Southern European countries. In Eastern European countries, alcohol use (slightly) increased between 2002 and 2006, but declined considerably between 2006 and 2010. Across countries and regions, weekly drinking declined to a similar degree among boys and girls from all age groups.

A variety of factors might have affected the general decrease in adolescent weekly drinking, including changes in income, marketing, availability, prevention approaches, adult prevalence, and shifts in teen culture (Simons-Morton et al., 2009). Policies are in place in all Western countries to limit underage access and restrict use among those of all ages (Brand, Saisana, Rynn, Pennoni, & Lowenfels, 2007), but there appears to be a tendency toward stricter alcohol prevention in many countries over the last few years (Anderson & Baumberg, 2006; Anderson, Møller, & Galea, 2012). In addition, changes in social norms and conditions may have accounted for the observed declines.

The general decline in weekly drinking is consistent with a general decline in adolescent tobacco and cannabis use (Hublet et al., submitted for publication), sexual risk behaviors (Ramiro et al., submitted for publication), and fighting (Pickett et al., 2013) in the beginning of the 21st century in Europe and North America. Together, these studies reflect a robust pattern of decline in risk behaviors among adolescents.

Notable exceptions to the generally observed decline in adolescent alcohol use were observed in eight countries. Six of these were in Eastern Europe. The lack of a decline in these countries may be explained by rapid increases in wealth in these countries and adolescents' subsequent opportunity to be more financially independent and to consume goods that were previously unavailable, including alcohol (Jernigan, 2001).

Strengths of this study include our use of large, nationally-representative datasets, inclusion of many countries, and uniformity of the protocol across countries and time. Limitations include 1) the repeated cross-sectional study design, which makes it impossible to draw any conclusions on the causes of the observed trends; 2) the study's reliance on self-reports, which may have caused some adolescents to provide dishonest or inaccurate answers (although anonymity was stressed); and 3) our time frame was the 8-year period between 2001/02 and 2009/10, so caution should be exercised in extending these conclusions to periods before or after this time span. Finally, it is important to underline that our outcome measure was (at least) weekly drinking of beer, wine, and spirits. Different alcohol outcome measures may

exhibit different temporal patterns across countries. A decrease in weekly alcohol use does thus not necessarily imply a decrease in the quantity of alcohol consumed. Future research may examine whether trends in different drinking behaviors, such as drunkenness, are also facing a decrease.

Our study confirms the need for a deep understanding of alcohol use trends in different populations that can facilitate establishing effective policies and preventive programs. In this sense, we see a risk in the public debate of an excessive and counterproductive alarmism when considering single and extreme cases of alcohol use during adolescence, when the trend of this phenomenon over time is decreasing or at least stabilizing. Further, while observed trends in adolescent weekly drinking were remarkably similar across countries and demographic subgroups, absolute prevalence rates in weekly drinking still differ substantially across countries. Future research may examine the role of national factors, such as wealth, the availability of alcohol, and adult drinking patterns in explaining these cross-national differences.

APPENDIX

Table A8.1 Sample size by year and country

Country	N by survey cycle and gender					
	Boys			Girls		
	2002	2006	2010	2002	2006	2010
Austria	2,241	2,385	2,477	2,231	2,463	2,566
Belgium	5,065	4,511	4,071	5,547	4,276	4,121
Canada	1,996	2,809	7,822	2,365	3,121	8,097
Croatia	2,180	2,442	3,018	2,217	2,526	3,244
Czech Republic	2,412	2,416	2,145	2,600	2,366	2,280
Denmark	2,259	2,757	2,086	2,413	2,984	2,244
Estonia	1,983	2,221	2,031	1,996	2,263	2,205
Finland	2,713	2,510	3,242	2,675	2,739	3,481
France	4,054	3,559	3,030	4,131	3,596	2,990
Germany	2,786	3,668	2,429	2,864	3,606	2,576
Greece	1,870	1,762	2,404	1,937	1,953	2,540
Hungary	1,848	1,696	2,299	2,316	1,836	2,565
Ireland	1,302	2,477	2,630	1,573	2,417	2,335
Italy	2,125	1,998	2,423	2,261	1,953	2,414
Latvia	1,633	2,049	2,070	1,848	2,196	2,214
Lithuania	2,887	2,904	2,751	2,758	2,728	2,587
Netherlands	2,120	2,141	2,252	2,148	2,137	2,339
Norway	2,554	2,438	2,175	2,469	2,273	2,167
Poland	3,204	2,649	2,078	3,179	2,840	2,184
Portugal	1,419	1,884	1,878	1,521	2,035	2,158
Russia	3,752	3,892	2,576	4,285	4,339	2,598
Slovenia	1,996	2,558	2,765	1,960	2,572	2,671
Sweden	1,978	2,192	3,346	1,948	2,223	3,372
Switzerland	2,309	2,257	3,358	2,370	2,364	3,320
Ukraine	1,893	2,388	2,809	2,197	2,681	3,081
Macedonia	2,053	2,629	1,988	2,108	2,652	1,956
UK	7,193	7,553	7,646	7,179	7,829	8,103
USA	2,322	1,857	3,260	2,703	2,035	3,014

Chapter 9

Do societal wealth, family affluence, and gender account for trends in adolescent cannabis use? A cross-national study of 30 countries

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ABSTRACT

Aims: This study examines cross-national trends over time in frequent adolescent cannabis use (40+ times consumed over lifetime at age 15) and relates these trends to gender, societal wealth, and family affluence. **Design:** Cross-sectional and trend analyses of adolescent cannabis use. **Participants:** 160,606 15-year-olds from 30 European and North American countries participating in the Health Behavior in School-aged Children (HBSC) study in 2002, 2006 and 2010. **Measurements:** Respondents' life-time cannabis use, demographics, family affluence (FAS), and frequency of peer contacts were measured individually. Indicators of wealth (Gross Domestic Product per capita, GDP) and perceived availability of cannabis were obtained nationally from public databases. Analysis Trends in frequency of cannabis use were modeled in relation to individual and social correlates. Specifically, we examined how gender, societal wealth, and family affluence are associated with adolescent cannabis use, and we tested whether these associations were stable over time. **Findings:** The frequency of lifetime cannabis use decreased among adolescents in Europe and North America, particularly in Western European countries and the US. This trend is not observed consistently in the rapidly developing countries in Eastern, Central, and Southern Europe. Over time (2002–2010) cannabis use became: (1) less characteristic of high GDP countries in contrast to lower GDP countries ($RR = 0.74$: CI 0.57–0.95); (2) less characteristic of youth from high FAS families in contrast to youth from low FAS families ($RR = 0.83$: CI 0.72–0.96); and (3) (even) more characteristic of males ($RR 1.26$: CI 1.04–1.53). **Conclusions:** Adolescent cannabis use appears to have "trickled down" from richer to developing countries, and from more affluent to less affluent youth. Furthermore, it has become (even) more characteristic of adolescent males. While the overall decrease in adolescent cannabis use may be positive as it suggests a decreased risk of experiencing potential negative effects of cannabis use for young people, it may be worrisome that cannabis use is becoming more pronounced among groups of adolescents who already have less positive health profiles.

INTRODUCTION

Since the 1960's, increasing numbers of young people in industrialized, affluent countries experimented with and used drugs. Occasional use of cannabis, the most widely consumed illicit substance, has become normative among a substantial proportion of high school and university students (Costa e Silva, 2002; Hibell et al., 2000; Johnston, Bachman, & Schulenberg, 2009; Nic Gabhainn & Francois, 2000). Cannabis consumption emerged as a central component of "Bohemian" lifestyles during the 1960's and 1970's. Hippies and other young people rebelling against the culture of their parents propagated the use of cannabis and other psychotropic drugs as a way to free themselves from the narrow-minded views that they considered typical of the older generation. A highly idealistic ideology of peace, love, and freedom thus fuelled cannabis use (Miller, 1991). Whilst this middle class youth "counterculture" first popularized the use of cannabis among their middle class peers, in later years it spread to the youth population with lower socioeconomic status (SES) (Ter Bogt, 2000). In the US, adolescent cannabis use increased during the sixties and peaked in the late seventies. It again rose during the 1990's after showing a decline in the eighties. At the end of the 1990's and in the first decade of the new century, the consumption declined one more time, followed by another (slight) increase thereafter (Johnston, Bachman, & Schulenberg, 2012). Across Europe, cannabis use increased in the 1990's, and it stabilized or decreased thereafter, with the exception of a number of countries, particularly in Eastern Europe (Hibell et al., 2009; Kuntsche, Simons-Morton, Fotiou, Ter Bogt, & Kokkevi, 2009).

Although there are few known health effects of experimental or occasional cannabis use among adolescents (Substance Abuse and Mental Health Services Administration, 2004), early and frequent use is associated with a wide range of psychosocial and health problems. Literature reviews of the correlates and consequences of early and/or frequent cannabis use have suggested that the use of the drug is associated with, or it can lead to cannabis dependence and the use of other illicit drugs. These studies further related the cannabis use to cognitive impairment, memory and learning deficiencies; problems at school and school drop-out; depression, anxiety, and suicidal thoughts; and increased risks for psychoses and schizophrenia (Hall, 2006; Hall & Degenhardt, 2009; Macleod et al., 2004; Monshouwer et al., 2006; Moore et al., 2007; Solowij et al., 2011). Whilst the outcome of the debate on cannabis' real causal effects on these outcomes is still open (Fergusson, Boden, & Horwood, 2006; Macleod & Hickman, 2010; McLaren, Silins, Hutchinson, Mattick, & Hall, 2010; Minozzi et al., 2010), the range of potential problems of cannabis use is broad and serious enough to consider both early initiation and immoderate cannabis use as significant public health concerns.

The Health Behavior in School-Aged Children (HBSC) study provides a unique opportunity to study trends in cannabis use in a large number of European and North American countries by analyzing three recent data collection cycles (2002, 2006, 2010). In this study, we thereby investigated the consistency of three major individual and social determinants of cannabis use: gender, societal wealth and family affluence (FAS).

The gender gap in cannabis use

Cannabis use has been theorized and found to involve complex interactions between biological, genetic, personality, attitudinal, family, peer, and community variables (Petraitis, Flay, & Miller, 1995). In virtually all empirical research on adolescent cannabis use, gender, as a focal point of a range of biogenetic and social factors, is a key variable in predicting the use of cannabis. Across geographical areas and time, adolescent males report higher prevalence of cannabis use compared to females (Fergusson, Boden, & Horwood, 2008; Kandel, Chen, Warner, Kessler, & Grant, 1997). However, this gender effect may be changing.

During the last five decades, female smoking and drinking has increased (Amos, 1996; Holmila & Raitasalo, 2005; Schaap et al., 2009). Two cultural trends worked in the same direction. First, the growing societal wealth in western countries promoted a unique youth cultural domain, involving special products, styles, and recreational activities such as dancing and partying. These fostered the consumption of smoking, drinking, and other (il)licit substances (Ter Bogt, 2000). Parker, Aldridge and Measam (1998) even hypothesized that youth leisure in affluent countries, such as the UK, has become infused with the consumption of not only alcohol and tobacco, but also with illicit drug use, up to the point where consumption of drugs has become “normalized”. Second, the emancipation of women of the seventies and beyond has not only led to a new definition of women in relation to the domains of work and care, it has also had profound effects on their leisure time. Traditionally confined to their home, young women in particular are now frequent visitors of leisure environments, such as pubs, bars, and clubs. In these leisure environments, female smoking and drinking has become as natural as their presence in these places (Kuntsche et al., 2011).

In some European countries, females now smoke more than males do (Currie et al., 2011), and while adolescent males generally still drink alcohol more frequently and in higher amounts compared to females, the gap between boys and girls is declining (Simons-Morton et al., 2009). The use of illicit drugs is also no longer anathema for girls and, although at a lower level, female cannabis use has generally followed similar trends to that reported for males (Hibell et al., 2009). While gender is a crucial factor in substance use, trends in the potential

closing of the gender gap in cannabis use that have occurred with regard to smoking and drinking have never been studied with regard to cannabis use in a cross-national context.

Wealth and cannabis use

While individual factors and peer culture in relation to drug use have received considerable attention in the literature, links between characteristics of the wider social context and adolescent cannabis use are less investigated. In a recent cross-national study, Ter Bogt and colleagues found that social wealth is related to higher rates of cannabis use among adolescents (Ter Bogt, Schmid, Nic Gabhainn, Fotious, & Vollebergh, 2006). The authors however speculated that, historically, cannabis use might spread from richer to poorer countries within Europe and North America (*Trickling-down effect 1; between countries*). Potentially, due to the rapid development of market-oriented economies in the Central and Eastern European regions, the recent increase in societal wealth and the establishment of modern youth culture may have led to an increase in adolescent cannabis use in these countries. Indeed, the 2007 ESPAD study reported significant increases in cannabis use (1995–2007) in Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Lithuania, Poland, Slovak Republic, and Slovenia (but not in Latvia, Romania, and Ukraine).

The same authors (Ter Bogt et al., 2006) speculated that *within countries*, at a familial level, wealth fosters adolescent cannabis use due to the fact that affluent youth have increased opportunities for leisure activities within the scene of a youth culture, which might facilitate drug use. However, once cannabis also becomes more accessible to youth from a lower socioeconomic status or family affluence, cannabis use may increase among these youth as well (*Trickling-down effect 2; within countries, between classes*). In some countries, cannabis use is now already more characteristic of lower than higher SES youth (Daniel et al., 2009). Trends in cannabis use as reliant on societal or family affluence have never been studied in a broad cross-national context.

The present study

As early and frequent cannabis use among adolescents is a significant health concern, monitoring cannabis use via standardized methods and measures is of fundamental importance to public health efforts. Second, it is important to identify factors that underlie the use of cannabis and trends in its use. The present study therefore sought to:

1. describe cannabis use trends in 30 European and North American countries between 2002 and 2010;
2. examine how gender, societal wealth, and family affluence relate to cannabis use;
3. test whether the gender gap in cannabis use is closing and whether trickling down effects occur from affluent to less affluent countries and from more to less affluent youth, respectively.

As the social context of adolescents is an important, if not the most important, factor in cannabis initiation and use (Fergusson et al., 2006; Macleod & Hickman, 2010), we included (perceived) availability (Ter Bogt et al., 2006) and peer contacts (Ennett, Flewelling, Lindrooth, & Norton, 1997; Kuntsche & Jordan, 2006) as covariates in our analyses.

METHOD

Study population and procedures

Our study was based on the last three cycles of the Health Behavior in School-Aged Children (HBSC) study. School-based anonymous surveys were conducted in the academic years 2002, 2006, and 2010 according to the common international HBSC research protocol (Currie, Samdal, Boyce, & Smith, 2001). National research teams surveyed schools to produce estimates for 11-, 13-, and 15-year-old students in their countries. Schools were selected to ensure that samples were representative geographically as well as of other demographic characteristics that could predict engagement in cannabis use, with variations in sampling criteria permitted to fit country-level circumstances. Some countries oversampled subpopulations (e.g., by geography, ethnicity) and therefore survey weights were applied.

Each participating country obtained approval to conduct the survey from the ethics review board or equivalent regulatory body associated with their respective institutions/countries. Participation was voluntary and informed consent was sought from school administrators, parents, and children according to local human subject requirements. At the student-participant level, reported response rates among countries varied by survey cycle and country, for example in 2010 response rates ranged from 44% to 92%. Response rates were highest in countries with implicit consent requirements (Roberts et al., 2009; Currie et al., 2012). Illicit drug use questions in HBSC were administered to 15-year-olds only.

Measures

Data were collected at two levels. At the individual level, student questionnaires included mandatory items that measured cannabis use as well as individual, peer group, and family items (Currie et al., 2010). At the country level, data were abstracted from public data registries.

Cannabis use

The HBSC cannabis use items have been used since 1994 in all participating countries. Students reported the frequency with which they had used cannabis in their lifetime on a scale from 1 to 7, with 1 = never, and 7 = 40 or more times. Students in the last category were characterized as *frequent lifetime users* and compared with those who reported never or less frequent lifetime use.

Time

Data were collected in three consecutive surveys (2002, 2006, and 2010). Trends in frequent lifetime cannabis use were expressed in terms of changes in prevalence per four-year survey cycle.

Individual-level predictors

Gender (males vs. females) and *family affluence* (measured by the Family Affluence Scale, FAS, which is the validated HBSC measure of family socioeconomic status) (Currie et al., 2008) were included as individual predictors. FAS regards the material conditions of participant's household (car, own bedroom, holiday frequency, number of computers). Responses were summed on a 0 to 9 point scale, with scores between 0 and 3 indicating low affluence, 4 to 5 indicating medium affluence, and 6 to 9 indicating high affluence.

Two measures described involvement with peers were: *frequency of peer contacts in the evenings*, assessed by question *How many evenings per week do you usually spend out with your friends?* (0 to 7 evenings per week), and *frequency of peer contact through electronic communication*, assessed by question, *How often do you talk to your friend(s) on the phone or send them text messages or have contact through the internet?* (1 = rarely or never to, 5 = every day).

Country-level predictors

As indicators of societal wealth, estimates of gross *domestic product (GDP) per capita* (2011) were available by survey cycle and country from the World Bank. This measure represents the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products, divided by the midyear population (World Bank, 2012).

Generalized *perceived availability of cannabis* was taken from the European School Survey Project on Alcohol and Other Drugs (ESPAD). Estimates were obtained for each country using the ESPAD survey cycle that immediately preceded each HBSC survey cycle. For each country and timeframe, the percentage of ESPAD students indicating that cannabis availability was “easy” or “fairly easy” to obtain was estimated using mean responses of respondents.

Statistical analysis

Data analyses were conducted with SAS 9.3 (SAS Institute, Cary, NC, 2012). Descriptive analyses were conducted in order to characterize the international sample by survey cycle and basic demographics. Prevalence values of frequent lifetime cannabis use were then estimated by survey cycle, country, and gender. Following this initial description, we addressed various study objectives using: (1) a cross-national analysis of trends in frequent lifetime cannabis use over time (the trends analysis); (2) an analysis of predictors of frequent lifetime cannabis use at the individual, country, and temporal levels (a main effects analysis); and (3) an analysis of interactions of key predictors with survey cycle to examine possible variations in the effects of these predictors on frequent lifetime cannabis use over time (an interactions analysis).

Trends analysis. We evaluated trends in frequent lifetime cannabis use over time within each country using a Poisson regression analysis that modeled frequent use (*yes* vs. *no*) as the dependent variable and gender and time (year of survey cycle) as the independent variables. Models accounted for the clustered nature of the sampling scheme, with students nested within schools in 26 out of 30 countries. As four countries (Germany, Greenland, Slovakia, and Switzerland) had incomplete school identifiers in the early cycles, clustering by school in these countries was conducted by down-weighting their respective samples using a conservative design effect of 1.2 (Roberts et al., 2009). Coefficients and standard errors from the adjusted models were used to generate estimates of relative risk (RR) and associated 95% confidence intervals for 4-year survey cycle.

Main effects analysis. We first examined bivariate correlations between predictors of cannabis use at the country level and reported rates of frequent lifetime use by cycle using a series of exploratory correlational analyses. Next, taken all countries together, a series of multiple Poisson regression analyses were conducted to predict engagement in frequent lifetime cannabis use based upon our hypotheses and associated theories. These analyses focused on the main effects of the various predictors measured at both individual and country levels. Countries were included as random effects in these models, and random intercepts indicating baseline levels of cannabis use were also assumed by country. Due to the missing school identifiers in the aforementioned countries, we down-weighted all observations by a design effect of 1.2 in order to account for clustering at the school sampling unit level. Following bivariate analysis, a hierarchical series of models was developed as follows: Model 1 adjusted model for key individual-level predictors; Model 2 adjusted model for country-level predictors; Model 3 considered individual plus country-level predictors simultaneously; Model 4 considered individual plus country-level predictors with time (survey cycle). Model findings were presented in the form of adjusted relative risks and their associated 95% confidence intervals.

Interactions with time. In Model 5, we tested for the presence of interactions of time (survey cycle) with several key predictors measured at the individual level (gender and FAS) and the country level (GDP per capita). Two-way interactions terms (survey cycle * each predictor) were introduced individually and then together into each model. Final model results were again presented in terms of relative risks and their associated confidence intervals adjusted for the clustered nature of the data collection.

Statistical power. Because of the large available sample sizes, the overall analysis had strong power and could detect main effects in the form of relative risks of 1.02 or larger (or conversely 0.98 or lower; alpha = .05, 2 sided, design effect of 1.2). However, power to detect such effects varied at the country level depending upon the prevalence of cannabis use and available sample sizes. For example, Greenland (496 boys, 556 girls) and the United Kingdom (7,218 boys, 7,389 girls) had the smallest and largest numbers of study participants. Comparing the highest versus lowest proportions of young people reporting frequent lifetime cannabis use by survey cycle, after accounting for the clustered sample design, the power to detect differences in the observed prevalence between the highest and lowest cycles was quite modest in Greenland (42% in boys, 77% in girls) and very high (virtually 100% in both boys and girls) in the United Kingdom. Hence, modest sample sizes and an associated lack of statistical power in a few countries (see Table 9.1) may account for an absence of trends in those countries.

RESULTS

A sample of 15-year-old adolescents (weighted $N = 160,606$) from 30 countries participated in the 2002, 2006, and 2010 cycles of the HBSC survey and provided full responses to the lifetime cannabis use items (Table 9.1). There was sufficient variability in individual and country-level predictors to permit meaningful sub-analyses by gender and time and to build various regression models.

Trends in cannabis use

Reported engagement of young people in frequent lifetime use of cannabis varied widely by country, gender, and survey cycle (Tables 9.2a and 9.2b). The 10 countries with the greatest increases (2002–2010) in terms of GPD per capita were Russia, Ukraine, Slovakia, Latvia, Lithuania, Croatia, Estonia, Czech Republic, and FYR Macedonia; Slovenia ranked 13 and Hungary 14 out of 30 (data not shown). Frequent cannabis consumption stabilized or rose in all of these new market economy countries. In high GPD level Western/Southern European and North American countries, frequent cannabis use generally declined, particularly among male adolescents (Belgium, Canada, Denmark, France, Germany, Ireland, Spain, Switzerland, UK, and US) and less often among female adolescents (France, Ireland, Italy, Netherlands, Portugal, and UK). Boys universally reported higher prevalence levels compared to girls, with notable differences in the reported prevalence levels across time. Statistically significant declines were reported for boys in ten countries, mainly Western/Southern European and North American. For girls (see above), statistically significant declines were reported in six countries. Increases were observed for boys in Austria, FYR Macedonia, Latvia, Lithuania, and for girls in Russia.

Shown in Table 9.3 are the median overall percentages of frequent users across the 30 participating countries for the three time points. Prevalence levels were higher among boys compared to girls at all time points. Overall, the results show a significant decrease in frequent cannabis use among 15-year-old boys and girls between 2002 and 2010.

Main effects analysis

Table 9.4 shows the results of our Poisson regression modeling for the individual-level and country-level as well as temporal predictors of frequent lifetime cannabis use. The analysis was conducted with adjustment of standard errors for clustering and the hierachal approach to model building. A bivariate correlation analysis confirmed the potential importance of

Table 9.1 Available sample sizes by country ($N = 30$), gender and HBSC survey cycle

Country	Sample (n) by survey cycle and gender						
	Boys			Girls		Total	
	2002	2006	2010	2002	2006		
Austria	643	693	885	634	801	935	4,591
Belgium	1,658	1,562	1,349	1,753	1,468	1,218	9,008
Canada	528	1,095	2,612	679	1,194	2,829	8,937
Croatia	619	773	1,197	816	857	1,227	5,489
Czech Republic	806	842	747	854	823	775	4,587
Denmark	656	762	577	713	790	649	4,147
Estonia	619	801	661	648	786	737	4,252
Finland	867	790	1,008	874	895	1,102	5,536
FYR Macedonia	672	952	814	727	944	722	4,831
France	1,301	1,139	913	1,313	1,083	993	6,742
Germany	842	1,271	736	899	1,281	904	5,933
Greece	643	650	842	681	766	806	4,388
Greenland	100	207	189	138	210	208	1,052
Hungary	498	550	798	812	637	936	4,231
Ireland	345	914	962	574	771	733	4,299
Israel	697	758	0	850	1,239	0	3,544
Italy	541	678	764	679	657	782	4,101
Latvia	481	628	666	631	702	709	3,817
Lithuania	981	940	945	923	921	847	5,557
Netherlands	637	672	783	636	691	749	4,168
Poland	1,022	1,092	685	1,105	1,195	725	5,824
Portugal	378	613	680	422	770	873	3,736
Russia	1,138	1,238	919	1,436	1,516	928	7,175
Slovakia	0	591	961	0	661	953	3,166
Slovenia	543	780	914	509	781	901	4,428
Spain	821	1,519	962	935	1,546	1,041	6,824
Switzerland	770	733	1,138	731	767	1,108	5,247
Ukraine	730	835	881	871	994	1,016	5,327
United Kingdom	2,083	2,492	2,643	2,204	2,507	2,678	14,607
USA	754	649	968	871	635	924	4,801
All countries							
Median	664	785	883	772	812	903	4,816
Total	22,373	27,219	28,199	24,918	28,888	29,008	160,606

Table 9.2a Prevalence rates of frequent (> 40 times) use of cannabis in lifetime and temporal trend, by country: 15-year-old males

Country	Rate per 100 males			Temporal trend (change per 4 year cycle)					p	
	2002	2006	2010	β^a	SE	RR^b	95% CI			
							LL	UL		
Austria	1.8	1.7	4.2	0.518	0.200	1.68	1.13	2.48	.01	
Belgium	8.6	4.8	4.9	-0.331	0.100	0.72	0.59	0.87	<.001	
Canada	17.7	9.4	9.8	-0.250	0.073	0.78	0.67	0.90	<.001	
Croatia	2.8	3.5	2.4	-0.087	0.166	0.92	0.66	1.27	.60	
Czech Republic	5.6	4.8	4.2	-0.135	0.118	0.87	0.69	1.10	.26	
Denmark	4.0	2.0	2.2	-0.387	0.200	0.68	0.46	1.01	.05	
Estonia	1.9	3.2	2.3	0.097	0.184	1.10	0.77	1.58	.60	
Finland	1.4	1.9	1.4	0.000	0.190	1.00	0.69	1.45	1.00	
FYR Macedonia	0.2	0.2	1.3	1.349	0.514	3.85	1.41	10.6	<.001	
France	8.6	7.2	6.2	-0.171	0.083	0.84	0.72	0.99	.04	
Germany ^c	6.6	3.3	1.2	-0.799	0.164	0.45	0.33	0.62	<.001	
Greece	2.1	0.6	2.3	0.024	0.217	1.02	0.67	1.57	.91	
Greenland ^c	6.4	3.4	2.1	-0.559	0.384	0.57	0.27	1.21	.15	
Hungary	2.8	1.8	2.4	-0.067	0.206	0.94	0.62	1.40	.74	
Ireland	8.4	8.2	4.2	-0.375	0.130	0.69	0.53	0.89	<.01	
Israel	1.8	1.6	----	-0.149	0.434	0.86	0.37	2.02	.73	
Italy	4.8	2.7	3.0	-0.241	0.168	0.79	0.57	1.09	.15	
Latvia	1.1	3.0	3.4	0.449	0.209	1.57	1.04	2.36	.03	
Lithuania	0.8	1.8	2.0	0.463	0.211	1.59	1.05	2.40	.03	
Netherlands	7.0	6.2	4.9	-0.190	0.120	0.83	0.65	1.05	.11	
Poland	3.8	3.0	3.1	-0.095	0.150	0.91	0.68	1.22	.53	
Portugal	4.6	2.5	3.0	-0.210	0.178	0.81	0.57	1.15	.24	
Russia	1.4	2.8	1.6	0.084	0.169	1.09	0.78	1.51	.62	
Slovakia ^c	----	1.9	2.2	0.139	0.419	1.15	0.51	2.61	.74	
Slovenia	7.8	3.8	5.6	-0.187	0.140	0.83	0.63	1.09	.18	
Spain	12.0	8.8	5.7	-0.325	0.127	0.72	0.56	0.93	.01	
Switzerland ^c	16.2	7.3	6.7	-0.466	0.086	0.63	0.53	0.74	<.001	
Ukraine	2.1	2.0	1.9	-0.041	0.195	0.96	0.65	1.41	.83	
United Kingdom	10.9	7.4	5.4	-0.356	0.055	0.70	0.63	0.78	<.001	
USA	14.5	8.1	10.3	-0.216	0.082	0.81	0.69	0.95	<.01	
All countries	4.7	3.1	3.0	-0.223	0.021	0.80	0.77	0.83	<.001	

^a Modeled relative change in adjusted beta for lifetime cannabis use, per 4 year cycle.^b Modeled relative change in age/gender adjusted relative risks of frequent lifetime cannabis use, per 4 year cycle.^c Estimated using traditional sample down-weighting methods.

Table 9.2b Prevalence rates of frequent (> 40 times) use of cannabis in lifetime and temporal trend, by country: 15-year-old females

Country	Rate per 100 females			Temporal trend (per 4 year cycle)					p	
	2002	2006	2010	β^a	SE	RR^b	95% CI			
							LL	UL		
Austria	1.6	1.3	0.7	-0.352	0.291	0.70	0.40	1.24	.23	
Belgium	3.1	2.2	2.0	-0.262	0.147	0.77	0.58	1.03	.07	
Canada	8.1	6.5	7.2	-0.063	0.086	0.94	0.79	1.11	.46	
Croatia	1.1	1.9	1.0	-0.017	0.221	0.98	0.64	1.52	.94	
Czech Republic	2.8	2.8	2.5	-0.064	0.153	0.94	0.69	1.27	.68	
Denmark	0.6	1.3	0.8	0.106	0.303	1.11	0.61	2.01	.72	
Estonia	0.2	0.8	0.7	0.477	0.385	1.61	0.76	3.43	.22	
Finland	0.7	0.4	0.3	-0.462	0.357	0.63	0.31	1.27	.20	
FYR Macedonia ^c	0.0	0.1	0.1							
France	4.3	2.7	2.2	-0.359	0.127	0.70	0.54	0.90	< .01	
Germany ^d	1.8	2.1	0.7	-0.573	0.303	0.56	0.31	1.02	.06	
Greece	0.0	0.4	0.3	0.521	0.623	1.68	0.50	5.71	.40	
Greenland ^d	4.6	2.4	0.0	-1.775	1.070	0.17	0.02	1.38	.10	
Hungary	0.5	0.3	0.2	-0.387	0.445	0.68	0.28	1.62	.38	
Ireland	3.6	3.7	1.4	-0.426	0.208	0.65	0.43	0.98	.04	
Israel	0.4	0.4	----	0.212	0.900	1.24	0.21	7.21	.81	
Italy	3.8	1.1	1.2	-0.582	0.231	0.56	0.36	0.88	.01	
Latvia	0.0	0.3	0.3	0.815	0.729	2.26	0.54	9.43	.26	
Lithuania	0.0	0.3	0.2	0.698	0.608	2.01	0.61	6.62	.25	
Netherlands	4.1	3.4	1.5	-0.511	0.177	0.60	0.42	0.85	< .001	
Poland	0.5	0.6	0.8	0.200	0.309	1.22	0.67	2.24	.52	
Portugal	2.7	1.5	0.8	-0.615	0.245	0.54	0.33	0.87	.01	
Russia	0.2	0.5	0.8	0.716	0.345	2.05	1.04	4.02	.04	
Slovakia ^c	----	0.5	0.2							
Slovenia	4.9	1.7	3.5	-0.143	0.170	0.87	0.62	1.21	.40	
Spain	5.9	5.5	3.5	-0.211	0.138	0.81	0.62	1.06	.13	
Switzerland ^d	7.9	4.4	3.1	-0.351	0.276	0.70	0.41	1.21	.20	
Ukraine	0.5	0.3	0.1	-0.631	0.492	0.53	0.20	1.40	.20	
United Kingdom	6.3	3.9	2.1	-0.530	0.077	0.59	0.51	0.68	< .001	
USA	7.3	7.3	5.2	-0.157	0.109	0.85	0.69	1.06	.15	
All countries	1.8	1.4	0.8	-0.261	0.030	0.77	0.73	0.82	< .001	

^a Modeled change in adjusted beta for frequent lifetime frequent cannabis use, per 4 year cycle.^b Age/gender adjusted relative risks of frequent lifetime cannabis use, per 4 year cycle.^c Model did not converge.^d Estimated using traditional sample down-weighting methods.

Table 9.3 Summary of temporal trends in frequent (> 40 times) lifetime cannabis use among 15-year-olds, by gender and HBSC survey cycle

	Overall median prevalence per 100 participants for the 30 countries, by gender and survey cycle			Number of countries reporting significant linear trend between 2002 and 2010 ($p < .05$)		
	2002	2006	2010	Increase	No change	Decrease
Frequent (> 40 times) use						
Boys	4.7	3.1	3.0	4	16	10
Girls ^a	1.8	1.4	0.8	1	21	6

^a Model did not converge in two countries, n countries = 28.

all of demographic and social factors that had been hypothesized to influence cannabis use *a priori*. Individual-level risk factors (Model 1) for frequent use included male gender, lower family affluence, and increased frequency of peer contact in the form of evenings out with friends or electronic media communications. The country level risk factor analysis (Model 2) showed that perceived availability was a clear risk factor for frequent cannabis use ($RR = 1.40$), while GDP per capita was a negative predictor ($RR = 0.74$). In bivariate analyses, however, GDP was a positive predictor of adolescent cannabis use. The multivariate findings imply that in high GDP countries where availability is generally high, fewer young people report frequent use of cannabis than would be expected based on GDP alone, and vice versa.

When the individual predictors were modeled together with the country-level factors, the findings observed in Models 1 and 2 were generally replicated (Model 3) while some estimates were slightly attenuated. The time variable (survey cycle) was then added to the multivariate model. A decline in frequent use was evident with time. Observed relations with the individual-level predictors remained the same as before, and perceived availability remained associated with frequent use, but the relationships with GDP became weak and statistically non-significant (Model 4).

Interactions with time

In Model 5, we present interactions with time (survey cycle) to test whether the associations of individual-level and country-level factors with cannabis use were similar across survey cycles. The survey cycle year 2002 was used as a referent group in these analyses.

Interactions of survey cycle with gender, FAS, and GDP per capita were statistically significant. The models identified stronger associations between gender and cannabis use in the later cycles, suggesting that the effects of male gender were getting more pronounced over time. It has to be noted that though that this strong overall pattern was not consistent across all countries, with some countries demonstrating a narrowing gap (e.g., Belgium, Canada, Czech Republic, Denmark, Estonia, Germany, Poland, Russia, and Spain) and others a widening gap (e.g., Austria, Finland, France, Hungary, Ireland, Italy, Netherlands, Portugal, Ukraine, and UK) in terms of changes in the relative difference in cannabis use (male/female ratio 2002: male/female ratio 2010) (data not shown). For FAS at the individual level and GDP per capita at the country level, the models identified weaker associations between higher levels of affluence and societal wealth in later cycles (Table 9.4), indicating that the associations of high GDP and high FAS with adolescent cannabis use are waning over time.

DISCUSSION

This study explored cannabis use trends among 15-year-olds in 30 European and North American countries between 2002 and 2010. Particularly in affluent countries in Western and Southern Europe, and North America (Belgium, Canada, Denmark, France, Germany, Ireland, Italy, Netherlands, Portugal, Spain, UK, and US, a decrease in frequent cannabis consumption was observed among boys and/or girls. On the other hand, stabilization or even increases in cannabis use were found particularly in the emerging market countries that have recently experienced a rapid increase in their GDP. In three of the twelve former communist countries in Eastern, Central, and Southern Europe, cannabis use increased among boys (FYR Macedonia, Latvia, and Lithuania) and in one, it increased among girls (Russia). In the remaining nine countries, cannabis use stabilized over time.

Second, we tested whether societal and individual factors predicted differences in cannabis use. Country level factors (GDP per capita and perceived availability) both related positively to cannabis use, indicating that use is higher in richer countries and in countries where cannabis is readily available. An association was also found for individual factors such as gender, family affluence, and peer contacts, implying that males, adolescents from less affluent families, and adolescents with frequent peer contacts use more cannabis.

Third, we examined whether gender, societal wealth and family affluence were stable predictors of cannabis use over time. Male gender emerged as a risk factor that exhibited a greater importance in the later years of study. Thus, no evidence was found for the closing

Table 9.4 Results of multiple Poisson regression analysis examining individual-level, country-level and time variables as possible determinants of frequent lifetime use of cannabis, 2002 to 2010

Indicator	Model 1: Individual level (n = 145,946)	Model 2: Country level (n = 124,294)	Model 3: Individual + country (n = 116,835)	Model 4: Individual + country + time (n = 116,835)	Model 5: Interactions with time (n = 116,835)
	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)
Individual level variables					
Male gender	1.90 (1.78–2.03)		1.99 (1.84–2.15)	1.99 (1.84–2.15)	1.85 (1.62–2.11)
Family Affluence Scale Per unit increase (3 levels)					
Medium vs. High	1.16 (1.08–1.24)		1.13 (1.04–1.23)	1.12 (1.03–1.22)	
Low vs. High	1.46 (1.30–1.63)		1.39 (1.22–1.59)	1.36 (1.20–1.56)	
Frequency of peer contact – days Frequency of electronic contact	1.41 (1.39–1.43) 1.06 (1.04–1.09)		1.41 (1.39–1.43) 1.07 (1.04–1.10)	1.40 (1.38–1.43) 1.08 (1.04–1.11)	1.37 (1.34–1.41) 1.08 (1.04–1.11)
Country level variables					
GDP per capita – per 1.0 SD	0.74 (0.67–0.81)	0.76 (0.69–0.84)	1.00 (0.85–1.17)	1.67 (1.18–2.37)	
Perceived availability – per 1.0 SD	1.40 (1.24–1.57)	1.27 (1.11–1.45)	1.22 (1.06–1.39)	1.05 (0.83–1.32)	

Time				
Per 4 year cycle (2002 referent)		0.86	(0.79-0.93)	
2006 vs. 2002		0.83	(0.48-1.42)	
2010 vs. 2002		1.37	(0.75-2.49)	
Interactions with time (2002 referent)				
Male gender * Cycle				
2006 vs. 2002		1.01	(0.84-1.21)	
2010 vs. 2002		1.26	(1.04-1.53)	
Increased FAS (3 levels) * Cycle				
2006 vs. 2002		0.91	(0.79-1.04)	
2010 vs. 2002		0.83	(0.72-0.96)	
GDP per 1.0 SD * Cycle				
2006 vs. 2002		0.82	(0.65-1.02)	
2010 vs. 2002		0.74	(0.57-0.95)	

Note. No data were available on perceived availability for Canada and the US; these countries were excluded from the analysis.

of the gender gap in cannabis use. Furthermore, over time, adolescent cannabis use became less characteristic of high GDP countries compared to low GDP countries, and it became less characteristic of youth from high affluent families compared to youth from low affluent families.

A potential explanation for our surprising finding that cannabis use has become increasingly characteristic of adolescent males from 2002 to 2010, in contrast to our hypothesis that the gender gap in adolescent cannabis use would be decreasing, may be our focus on frequent lifetime cannabis use as opposed to occasional cannabis use. While many girls may engage in occasional and experimental use, frequent use of cannabis (an illicit substance in the vast majority of the countries under study) suggests connections to users and traders of illegal substances operating underground with whom boys rather than girls are more likely to associate. With declining rates of cannabis use, cannabis may become an even more non-mainstream drug of choice, further concentrating in areas with an illegal, tough reputation. Hence, for girls, the threshold they have to cross in order to become a regular user may be systematically higher than for boys. This threshold may have become even higher in the last decade, resulting in lower prevalence of use among girls. Further research should explore whether the de-normalization of cannabis use has affected girls more than it did boys.

More in line with our expectations, our results provided evidence supporting the hypothesis of “*Trickling-down*” effect 1 and 2. While cannabis use used to be characteristic of countries with a high GDP and of individuals with high familial wealth, adolescents from less affluent countries over time have increasingly resembled their peers from richer countries, and adolescents from less affluent families have increasingly resembled their wealthier peers. Here, a parallel with recent trends in (adolescent) tobacco use becomes visible. Historically, tobacco use was more prevalent in countries with higher societal wealth and among individuals with higher SES (Hublet et al., 2006; Huisman et al., 2005; Lopez, Collishaw, & Piha, 1994). More recently, however, poorer countries and individuals of lower SES have followed the pattern laid out by more affluent countries and groups. Nowadays, tobacco use tends to be more prevalent in poorer countries and among poorer individuals in Europe and North America (Hublet et al., 2006; Huisman et al., 2005; Lopez et al., 1994). As the route of administration is most often similar for tobacco and cannabis, i.e., cannabis is usually smoked with tobacco, the decline in tobacco use in richer countries and among higher SES youth may be closely related to the observed decline in adolescent cannabis use.

Both for tobacco and cannabis, the recent decrease in especially richer countries and among higher SES groups may be explained by the recently increased attention for, and

knowledge of, the harmful effects of substance use for young people and the subsequent implementation of prevention measures aimed at reducing substance use (e.g., European Commission, 2009). According to Mackenbach and McKee (2013), wealthy countries are more likely to implement such measures because “people in more advanced industrialized societies have been shown to shift their priorities from basic economic and physical security towards subjective well-being, self-expression and quality of life” (p. 196). This implies that they “look more to the future and invest in measures that will enhance future health” (p. 196). Thus, while wealth in earlier decades fostered adolescent substance use due to increased opportunities for use (i.e., because of increased availability and the existence of a flourishing youth culture), nowadays, more restrictive national health policies in wealthy countries may have contributed to the observed decrease of adolescent cannabis use. This may also explain the weakened effect of GDP and family affluence on adolescent cannabis use that was identified in this study. Future research on the mechanisms through which national policies might affect adolescent cannabis use are however necessary to test this hypothesis.

Limitations

This study has a number of limitations. First, this study assumed “trickling-down” processes from richer to poorer countries and from more affluent to less affluent families. Although our results did not bring forward evidence that contradicted these potential trends, we did not measure “trickling-down” effects directly. Our study design did not involve the measurement of modeling, imitation, or transmission of cannabis use behaviors from one country to another or from affluent to less affluent youth. Future studies should incorporate such measures as a more direct test of such “trickling-down” theories. Second, in this study, we did not investigate several possible determinants of frequent cannabis use, including personality factors, such as sensation seeking and disinhibition or genetic and biological markers. Although we included an important set of social and individual factors in our models and showed that they contributed to cannabis use independently, a more elaborate model of cannabis use should also include additional biological, genetic, and personality factors, as well as their interactions. Third, we only evaluated life time measures of cannabis use and we could therefore not discriminate between current frequent users and youth that may have experimented with the drug at a lower frequency across a longer period of time. However we recall that our study included relatively young, 15-year-old students. The 2010 HBSC data show that prevalence of life time use (17% of the sample) was close to the prevalence of last year use (13%), indicating that most youth started using cannabis only recently (Currie et al.,

2012). Finally, the results of this study may be partially attributable to differences in response rates between countries. These were not recorded centrally for earlier years of the survey for all countries, and it is therefore not fully possible to account for these analytically due to missing response rate data. However, analyses of the most complete (2010) data suggest that, if anything, higher survey response rates were associated with lower use of cannabis, although these results were not statistically significant ($r = -.36$; $n = 29$; $p = 0.06$ for boys; $r = -.28$; $n = 29$; $p = 0.14$ for girls).

Conclusion

The overall decrease in frequent cannabis use observed in our full study sample is reassuring. Frequent cannabis use, particularly at an early age, is a risk factor for cannabis dependence and misuse and it may function as a gateway to use of other illicit substances. Substantial decreases in cannabis use that now occur in concert with decreasing tobacco- and alcohol use (Currie et al., 2012) may translate into lower levels of substance abuse and hence improved health among adolescents and young adults. However, the “trickling-down” from high GDP to low GDP countries and from adolescents from more to less affluent families may involve new risks. Health and wellbeing of adolescents from less affluent circumstances are less positive compared to their peers from richer countries and families (Marmot, 2006). The stabilization or even increase in cannabis use, for example, in Eastern, Central, and Southern Europe has the potential to impair the health of young people already at higher risk to be unhealthy. Further, male adolescents have always been at higher risk for excessive use and dependence, and now that frequent cannabis use is concentrated in this group, relatively more users may face health problems. Future studies should therefore closely monitor tendencies for “trickling-down” and “de-normalization” effects in frequent cannabis use as fundamental indicators of substance use and health in adolescent populations.

Chapter 10

Macro-level age norms for the timing of sexual initiation and adolescents' early sexual initiation in 18 European countries

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ABSTRACT

Although speculated upon, there has been little empirical research assessing the importance of macro-level cultural values in explaining cross-national differences in adolescent sexual behavior. Based on classic social norms and social comparison theories, we hypothesized that country-level age norms for sexual initiation timing would be associated with early sexual initiation (ESI). Further, based on recent literature highlighting the persistence of a sexual double standard, we anticipated that the association would be stronger for girls than boys. Nationally-representative data from 18 countries that participated in the 2006/07 European Social Survey (ESS-3, $N = 34,968$) and the 2005/06 Health Behaviour in School-Aged Children Study (HBSC, $N = 31,385$) were analyzed. Age norms for the timing of sexual initiation were measured as the average country-level response to an item asking the age at which ESS respondents believed someone is too young for sex. HBSC respondents (ages 14–16) self-reported age at sexual initiation, which we defined as early (< 15 years) or not (> 15 years or no initiation). Respondents also reported age, family affluence, perceived socioeconomic status, and family living arrangement. Bi- and multivariable analyses (three-level logistic models with random intercepts for school and country) were run separately by biological sex. In multivariable analyses controlling for demographics, higher age norms were associated with reduced likelihood of ESI among girls (AOR 0.66, 95% CI 0.48–0.90), and explained 16% of between-country variability in ESI. This association remained robust even after controlling for additional individual-level behavioral and attitudinal factors (i.e., substance use, school attachment, and positive parent–adolescent communication). For boys, age norms for sexual initiation timing were not significantly associated with ESI. Results suggest that macro-level cultural norms play a role in girls' sexual initiation timing. Research that further explores the sexual health outcomes of early initiators in countries with high and low age norms is warranted.

INTRODUCTION

Sexual initiation is a significant transitional point in the lives of many adolescents, and the timing of this initiation can impact their social lives and health. Earlier sexual initiation (ESI) has been linked with increased risk for sexually transmitted infections (STIs) and pregnancy during adolescence, short-term increases in depressive symptoms among girls in some contexts, lower educational attainment by early adulthood, greater sex partner accumulation, and risky sexual practices in adulthood (Coker et al., 1994; Kaestle, Halpern, Miller, & Ford, 2005; Sandfort, Orr, Hirsch, & Santelli, 2008; Shoveller, Johnson, Langille, & Mitchell, 2004; Spriggs & Halpern, 2008a, 2008b). Risk of ESI is greater among adolescents who have lower school attachment, greater substance use, poorer parental relationships, and who have been sexually abused in childhood (Madkour, Farhat, Halpern, Godeau, & Nic Gabhainn, 2010a; Madkour, Farhat, Halpern, Nic Gabhainn, & Godeau, 2012; Raj, Silverman, & Amaro, 2000). Prior studies have demonstrated that the timing of sexual initiation differs considerably across countries. For example, a 2005/06 study revealed that among 14- to 16-year-olds in Europe, Canada and Israel, prevalence of ever having sexual intercourse varied from 12% in Slovakia to 61% in Greenland (Currie, Nic Gabhainn, et al., 2008). However, research explaining this cross-national variation is scarce.

A number of studies have speculated that differences in socio-cultural norms may (at least partly) explain cross-national variation in the timing of adolescent sexual onset (Darroch, Frost, & Singh, 2001; Madkour, Farhat, Halpern, Godeau, & Nic Gabhainn, 2010b; Madkour et al., 2010a), yet no studies have quantitatively tested this hypothesis. The main goal of the present study was to examine whether culturally shared norms about the appropriate age for adolescents to become sexually active could explain cross-national variability in early sexual initiation (ESI) across 18 contrasted European countries.

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Perceived norms and adolescent sexual behavior

According to classic social norms and social comparison theories, individuals tend to adopt group attitudes and act in accordance with group expectations based on affiliation needs and social comparison processes (Festinger, 1954), social pressure toward group conformity (Asch, 1951, 1952), and the formation and acquisition of reference group norms (Newcomb, 1943; Newcomb & Wilson, 1966; Sherif, 1936, 1972). Recent research shows strong support for the role of perceived norms at the individual level in adolescent sexual initiation. In prospective studies of U.S. urban primarily minority youth ages 11–13, researchers have found that

perceptions of greater peer involvement in sex and peer beliefs regarding the appropriate timing for sexual initiation were strong predictors of ESI (Kinsman, Romer, Furstenberg, & Schwarz, 1998; O'Donnell, Myint, O'Donnell, & Stueve, 2003; Santelli et al., 2004). While these studies illustrate the role of perceived peer norms in adolescents' sexual initiation, to the knowledge of the authors, no studies exist describing how macro-level (societal) norms may shape precocious sexual behavior.

Macro-structural contexts and adolescent sexual behavior

According to ecological systems theory (Berk, 2000; Bronfenbrenner, 1979), adolescent behavior can be influenced by contextual factors at different layers of environment: the micro-system (the adolescent's immediate surroundings, such as family, school, and peers), the meso-system (the connection between two or more micro-systems, such as the relationship between parents and teachers), the exo-system (the larger social system in which the child does not directly function, but is influenced by, such as parental work experiences), the macro-system (cultural values, customs, and laws), and the chrono-system (changes across time, such as changing social relationships across age, or changing socio-historical circumstances across decades). The macro system is likely to influence youths' sexual socialization through its shaping of cultural values expressed by socialization agents at the micro-system level – a child's family, peers and the media. For example, children are exposed to messages about modesty, nudity and privacy, including gender-specific messages about proper conduct at home and at school (Shtarkshall, Santelli, & Hirsch, 2007), which likely reflect macro-level cultural ideas on sexuality.

Two recent comparative studies using qualitative and case study methods have examined the possible influence of country-level cultural norms and values on adolescent reproductive health, including ESI, teenage childbearing, and STIs. Although these studies found substantive differences between the U.S. and other (primarily European) nations in cultural acceptability of adolescent sexual behavior, the similarity between the U.S. and such countries in rates of ESI seemed to suggest such cultural values had little influence on sexual initiation timing (Darroch et al., 2001; Schalet, 2004). However, the greater cultural conservatism of the U.S. versus other nations was hypothesized to affect the elevated rates of teenage childbearing and STIs in the U.S. versus European nations (Darroch et al., 2001). The limitations of these cross-national studies, however, have been that they only included a small number of countries (two in one study, five in the other), and have mainly focused on contrasting Western and Northern European nations with the U.S. This is limiting because the prevalence of sexual initiation within Europe differs considerably (Currie, Nic Gabhainn,

et al., 2008), as do socio-cultural norms regarding adolescent sexuality (Kontula, 2004; Bajos, Guillaume, & Kontula, 2003).

The sexual double standard

As highlighted by Bronfenbrenner (1979), various levels of the ecological system both directly and interactively influence behavior. This implies that some adolescents may be more influenced by socio-cultural norms than others. Recent literature (Bay-Cheng, Burnette, & McAnulty, 2006; Kraeger & Staff, 2009) highlighted the continued persistence of the sexual double standard – that boys are permitted greater sexual freedom than girls. This double-standard grows out of traditional gender roles, where masculinity is in part demonstrated through sexual prowess (including sex partner accumulation), while femininity is defended through guarding against the sexual advances of men (Carpenter, 2005). This double-standard may lead to more negative sanctions for girls after ESI than for boys, including pejorative labeling by peers and problem-focused parent–adolescent interactions (Shoveller et al., 2004; Tolman, 2002). Given possible gender differences in expected negative sanctions after early sexual debut, it may be expected that associations between societal norms for the timing of sexual onset and early sexual initiation are stronger for girls compared to boys.

The present study

In the present study, we examined the influence of dominant socio-cultural norms on adolescents' likelihood of early sexual initiation. We conducted a test of macro-level processes and influences (Bronfenbrenner, 1979; Lerner, 2002) on adolescent behavior, one that is rarely encountered in the empirical literature (Vazsonyi et al., 2010). Specifically, we addressed the following research questions:

1. Do norms about the age at which it is considered acceptable for adolescents to become sexually active explain cross-national variability in ESI among adolescents?
2. Does the association noted in (1) vary by biological sex?

We hypothesized that adolescents living in countries with more conservative (i.e., higher) age norms were less likely to experience ESI, compared to adolescents living in countries with more liberal (i.e., lower) age norms. Further, we hypothesized that this inverse association is stronger for girls than boys.

METHOD

Data

Data from the European Social Survey Round 3 (ESS; 2006/07) and the Health Behaviour in School-aged Children Study (HBSC; 2005/06) were utilized. The ESS is a multi-country cross-sectional survey conducted biennially designed to track the attitudes, beliefs and behavior of European populations (ESS, 2012). The survey covered 25 countries in 2006/07. Respondents were selected using probability samples of the resident national population aged 15 or older living in private households. Face-to-face interviews were conducted. Across the 18 countries included in this analysis, the median response rate was 64.5% (range 46%–73%). All data were weighted using the design weight provided by the ESS, which corrects for slightly different probabilities of selection.

The HBSC study was conducted in 41 primarily European nations in 2005/06 in collaboration with the World Health Organization Regional Office for Europe. HBSC was designed to examine the health and health behaviors of adolescents across country contexts (Currie, Nic Gabhainn, et al., 2008; Roberts et al., 2007; Roberts et al., 2009). Cluster sampling, with classes as the primary sampling units, was used to select nationally representative samples of students (in most countries). Classes were selected to maximize the number of sampled youth at ages 11, 13, and 15, but the actual age of respondents in each class ranged from slightly below to slightly above the targeted age. Data collection was conducted during the 2005/06 academic school year; students completed anonymous questionnaires within classrooms, and over 205,000 students were included in the international HBSC dataset. Each country obtained approval to conduct the survey from their ethics review board or equivalent regulatory body. Participation was voluntary, and consent (explicit or implicit) was sought from school administrators, parents and children as per national human subject requirements. All countries adhered to a strict international protocol with respect to the sampling and data collection procedures, although in some countries, schools were permitted to opt out of certain modules. At the school level, sampling was done with replacement (as required) and school response rates varied by country (from 47% to 100%, but > 70% for 14 of 18 included countries). At the student level, response rates also varied by country but were > 70% for most of the national surveys included here (Roberts et al., 2009). The present secondary analysis was deemed exempt from Institutional Review Board (IRB) review by the Tulane University IRB.

The present analysis is limited to the eighteen European countries that participated in both HBSC 2005/06 and ESS-3: Denmark, Estonia, Finland, Sweden, and Great Britain in Northern Europe; Bulgaria, Hungary, Russia, and Ukraine in Eastern Europe; Portugal, Slovenia and Spain in Southern Europe; and Austria, Belgium, France, Germany, Netherlands, and Switzerland in Western Europe. The separate HBSC country surveys conducted in England, Scotland and Wales were combined into Great Britain for the current analysis to align with the ESS, which was conducted in the United Kingdom as a whole. The countries included vary in terms of culture, religion, economic systems, adolescent access to sexual health services, and adolescent sexual behavior (Bambra & Eikemo, 2009; Currie, Nic Gabhainn, et al., 2008; Kontula, 2004; Wendt, 2009).

Measures

Outcome – early sexual initiation. The main outcome variable is *early sexual initiation*, which was defined as sexual initiation before age 15. This cutoff was used due to comparative research suggesting adolescent girls under fifteen are physiologically unprepared for pregnancy; adolescent girls' cervixes are more vulnerable to STI infection at this age; and "adolescents' lower cognitive capacity for making safe, informed, and voluntary decisions" due to immaturity of the prefrontal cortex below age 15 (Dixon-Mueller, 2008). Defining sexual initiation before age 15 as early initiation is also consistent with the UNAIDS definition of early initiation (Joint United Nations Programme on HIV/AIDS (UNAIDS), 2012). This variable was constructed based on HBSC respondents' report of ever having sexual intercourse and reported age at first intercourse. For respondents who were aged 14 at the time of the survey, a response of "yes" to the ever sexual intercourse question resulted in their being coded as having early sexual intercourse (ESI = 1). For respondents who were aged 15–16, if they reported ever having sexual intercourse and an age at first intercourse that was 14 years or younger, they were coded as having experienced early sexual intercourse (ESI = 1). All others were coded as not having experienced early sexual intercourse (ESI = 0).

Predictor – age norms. *Age norms for sexual initiation* were constructed by averaging within-country responses to the question "At what age is someone too young to have sexual intercourse?" We applied the ESS-provided weights to generate the mean response. Higher ages indicate less tolerance for ESI. Using formulae provided by Lüdtke et al., we found acceptable levels of reliability within countries for age norms (Lüdtke, Trautwein, Kunter, & Baumert, 2006).¹

¹ For age norms we calculated the ICC(2) to equal 0.99. Ludke, et al. (2006) suggest an ICC(2) above 0.70 indicates acceptable reliability.

Individual-level controls. We included a number of individual-level demographic control variables that have been associated with ESI in previous analyses. Age at last birthday was included as a continuous variable, since likelihood of sexual initiation increases with age (Centers for Disease Control and Prevention, 2006). The HBSC Family Affluence Scale (FAS) was used to capture *family affluence* (Currie, Molcho, et al., 2008). This control was included because affluence has been inversely related to likelihood of adolescents' ESI (Madkour et al., 2010a). This scale was based on the respondent's reporting of various assets available in his/her household, including computers, having his/her own bedroom, number of cars, and number of family vacations. Researchers have found this scale to have good reliability and validity (Currie, Molcho, et al., 2008). Scores ranged from zero to seven, categorized as low, medium and high affluence, based on published guidelines to be used consistently across countries (*ibidem*). A third variable, *perceived socioeconomic status*, was based on respondents' reports of how well-off their family is on a five-point scale (very well off to not at all well off), collapsed to create a three-level variable (better off, average, worse off). *Family living arrangement* was included because living with two biological parents, contrasted to other living arrangements, has been associated with decreased odds of ESI among adolescents in past studies (Madkour et al., 2010a, 2010b). This variable was specified using four categories: with both biological parents, stepfamily, single parent, or other.

Analysis sample

We applied three inclusion criteria. First, we limited to students in classrooms targeted for the 15-year-old sample (4% 14-year-olds, 81.6% 15-year-olds, 14.4% 16-year-olds), as those were the only students asked about sexual behavior ($N = 67,872$). Second, we limited to HBSC participants in the 18 countries where the ESS-3 was also conducted ($N = 36,977$). We then limited to students who had complete data on all analysis covariates ($N = 31,385$). Missingness varied across study variables: ESI (12.8%); age (0%); family living arrangement (0%); family affluence (2.8%); and perceived socioeconomic status (1.9%). Missingness for ESI was due both to schools excluding the sexual behavior module (21.7% of missing) as well as individual-level non-response (78.3% of missing). Because the age norms variable was derived based on aggregated ESS responses, no HBSC respondents were excluded from the analysis due to missingness on this variable. Compared to those excluded from the analysis, respondents who were included were significantly more likely to report living with both biological parents (71.7% vs. 62.9%) and high family affluence (37.8% vs. 34.1%), and less likely to report high perceived socioeconomic status (46.1% vs. 49.1%) and ESI (14.4% vs. 17.6%).

Analysis

All analyses were performed in Stata version 10 (StataCorp LP, College Station, Texas), with individuals ($N = 31,385$) as the units of analysis. Individuals were nested in schools ($N = 2,374$), which were nested in countries ($N = 18$). The number of individuals per school ranged from one to 121, with the majority of schools (67%) including 10 or more individuals. Due to the small number of countries included in the sample, between-country variance estimates in multilevel models may be underestimated, and standard errors of country-level variables may be overestimated (Theall et al., 2011). Therefore, the estimated proportion of variability attributable to the country level and the statistical significance of country-level effect estimates likely will be underestimated.

We next examined the univariate distributions of variables across countries (i.e., proportions and means). Stratifying by biological sex, we then examined crude bivariate relationships between ESI and covariates. For individual-level variables, we used single-level binary logistic models with standard error corrections for non-independence within schools and countries. For country-level age norms, we used multilevel models with random intercepts for schools and countries. In these analyses, we categorized countries into quartiles according to their age norms scores.

In the last step, we conducted multivariable multilevel logistic regression analyses separately for boys and girls using a forward-build modeling strategy. Multilevel models permit us to parse the total variability in ESI to various levels (i.e., individual, school and country) (Raudenbush & Bryk, 2002). Our first model was empty or null to quantify the amount of variability in ESI at the individual, school and country levels. Using an estimated level-one variance of $\pi^2/3$ (Snijders & Bosker, 1999), since variance at level-1 is unobserved for dichotomous outcomes, we calculated the country level ICC as:

$$\frac{Variance_{Country}}{\pi^2/3 + Variance_{School} + Variance_{Country}}$$

The country-level ICC communicates the amount of variability in the outcome (ESI) that is due to differences between country contexts. We also calculated a Median Odds Ratio (MOR), which can be interpreted as the increased risk that (in median) one would have if moving to another area with a higher risk when randomly picking out two areas (Merlo et al., 2006). This was calculated as:

$$\exp(0.95 \sqrt{Variance_{Country}})$$

In the second model, we added individual-level controls to determine the extent to which country-level variability was explained by these factors, which was assessed by examining the proportionate change in the country-level variance estimate. In the third model, we added age norms to assess its relationship with ESI net of individual factors, and to examine the proportion of between-country variability in ESI that it explained. Significance testing was conducted at $\alpha = 0.05$. All variables that were theoretically relevant were maintained across models.

RESULTS

Descriptive results

Individual-level characteristics of HBSC study respondents, as well as the distribution of ESS-reported age norms for sexual initiation timing, are presented in Table 10.1. Over half of the sample (52.8%) was female. The average age was 15.1 years (4.0% 14y, 81.6% 15y, 14.4% 16y). Almost 4 in 10 respondents (37.9%) were classified as highly affluent, 46.1% reported high perceived socioeconomic status and nearly three-quarters (71.8%) lived with both biological parents. Across countries, 14.4% reported having experienced ESI (i.e., before age 15). Prevalence of ESI ranged from a low of 9.5% in Estonia to a high of 34.1% in Denmark. Perceptions of when a person is too young to have sex varied from a low of 15.2 years in Austria to a high of 17.3 in the Ukraine.

Bivariate results

Crude associations between study variables and ESI are presented in Table 10.2 separately by respondent sex. For both boys and girls, younger age was associated with increased odds of ESI. Family structures other than two biological parents were also associated with girls' and boys' increased odds of ESI, although these associations seemed stronger for girls. Although family affluence was not associated with boys' ESI, girls with lower affluence had reduced odds of ESI compared to medium affluence girls, and girls with high affluence had increased odds of ESI relative to medium affluence girls. For both girls and boys, adolescents perceiving lower socioeconomic status had increased odds of ESI compared to those perceiving average socioeconomic status. For boys, those perceiving high socioeconomic status also were more likely to report ESI compared to those reporting average socioeconomic status. Girls living

Table 10.1 Demographic characteristics, early sexual initiation, and country-level variables in 18 European nations

	# of HBSC respondents	Female (%)	Age (Mean)	Individual-level characteristics (from HBSC; N = 31,385)			Country-level characteristic (from ESS; N = 34,968)
				High family affluence (%)	High perceived SES (%)	Living with both biological parents (%)	
TOTAL	31,385	52.8	15.1	37.9	46.1	71.8	14.4
North	10,107	51.5	15.2	45.0	53.0	65.9	16.8
Denmark	1,302	52.0	15.2	51.2	21.9	53.9	34.1
Estonia	1,458	49.9	15.3	23.9	55.6	63.5	9.5
Finland	1,519	54.6	15.3	38.5	64.3	69.3	13.2
Great Britain	4,363	51.0	15.2	48.6	50.7	67.2	15.2
Sweden	1,389	51.0	15.0	57.6	74.1	71.7	17.2
East	6,311	56.3	15.1	11.1	51.8	68.7	12.8
Bulgaria	1,434	55.5	15.1	13.7	36.4	77.9	19.2
Hungary	1,019	55.5	15.0	22.3	29.5	74.3	10.8
Russia	2,089	57.8	15.1	8.7	92.1	60.7	11.5
Ukraine	1,732	55.8	15.3	5.5	28.8	67.6	10.3
South	5,133	54.2	15.1	40.1	28.9	82.7	10.4
Portugal	1,253	58.0	15.1	34.9	40.0	79.7	12.4
Slovenia	1,340	53.5	15.1	45.1	54.0	83.4	8.3
Spain	2,455	52.9	15.1	40.0	9.6	83.8	10.5
West	10,207	51.0	15.0	46.2	44.4	74.0	14.9
Austria	1,346	55.0	14.7	40.3	57.4	76.4	20.8
Belgium	1,893	48.4	15.0	44.5	30.7	70.9	12.7
France	2,021	49.9	15.1	48.8	54.9	72.5	16.0
Germany	2,235	51.0	14.9	46.7	51.1	72.3	14.7
Netherlands	1,218	51.4	15.0	48.8	24.5	78.2	13.6
Switzerland	1,319	52.3	15.0	47.5	41.9	77.4	12.1

¹ Sexual initiation before age 15.² Average within-country response to ESS question "At what age is someone too young to have sexual intercourse?"

Table 10.2 Bivariate analysis: individual and country-level features predicting early sexual initiation by respondent sex

	Adolescent girls (n = 16,563)			Adolescent boys (n = 14,822)		
	N ESIs/N total sample (% ESIs)	Crude OR (95% CI)	N ESIs/N total sample (% ESIs)	Crude OR (95% CI)		
Individual covariates¹						
Age						
14 years old	109 / 660 (16.5)	1.29(1.03–1.61)*	125 / 592 (21.1)	1.45 (1.17–1.79)***		
15 years old	1,816 / 13,629 (13.3)	Ref.	1,872 / 11,991 (15.6)	Ref.		
16 years old	274 / 2,274 (12.0)	0.89(0.77–1.03)	315 / 2,239 (14.1)	0.88 (0.77–1.01)		
Family affluence						
Low	386 / 3,654 (10.6)	0.73 (0.65–0.83)***	380 / 2,573 (14.8)	0.94 (0.82–1.08)		
Medium	990 / 7,169 (13.8)	Ref.	950 / 6,108 (15.6)	Ref.		
High	823 / 5,740 (14.3)	1.04 (0.94–1.16)	982 / 6,141 (16.0)	1.03 (0.93–1.15)		
Perceived socioeconomic status						
Lower than average	267 / 1,373 (19.4)	1.68 (1.43–1.96)***	189 / 996 (19.0)	1.45 (1.22–1.72)***		
Average	1,009 / 8,019 (12.6)	Ref.	908 / 6,517 (13.9)	Ref.		
Better off than average	923 / 7,171 (12.9)	1.03(0.92–1.15)	1,215 / 7,309 (16.6)	1.23 (1.11–1.36)***		
Family living structure						
With both biological parents	1,222 / 11,733 (10.4)	Ref.	1,495 / 10,790 (13.9)	Ref.		
Stepfamily	383 / 1,630 (23.5)	2.64 (2.34–2.98)***	229 / 1,64 (19.7)	1.52 (1.30–1.78)***		
Single parent	450 / 2,561 (17.6)	1.83 (1.63–2.06)***	449 / 2,278 (19.7)	1.53 (1.36–1.71)***		
Other	144 / 639 (22.5)	2.50 (2.01–3.11)***	139 / 590 (23.6)	1.92 (1.58–2.32)***		
Country-level predictor²						
Age norms (quartiles)						
1 (Lowest quartile)	738 / 4,581 (16.1)	Ref.	726 / 4,010 (18.0)	Ref.		
2	431 / 3,033 (14.2)	0.86 (0.44–1.68)	457 / 2,914 (14.3)	0.75 (0.47–1.20)		
3	718 / 5,381 (13.3)	0.66 (0.35–1.24)	711 / 5,107 (13.9)	0.70 (0.45–1.09)		
4 (Highest quartile)	312 / 3,568 (8.7)	0.48 (0.25–0.95)*	418 / 2,791 (15.0)	0.72 (0.45–1.15)		

Note. ESIs = early sexual initiation; OR = odds ratio; CI = confidence interval. *p < .05; **p < .01; ***p < .001.

¹ OR estimates derived using single-level logistic regression analyses.

² Denominators vary between quartiles because quartiles were assigned based on analyses of countries (n = 18) regardless of sample size; OR estimates derived using three-level logistic regression analyses.

in the countries in the highest quartile of age norms evidenced significantly lower likelihood of ESI compared to those in the lowest quartile (OR 0.48, 95% CI 0.25–0.95). Although girls in other quartiles did not evidence significant differences in ESI odds compared to girls in the lowest quartile, there was a trend toward a linear relationship between age norms and girls' ESI odds. At the country level, age norms were not significantly associated with boys' odds of ESI.

Multivariable results

Multivariable results for adolescent girls are presented in Table 10.3. In the null model, the ICC indicates that approximately 8% of the variability in girls' ESI is due to differences across country contexts. The MOR indicates that a girl's odds of ESI would, on median, increase by 71% if moving from a lower risk to a higher risk country picked randomly. In the second model, we added individual-level covariates. Living in a stepfamily, with a single parent, or in another living situation were all associated with increased odds of ESI contrasted to living with both biological parents. Lower than average and higher than average perceived socioeconomic status were significantly positively related to girls' odds of ESI. Low affluence, contrasted with medium affluence, was associated with reduced odds of girls ESI. These variables together explained about 15.6% of between-country differences in girls' ESI. In the third model, we added country-level age norms for sexual initiation timing. We included the continuous form of this variable due to bivariate results suggesting a linear relationship. Age norms were significantly negatively associated with girls' ESI (AOR 0.66, 95% CI 0.48–0.90), and explained an additional 15.7% of between-country differences in girls' ESI.

As an additional analysis, we tested the robustness of the findings for girls by adding controls for school attachment, substance use, and positive parent–adolescent communication to the model. These three factors have been identified as individual-level correlates of ESI in past HBSC studies (Madkour et al., 2010a). One may be concerned that the observed relationship between macro-level age norms and ESI for girls is spurious, reflecting only the differential distribution of individual-level behavioral or attitudinal risk factors for ESI across countries. Measures were constructed similarly to the prior study (Madkour et al., 2010a). School attachment was based on a polychoric principal components analysis of five items describing students' perceptions of classmates and the general school environment (4- to 5-point Likert scales for five items, Cronbach's $\alpha = 0.71$); higher scores indicate higher school attachment. Substance use was based on a polychoric principal components analysis of frequency of alcohol use (5-point Likert scale), frequency of tobacco use (5-point Likert

Table 10.3 Multilevel logistic regression models: age norms and early sexual initiation for adolescent girls ($n = 16,563$)

	Model 1: Null AOR (95% CI)	Model 2: Demographics AOR (95% CI)	Model 3: Demographics + age norms AOR (95% CI)	Model 4 (post-hoc): Additional individual-level controls ² AOR (95% CI)
Individual predictors				
Age	—	0.90 (0.79–1.01)	0.90 (0.79–1.02)	0.75 (0.65–0.87)***
Family affluence	—	0.82 (0.71–0.95)** Ref.	0.83 (0.72–0.95)** Ref.	0.93 (0.78–1.10) Ref.
Low	—	0.98 (0.87–0.9)	0.98 (0.87–1.09)	0.99 (0.86–1.12)
Medium	—	—	—	—
High	—	—	—	—
Perceived socioeconomic status	—	1.61 (1.36–1.90)*** Ref.	1.61 (1.36–1.90)*** Ref.	1.29 (1.06–1.57)* Ref.
Lower than average	—	—	—	—
Average	—	—	—	—
Better off than average	—	1.13 (1.01–1.27)* Ref.	1.13 (1.01–1.27)* Ref.	1.10 (0.96–1.25)
Living arrangement	—	—	—	—
With both biological parents	—	2.46 (2.14–2.83)*** 1.82 (1.60–2.08)*** 2.40 (1.91–3.02)***	2.46 (2.14–2.83)*** 1.83 (1.60–2.08)*** 2.41 (1.91–3.03)***	1.69 (1.44–1.99)*** 1.48 (1.27–1.72)*** 1.88 (1.41–2.49)***
Stepfamily	—	—	—	—
Single parent	—	—	—	—
Other	—	—	—	—
Substance use	—	—	—	—
School attachment	—	—	—	—
Positive parent–adolescent communication	—	—	—	—
Country predictor				
Age norms	—	—	0.66 (0.48–0.90)***	0.40 (0.25–0.65)***
Variance estimates				
School intercept (se)	0.39 (0.05)	0.37 (0.05)	0.37 (0.05)	0.31 (0.06)
Country intercept (se)	0.32 (0.11)	0.27 (0.10)	0.22 (0.07)	0.24 (0.09)
Statistics				
ICC (country)	0.08	0.07	0.06	0.07
% change in country intercept variance ¹	—	15.6%	31.3%	24.5%
Median odds ratio (MOR)	1.71	1.64	1.57	1.59

Note. ESI = early sexual initiation; se = standard error; AOR = adjusted odds ratio; CI = confidence interval. * $p < .05$; ** $p < .01$; *** $p < .001$.

¹ Relative to Null model. ² Analyses limited to girls with complete covariate data on all analysis variables, $n = 14,697$.

scale), and frequency of getting drunk (5-point Likert scale, Cronbach's $\alpha = 0.65$); higher scores indicate greater substance use. Positive parent–adolescent communication was based on averaging respondents' reported level of satisfaction with maternal and paternal communication (rated on a 1–5 Likert scale, higher scores indicate more positive parent–adolescent communication). These supplementary analyses were restricted to respondents with complete covariate data on these additional measures ($n = 14,697$). Because Spain did not include the substance use questions in its 2005/06 survey, only 17 nations were included. Although both substance use (AOR 3.33, 95% CI 3.13–3.54) and school attachment (AOR 0.89, 95% CI 0.85–0.93) were significantly associated with girls' ESI in these analyses, associations between country-level age norms and ESI actually became stronger after adding these variables to the model (AOR 0.40, 95% CI 0.24–0.65). Some, but not all, of this strengthening was due to the differences in samples across models.² This indicates that age norms explain cross-national variability in girls' ESI above and beyond these risk factors.

Multivariable results for adolescent boys are presented in Table 10.4. In the null model, the ICC indicates that approximately 3% of the variability in boys' ESI is due to differences across country contexts. The MOR indicates that a boy's odds of ESI would, on median, increase by 41% if moving from a lower risk to a higher risk country picked randomly. Individual-level covariates were added in the second model. Age was significantly negatively related to boys' odds of ESI. Living in a stepfamily, with a single parent, or another living situation, compared to living with both biological parents, were all associated with increased odds of boys' ESI. Lower than average and higher than average perceived socioeconomic status were both associated with increased odds of boys' ESI, while low affluence compared to medium affluence was negatively related to boys' ESI. After accounting for these individual-level differences, estimated between-country variability in boys' ESI increased by 3.2%. In the third model, we added country-level age norms, which were not significantly related to boys' ESI, although this variable explained 3.4% of between-country variability.

To check whether the multivariate analyses for boys and girls were statistically different from one another, in supplementary analyses (not shown), we pooled data for males and females and added a cross-level interaction between country-level age norms and gender. Results support a statistically significant difference between boys and girls in the association between country-level age norms and early sexual initiation ($p < .001$).

² We reran model 3 using the same sample as model 4. Doing so resulted in an AOR estimate for age norms of 0.56 (95% CI 0.36–0.87), $p = .009$.

Table 10.4 Multilevel logistic regression models: age norms and early sexual initiation for adolescent boys ($n = 14,822$)

	Model 1: Null AOR (95% CI)	Model 2: Demographics AOR (95% CI)	Model 3: Demographics + age norms AOR (95% CI)
Individual predictors			
Age	–	0.85 (0.75–0.96)**	0.85 (0.76–0.96)**
Family affluence	–	0.80 (0.69–0.93)**	0.80 (0.70–0.93)**
Low	Ref.	Ref.	Ref.
Medium	–	1.09 (0.98–1.21)	1.09 (0.97–1.21)
High	–	1.50 (1.24–1.82)***	1.50 (0.94–1.37)***
Perceived socioeconomic status	–	Ref.	Ref.
Lower than average	–	1.32 (1.19–1.48)***	1.33 (1.19–1.48)***
Average	Ref.	Ref.	Ref.
Better off than average	–	1.57 (1.33–1.85)***	1.57 (1.33–1.85)***
Living arrangement	–	1.63 (1.43–1.85)***	1.63 (1.43–1.85)***
With both biological parents	–	1.62 (1.30–2.04)***	1.62 (1.30–2.03)***
Stepfamily	–	–	–
Single parent	–	–	–
Other	–	–	–
Country predictor			
Age norms	–	–	0.87 (0.61–1.25)
Variance estimates			
School intercept (se)	0.43 (0.06)	0.43 (0.06)	0.43 (0.06)
Country intercept (se)	0.13 (0.05)	0.13 (0.05)	0.13 (0.05)
Statistics			
ICC (country)	0.03	0.03	0.03
Proportion change in country intercept variance ¹	–	-3.2%	0.2%
Median odds ratio (MOR)	1.41	1.41	1.41

Note. ESI = early sexual initiation; se = standard error; AOR = adjusted odds ratio; CI = confidence interval. * $p < .05$; ** $p < .01$; *** $p < .001$.

¹ Relative to Null model.

DISCUSSION

Although differences across countries in norms and cultural values have been speculated to play a role in cross-national differences in adolescents' sexual behavior (Madkour et al., 2010a, 2010b), little quantitative research has explored this proposition. In the current study, we analyzed data from eighteen European countries to assess the relationship between country level age norms for sexual initiation timing and adolescent ESI. We also tested whether this relationship varied by biological sex.

Higher age norms were associated with reduced odds of girls' early sexual initiation, and explained substantial between-country variability in girls' ESI. Although reducing early sexual intercourse among girls is thought to be a positive outcome, effects of more conservative (i.e., higher) age norms on the context of first sex and future experiences, especially among early initiators, may be negative. Higher country-level age norms for the timing of sexual initiation are likely part of a larger conservative cultural framework which may influence multiple sexual health outcomes. This larger cultural framework likely includes dimensions such as religiosity. In a recent analysis of states in the U.S., those with higher religiosity and political conservatism evidenced higher teen birth rates (Cavazos-Rehg et al., 2012). Although research is mixed in terms of the effect of individual-level religiosity on contraceptive or condom use (Brewster, Cooksey, Guilkey, & Rindfuss, 1998; Landor, Simons, Simons, Brody, & Gibbons, 2011; McCree, Wingood, DiClemente, Davies, & Harrington, 2003), interventions that try to promote religiosity to influence sexual behavior may have negative effects on condom and contraceptive use at the macro-level (Rosenbaum, 2009). Past comparative studies with a limited number of countries have found that pregnancy, teen birth, and STI rates were elevated in countries with more culturally conservative views on sexuality (Darroch et al., 2001; Schalet, 2004). Further research examining the implications of macro-level cultural norms on other adolescent sexual health outcomes, such as contraceptive use and number of sexual partners, is warranted.

Additional investigations are also needed to determine whether the greater prevalence of early sexual initiation in countries with lower age norms translates into a greater burden of STI and teen pregnancy. If disparities in these other outcomes according to sexual initiation age norms are apparent, countries with lower age norms may need to make educational and clinical interventions available earlier in development compared to other countries. However, if lower age norms reflect a more open and positive approach to adolescent sexuality, it is possible that negative health outcomes are not elevated and that youth in these countries have access to the preventive services and education needed.

The extent to which age norms merely reflect economic conditions may be of concern, as there was a moderately strong negative correlation between family affluence and age norms ($r = -0.63$). However, in crude analyses, affluence was only associated with ESI among girls. Adjustment for affluence (among other factors) only moderately affected the association between age norms and ESI for girls. Further, adding affluence and individual-level factors to multivariable models explained only a small portion of between-country variance in ESI. Together these findings suggest that while socioeconomic contexts may be correlated with cultural norms, cultural norms are distinct predictors of girls' ESI. Future research that further elucidates how macro- or meso-level socioeconomic environments shape adolescent sexual health is warranted.

The observed sex difference in the relationship between age norms and ESI offers further support for differences in sexual standards for adolescent girls and boys found in past studies (Bay-Cheng et al., 2006; Tolman, 2002). Such a double-standard is problematic in that it could lead to some of the negative sequelae of ESI observed for girls but not boys in some contexts, most notably negative psychological symptoms (Madkour et al., 2010b; Spriggs & Halpern, 2008a) and peer judgment and rejection (Shoveller et al., 2004). These double-standards also may lessen young women's power in sexual encounters, including their ability to request male partners to use condoms and to refuse unwanted sexual contact (Crawford & Popp, 2003; Hird & Jackson, 2001). Further research should explore the role of sexual norms in producing sex-disparate outcomes of ESI, and their implications for young women's sexual health.

Although this study has strengths, such as the use of large, nationally-representative datasets, inclusion of more countries compared to past qualitative studies, and the use of multilevel analyses to quantitatively estimate the effects of age norms on ESI, findings should be interpreted with knowledge of their limitations. First, although we were able to incorporate data from a much larger set of countries than previously studied (Darroch et al., 2001; Schalet, 2004, 2011), our country sample size may result in an under-estimate of between-country variance, and an overestimate of the standard errors for age norms. This suggests that between-country differences in ESI, as well as the statistical significance of age norms, may be greater than we report. Future analyses that include more countries may more precisely quantify between-country differences, and be able to test for additional country-level factors that contribute to such variability. Second, our study is cross-sectional, and therefore causal inference should be made with caution. However, given that we measure norms reported by respondents other than the adolescents reporting sexual behavior, we do avoid some potential

problems of endogeneity (i.e., ESI influencing adolescents' perceptions of norms). Third, age at sexual initiation is self-reported by adolescents and subject to reporting biases related to the cultural norms of their country of residence. If ESI is under-reported in more conservative countries (with higher age norms), then the association between age norms and ESI may be overestimated in the current analysis. Fourth, due to our use of a complete case analysis, there may be selectivity biases in our sample. Given that non-respondents are likely from higher risk groups, we possibly have underestimated the prevalence of ESI. Reducing variability in the sample may result in an underestimation of the association between predictors and ESI. Fifth, the measure of age norms did not distinguish between norms for boys and norms for girls, which may account for our lack of significant findings for boys. Sixth, the sample does include some 14-year-olds ($n = 1,252$), who have not yet completed their "at risk" period for ESI, which could affect study results. Although this group evidences a higher prevalence of ESI compared to other groups, excluding 14-year-olds has little impact on the estimated prevalence of ESI (14.4% with 14-year-olds, 14.2% without 14-year-olds). Finally, we were not able to control for some potentially important predictors of ESI at the individual level, such as childhood sexual abuse, perceived age norms, and religiosity, due to these variables not being available in the HBSC. If future datasets become available that include such measures, replications of our analyses including these factors would be warranted.

In conclusion, we found evidence for a reduced likelihood of ESI among girls living in countries with more conservative age norms for the timing of sexual initiation, compared to girls living in countries with more liberal age norms. This effect was not found for boys. Our results support the influential role of macro-level cultural norms in the sexual behavior of adolescents, particularly girls. The role of such factors in other adolescent sexual and behavioral health outcomes, particularly teen pregnancy and STI risk, deserves further study. Future analyses should also explore other potential macro-level predictors of sexual behavior, including country-level wealth and ethnic diversity. Finally, studying how macro-level characteristics interact with more proximal determinants of adolescent sexual behavior (e.g., parental monitoring or ethnic background) may provide valuable information about intervention opportunities across a variety of sociocultural contexts.

“I am not an Athenian nor a Greek, but a citizen of the world.”

Socrates (from Plutarch, Of Banishment; 469 BC – 399 BC).

Part IV

**Cross-national consistencies
in the co-occurrence and correlates
of adolescent substance use
and sexual behavior**

Chapter 11

Cross-national evidence for the clustering and psychosocial correlates of adolescent risk behaviors in 27 countries

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ABSTRACT

According to Jessor's Problem Behaviour Theory (PBT), adolescent norm-breaking behaviors cluster and can be predicted by various psychosocial factors including parent, peer, and school attachment. The present study tested the extent to which this theoretical model could be replicated among adolescents from 27 different European and North American countries. The analyses were based on data from the 2009/10 Health Behaviour in School-aged Children (HBSC) study. Participants compromised 56,090 adolescents who self-reported on substance use (tobacco, alcohol, cannabis) and early sexual activity as well as on psychosocial factors (parent, peer, and school attachment). Multiple group confirmatory factor analyses (with country as grouping variable) showed that substance use and early sexual activity loaded on a single underlying factor across countries. In addition, multiple group path analyses (with country as grouping variable) showed that the associations between this factor and parent, peer and school attachment were identical across countries. These findings demonstrate cross-national consistencies in the clustering and psychosocial correlates of substance use and early sexual activity across Western countries. While Jessor's PBT stresses the problematic aspects of norm-breaking behaviors, they can also be understood as a reflection of normative, developmental processes that take place during adolescence. That is, to achieve individuation and develop an identity, young people tend to turn towards each other, distance themselves from parents and conventional institutions like school, and experiment with norm-breaking, adult-like behaviors. As such, norm-breaking behaviors may be considered core features of globalized adolescent peer culture. Both the problematic and normative aspects of clustered risk behaviors during adolescence are discussed.

INTRODUCTION

Adolescence, the transitional phase between childhood and adulthood, is a unique period of discovery and experimentation. While searching for more autonomy from their parents and spending more (unsupervised) time with peers (Meeus, Iedema, Maassen, & Engels, 2005), adolescents increasingly find themselves in new contexts and start experimenting with adult-like and norm-breaking behaviors, such as substance use and sexual activity. For some adolescents, this experimentation turns into excessive rates of substance use and engagement in risky sexual behaviors, which can have serious consequences for their long-term physical and mental health (Blum, Solberg, & Wolinsky, 2004; Kaestle, Halpern, Miller, & Ford, 2005; MacLeod et al., 2004; McLaren, Silins, Hutchinson, Mattick, & Hall, 2010; Minozzi et al., 2010; Moore et al., 2007; Spriggs & Halpern, 2008a).

Researchers from a wide variety of countries, including the US (e.g., Calvert, Bucholz, & Steger-May, 2010; Donovan, Jessor, & Costa, 1999; Dunn, Ilapogu, & Taylor, 2008; Guilamo-Ramos, Litardo, & Jaccard, 2005; Poulin & Graham, 2001), Canada (Afifi, Cox, & Katz, 2007; Pickett et al., 2002; 2006), Brazil (Cazuza de Farias Júnior, 2007; Dumith, Muniz, Tassitano, Hallal, & Menezes, 2012), Israel (Harel-Fisch, Abdeen, Walsh, Radwan, & Fogel-Grinvald, 2012), and Korea (Kim & Kim, 2009), have demonstrated that risk-taking behaviors of adolescents cluster. One of the most influential theories that consider this clustering is Jessor and Jessor's Problem Behavior Theory (PBT, 1977; 1991; 1998; in press). According to PBT, behaviors such as illicit drug use, adolescent drinking, early sexual involvement, and delinquent behaviors are related to an individual's general 'proneness' to problem behavior, which is also referred to as a problem behavior syndrome (PBS). The behaviors in PBS are theorized to be highly correlated because they share many common causes.

Within PBS, substance use and sexual behavior form a separate cluster of behaviors (Willoughby, Chalmers, & Busseri, 2004), potentially due to their (perceived) adult-like status among adolescents. Some aspects of experimentation with these behaviors can be considered normative (Moffitt, 1993; 2006). It has even been suggested that this has important developmental functions, for example with respect to the intensification of peer contacts, the desire to explore different behaviors and lifestyles, and the development of an identity (Engels, 2003; Engels & ter Bogt, 2001; Engels & Knibbe, 2000; Engels, Knibbe, & Drop, 1999).

From both developmental and public health perspectives, it is important to understand the origins of these clustered risk-taking behaviors. Previous research based

on national samples has shown that low family attachment, strong peer orientation, and low school attachment are among the strongest correlates of high engagement in substance use and sexual activity (Buhi & Goodson, 2007; Engels & ter Bogt, 2001; Hummel, Shelton, Heron, Moore, & Van den Bree, 2013; Townsend, Flisher, & King, 2007). As these studies used different methodologies, comparison across countries has been difficult. To the knowledge of the authors, only six studies have examined cross-national consistencies in the clustering of risk behaviors and their associations with psychosocial factors (Chen, Greenberger, Lester, Dong, & Guo, 1998; Dmitrieva, Chen, Greenberger, & Gil-Rivas, 2004; Greenberger, Chen, Beam, Whang, & Dong, 2000; Jessor et al., 2003; Vazsonyi et al., 2008; 2010). These studies however only included a small number of countries. It is important to conduct cross-national comparative research on a larger scale, as this type of research can provide insights into the potential influence of the socio-cultural, or macro-level (Bronfenbrenner, 1999), environment on the clustering and psychosocial correlates of adolescent risk behaviors.

The Health Behaviour in School-aged Children (HBSC) study provides a unique opportunity to cross-nationally compare data on the clustering of adolescent substance use and sexual activity and their psychosocial correlates. This international collaborative effort is coordinated by an international network with measures, sampling, and administrative procedures designed to be consistent across participating countries, thus allowing for cross-national comparisons. In addition, the sampling design provides nationally representative estimates, as opposed to estimates reflecting smaller regions or communities of unknown generalizability. In the present study, we used data collected during the 2009/10 study cycle in 27 European and North American countries.

The purpose of this study was twofold. First, we examined cross-national consistencies in the clustering of substance use and sexual activity among 15-year-old adolescents. Second, we examined cross-national consistencies in the associations between this cluster of behaviors and three important psychosocial predictors: parent-adolescent communication (as a proxy for family attachment), the number of evenings spent out with peers, and school attachment. Based on the assumption that developmental processes are invariant across adolescents from different cultural or ethnic groups (Jessor, 2008; Rowe, Vazsonyi, & Flannery, 1994), we expected that the clustering of adolescent substance use and sexual activity and their associations with psychosocial factors would not differ cross-nationally.

METHOD

Sample and procedures

The analysis was based on the cross-national data from the 2009/10 Health Behaviour in School-aged Children (HBSC) study (Currie et al., 2012). The HBSC study is a WHO collaborative cross-national study, which aims to describe young people's health, health (risk) behaviors, and the social context of these behaviors. In 2009/2010, a total of 43 countries and regions participated in the study. Of these, 27 countries included measures on substance use (tobacco, alcohol, and cannabis use) and sexual activity. These countries, which were mainly European but diverse in legal, political, economic, and social terms, were included in this study.

All participating countries used identical protocols for sampling and data collection. Samples were drawn by systematic cluster sampling in which the primary sampling units were either school classes or entire schools. The fieldwork took place between Fall 2009 and Spring 2010. Response rates at school level ranged from 29% (Belgium, Flanders) to 98% (Macedonia), with the majority of countries having a response rate > 70%. At the student level, response rates ranged from 72% (Spain) to 97% (Germany), with the majority of countries having a response rate > 85%. Data were collected by means of a standardized questionnaire administered in classroom settings. Students were assured that their responses would remain anonymous and confidential. A translation-back-translation process maximized language equivalence across countries. Adolescents aged 11, 13 and 15 were invited to participate. A detailed description of the aims, theoretical framework, and protocol of the HBSC study can be found elsewhere (Roberts et al., 2009).

The current analyses were restricted to 15-year-olds because younger students were not asked the questions on cannabis use and sexual intercourse. Our final sample consisted of 56,090 adolescents (50.6% female; $M_{age} = 15.5$ years, $SD = .36$). For each country, the final sample was nationally representative in terms of geographical area (region), urban or rural geographic status, and, if applicable, language spoken at home and educational level. The demographic background of adolescents in the final sample by country is presented in Table 11.1.

Measures

Outcome variables

Adolescent substance use and sexual activity. Adolescent substance use and sexual activity was measured as a latent construct using four single items, being (1) daily smoking; (2) having had at least one episode of drunkenness in the previous month; (3) having used any cannabis in the previous month; (4) being sexually active. With respect to smoking tobacco, adolescents were asked: ‘How often do you smoke?’ The original answer categories (*never, less than weekly, weekly but not daily, daily*) were recoded into *no daily smoking* and *daily smoking*. With respect to drunkenness, adolescents were asked: ‘How often in the previous month have you drunk so much alcohol that you were really drunk?’ Original answer categories (ranging from *never* to *ten times or more*) were recoded into *never* and *at least once*. Cannabis use in the previous month was measured by the item ‘How often have you smoked cannabis in the previous month?’ The original answer categories (ranging from *never* to *40 times or more*) were recoded into *never* and *at least once*. Finally, adolescents were asked whether they had ever engaged in sexual intercourse (*yes/no*).

Psychosocial factors

Parent–adolescent communication. Parent–adolescent communication was measured using the following items: ‘How easy is it for you to talk to (1) your mother and (2) your father about things that really bother you?’ Response categories ranged from 1 (*very easy*) to 4 (*very difficult*). The mean answer on these two items reflects parent–adolescent communication. A fifth category included the response *‘I don’t have a mother/father or I do not see her/him’*. If adolescents did not have or see one parent, the variable parent–adolescent communication was based on their response to the question on the parent that was present in the child’s life. If adolescents did not have or see both parents ($N = 521$; 0.9%), they received a missing value on this variable.

Evenings out with friends. The amount of time adolescents spent with peers at night was measured using a single item: ‘How many evenings a week do you usually spend out with your friends?’ (Answer categories ranging from *zero* to *seven evenings*.)

School attachment. The extent to which adolescents liked going to school was measured using a single item: ‘How do you feel about school at present?’ Responses ranged from 1 (*I like it a lot*) to 4 (*I don’t like it at all*).

Confounding factors

Age. Age was derived from an item recording a participant's month and year of birth and relating that to the date of survey administration.

Gender. The participants indicated their gender by responding to the item, 'Are you a boy or a girl?' Responses were 1 (*boy*) and 2 (*girl*).

Family structure. Participants' home situations were assessed with a question inquiring about the people who lived with them in their (primary) home (e.g., mother, father, stepparents, siblings, grandparents). For control purposes, responses were classified as traditional family vs. other, that is, 1 (*the adolescent lives with his or her two biological parents*) vs. 0 (*other*).

Family affluence. Family affluence was measured using the Family Affluence Scale (FAS). This scale comprises four items asking the adolescents about the number of cars and computers at home and the number of family holidays per year, as well as whether they have their own bedroom. The scale ranges from zero (0) to nine (9) and was transformed into two dummy variables, representing low to medium vs. high family affluence (as per Currie et al., 2008). The FAS has good criterion validity across European and North American countries (Currie et al., 2008).

Plan of analysis

First, descriptive statistics were computed for demographic variables (age, gender, family structure and family affluence, see Table 11.1). Next, descriptive statistics and correlations were calculated for adolescent substance use and sexual activity, and these were compared across countries (Tables 11.1 and 11.2).

Next, an overall confirmatory factor analysis (CFA) was used to test the structure of a 'risk behavior factor' (a latent factor measured by the four substance use and sexual activity items) across countries using Mplus (version 7; Muthén & Muthén, 1998–2010). In Mplus, it is possible to factor analyze dichotomous variables using weighted least squared estimation methods (Muthén & Muthén, 1998–2010). Figure 11.1 presents the factor structure.

To answer our first research question on cross-national consistencies (i.e., measurement invariance) in the clustering of tobacco use, alcohol use, cannabis use, and sexual activity among adolescents, we conducted a set of multiple group confirmatory factor analyses (with country as grouping variable). A total of six models were tested. In Model 1, all factor loadings were free to vary across countries (default model). In Model 2, the factor loading of smoking

Table 11.1 Descriptive statistics of demographic variables and adolescent risk behavior by country samples

Country sample	N	Age in years	Gender	Family structure	Family affluence ¹	Daily smoking	Drunkenness last month	Cannabis use last month	Sexual activity
		Mean (SD)	% boys	% two-parent family	Mean (SD)	%	%	%	%
Austria	1,820	15.35 (.33)	48.6	72.0	5.98 (1.76)	19.6	30.3	6.1	31.6
Belgium	2,567	15.46 (.36)	52.6	64.6	6.16 (1.80)	11.6	22.7	10.3	29.1
Canada	5,441	15.45 (.36)	49.3	64.1	6.15 (1.77)	7.5	24.8	18.2	27.2
Czech Republic	1,522	15.45 (.33)	49.1	65.8	5.44 (1.84)	18.0	32.7	10.9	23.7
Denmark	1,226	15.65 (.33)	47.1	63.1	6.73 (1.56)	10.0	52.7	3.9	37.7
Estonia	1,398	15.78 (.32)	47.3	60.7	5.73 (1.99)	12.7	27.1	3.7	22.0
Finland	2,110	15.68 (.30)	47.8	70.3	6.07 (1.64)	14.5	34.0	4.4	22.4
France	1,906	15.46 (.36)	47.4	69.5	6.37 (1.76)	14.3	17.2	14.2	27.1
Germany	1,640	15.39 (.35)	44.9	75.7	6.18 (1.70)	10.5	20.7	3.7	22.4
Greece	1,648	15.66 (.32)	51.1	83.3	5.46 (1.82)	10.6	16.2	4.0	28.3
Hungary	1,733	15.48 (.33)	46.1	69.7	5.03 (1.95)	19.3	24.6	5.7	28.5
Iceland	3,680	15.47 (.31)	50.9	69.7	7.13 (1.56)	5.8	17.5	3.6	28.9
Ireland	1,695	15.45 (.36)	56.8	72.9	5.69 (1.68)	10.2	26.4	8.1	22.3
Latvia	1,375	15.58 (.33)	48.4	57.7	5.14 (3.04)	18.5	32.2	8.8	22.4

Lithuania	1,792	15.67 (.31)	52.7	67.6	5.14(1.97)	20.3	35.3	5.5	19.5
Luxembourg	1,382	15.46 (.36)	50.8	72.7	6.41 (1.78)	15.6	15.0	8.5	30.9
Netherlands	1,457	15.45 (.36)	50.1	80.7	6.60 (1.53)	11.9	15.2	9.2	20.8
Poland	1,410	15.68 (.27)	48.6	81.3	5.11(2.03)	9.9	17.7	7.7	15.7
Portugal	1,553	15.46 (.34)	43.8	77.5	5.97 (1.81)	6.7	11.5	5.3	21.5
Romania	2,002	15.10 (.20)	52.2	78.6	4.28 (2.06)	14.4	22.8	3.1	32.9
Slovakia	1,914	15.35 (.34)	50.2	75.0	4.86 (1.95)	12.1	21.5	5.5	12.7
Slovenia	1,815	15.60 (.35)	50.4	80.1	6.23 (1.73)	13.9	28.5	10.0	27.8
Spain	2,003	15.46 (.35)	48.0	80.7	6.00 (1.78)	13.8	25.5	16.0	21.4
Switzerland	2,246	15.35 (.34)	50.7	74.9	6.26 (1.68)	11.4	18.8	13.8	19.6
Ukraine	1,897	15.71 (.33)	46.4	70.0	4.12 (1.95)	15.3	20.0	2.5	27.8
Macedonia	1,536	15.46 (.33)	53.0	85.6	4.46 (1.92)	8.3	15.4	1.8	18.0
UK	5,322	15.60 (.32)	48.5	63.5	6.07 (1.78)	10.0	37.2	8.9	31.0
Total	56,090	15.50 (.36)	49.4	71.0	5.83 (1.95)	12.1	25.0	8.2	25.6

¹ Scale: 1 (low affluence) – 9 (high affluence).
Findings from analyses of variance indicated significant between-group differences across the four risk behavior scores ($p < .001$).

Table 11.2 Correlations between substance use and sexual activity¹

Variable	Daily smoking	Drunkenness last month	Cannabis use last month	Sexual activity
Daily smoking	—	.57 (.48-.70)	.62 (.36-.81)	.55 (.44-.71)
Drunkenness last month		—	.59 (.46-.71)	.48 (.35-.60)
Cannabis use last month			—	.48 (.22-.61)
Sexual activity				—

Note. $N = 56,090$. All correlations are significant ($p < .001$). Correlations are controlled for age, sex, family situation, and family affluence. The numbers in the parentheses are ranges of correlations based on individual country samples.

¹ Correlations are tetrachoric (based on dichotomous variables).

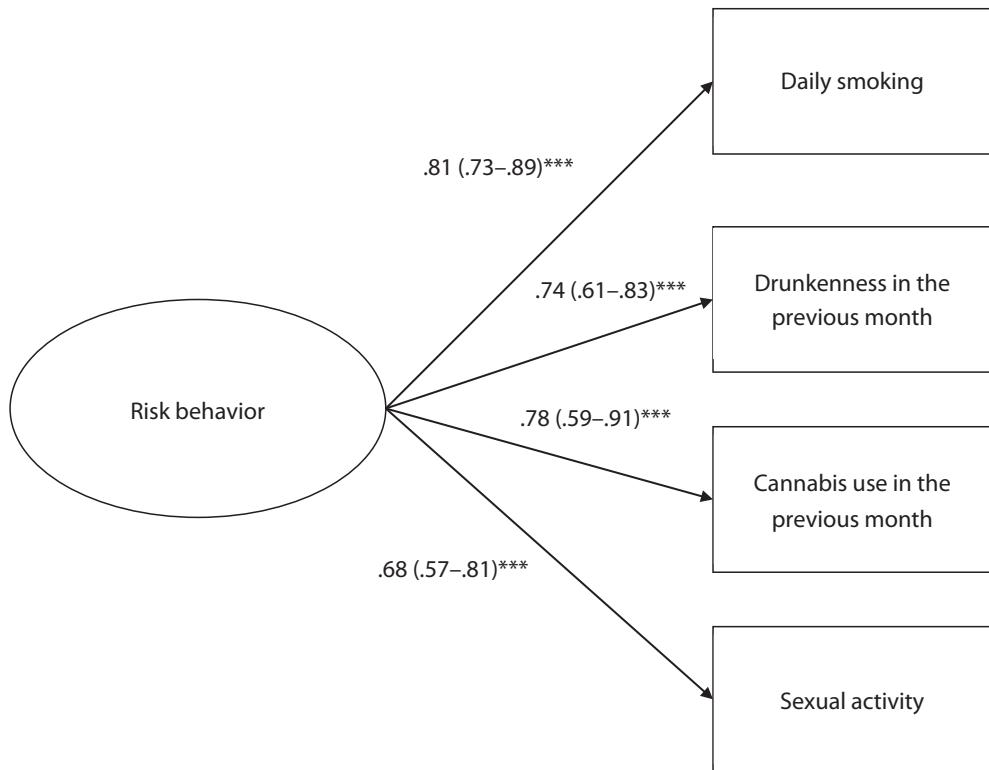


Figure 11.1 CFA of daily smoking, drunkenness, cannabis use, and sexual activity across 27 countries (total sample), $\chi^2(2) = 55.13, p < .001, CFI = .998, TLI = .994, RMSEA = .022$. *** $p < .001$. The numbers in the parentheses are ranges of standardized factor loadings based on the total sample of each country.

was constrained to be equal across countries. In Model 3, the factor loading of drunkenness was constrained. In Model 4, the factor loading of cannabis use was constrained and in Model 5, the factor loading of sexual activity was constrained to be equal across countries. In Model 6, all factor loadings were constrained to be equal. The model fit statistics of the different models were compared and the most parsimonious model with a good fit was selected (the model fit criteria are summarized below).

If the CFA with constrained paths had an acceptable fit (reflecting measurement invariance across countries), we proceeded with the path model (see Figure 11.2). Descriptive statistics were computed for the risk behavior factor, parent–adolescent communication, evenings out with friends, and school attachment, and these were compared across countries. Next, we used Mplus to test a path model of the associations between the three psychosocial factors and the risk behavior factor. First, we tested the path model in an overall analysis.

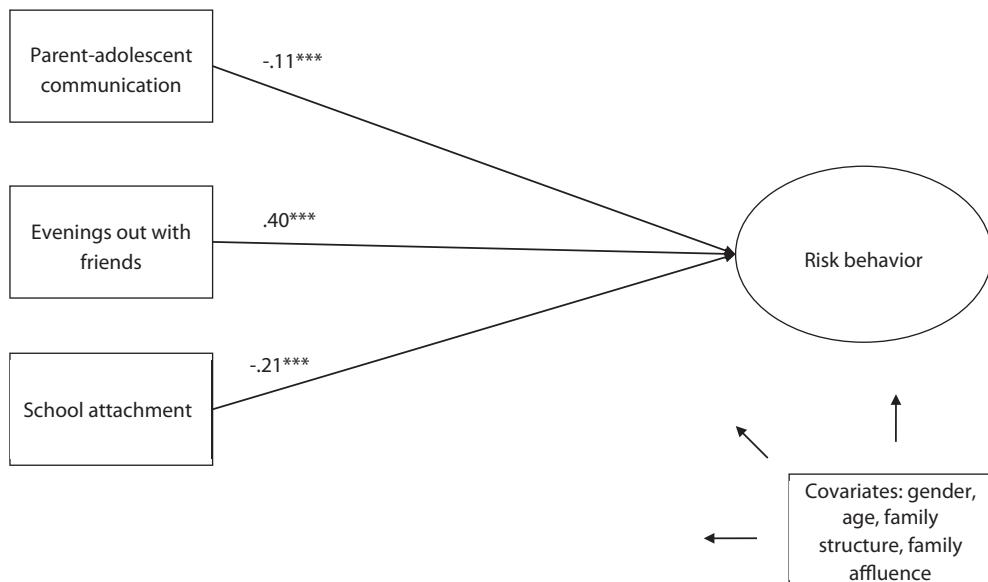


Figure 11.2 Path model predicting adolescent risk behavior (total sample), $\chi^2(31) = 370.29, p = .000$, $CFI = .989$, $TLI = .980$, $RMSEA = .014$. *** $p < .001$.

Next, to answer our second research question on cross-national consistencies in the strength of the associations between clustered risk behaviors on the one hand and parent-adolescent communication, evenings out with friends, and school attachment on the other, we employed a multiple group path analysis (also with country as grouping variable). A total of five different models were compared. In Model 1, all hypothesized paths were freely estimated. In Model 2, the path between parent-adolescent communication and the clustered risk behaviors was constrained to be equal across countries. In Model 3, the path between evenings out with friends and the clustered risk behaviors was constrained, and in Model 4 the path between school attachment and the clustered risk behaviors was constrained. In Model 5, all paths were constrained to be equal across countries. Also here, the model fit statistics of the different models were compared, and the most parsimonious model with a good fit was selected.

For all analyses, we assessed model fit with the chi-square fit statistic, the χ^2/df ratio, and evaluative criteria that were not sensitive to sample size, namely the comparative fit index (CFI ; Bentler, 1992; Bentler & Dudgeon, 1996), the Tucker-Lewis index (TLI ; Tucker & Lewis, 1973) and the root-mean-square error of approximation ($RMSEA$; Browne & Cudeck, 1993). The TLI and CFI are related to the total variance accounted for in the model and correct for

model complexity, with values larger than .90 indicating good model fit (Kline, 2010). In addition, the *RMSEA* is related to the residual variance, with values less than .05 indicating a good fit, although values less than .08 are acceptable (Kline, 2010). The comparison of the fit of the different models was based on the chi-square difference test and Chen's (2007) guidelines (i.e., the fit of the two models differs significantly if $\Delta CFI > .010$ and $\Delta RMSEA > .015$).

All analyses were corrected for cluster effects of pupils within the same school (primary sampling unit) by means of the option 'cluster is' in Mplus. As samples in the current study were large, we used alpha = .001 to be more conservative. Missing values on substance use and sexual activity ranged from 0% (daily smoking, Slovakia) to 36% (sexual activity, Belgium). In the analyses, missing values were model estimated in Mplus.

RESULTS

The risk behavior factor

Table 11.1 presents the prevalence rates of substance use and sexual activity by country. The findings from analyses of variance indicated significant between-group differences in the scores of all four behaviors. Table 11.2 presents the correlations among the different risk behaviors across countries. The correlation statistics provided evidence of strong and significant associations among the different risk behaviors.

A confirmatory factor analysis (CFA) was first run on the whole sample. The fit statistics of this analysis were good: $\chi^2(2) = 55.13, p = .000, CFI = .998, TLI = .994, RMSEA = .022$. The standardized factor loadings are presented in Figure 11.1; they ranged from .68 (sexual activity) to .81 (daily smoking).

To test for potential similarities or differences in the structure of the risk behavior factor across countries, we completed multiple group CFAs with country as grouping variable. The results of the nested model comparison can be found in Table 11.3. In the initial comparison between Models 1 (freely estimated: $\chi^2(54) = 183.91, p = .000, CFI = .996, TLI = .989, RMSEA = .034$) and 6 (fully constrained: $\chi^2(106) = 1052.60, p = .000, CFI = .973, TLI = .959, RMSEA = .066$), the following difference statistics were found: $\Delta\chi^2(52) = 824.08, p = .000, \Delta CFI = .023, \Delta TLI = .030, \Delta RMSEA = .032$. Although the difference statistics revealed a statistically significant difference between the models, the fit of the constrained model was acceptable. This indicates that the cross-national differences in the factor structure were only minor.

Table 11.3 Model fit statistics of the CFA model

Model	χ^2	df	p	CFI	TLI	RMSA	$\Delta\chi^2(\text{df})^1$	ΔCFI	ΔTLI	ΔRMSA
All loadings freely estimated	183.91	54	.000	.996	.989	.034	—	—	—	—
Smoking constrained	321.28	80	.000	.993	.986	.038	136.36(26)	.003	.003	.004
Drunkenness constrained	772.54	80	.000	.981	.961	.065	465.39(26)	.015	.028	.031
Cannabis constrained	292.14	80	.000	.994	.988	.036	118.88(26)	.002	.001	.002
Sexual activity constrained	470.75	80	.000	.989	.978	.049	251.04(26)	.007	.011	.015
All paths constrained	1052.60	106	.000	.973	.959	.066	824.08(52)	.023	.030	.032

CFI = comparative fit index; TLI = Tucker-Lewis index; RMSA = root mean square error of approximations; Δ statistics indicate the difference with the default model (all paths freely estimated).

¹ $\Delta\chi^2$ tests were all significant ($p < .001$).

As outlined in the plan of analysis, to be conservative, we completed a series of the nested model comparisons to evaluate individual loadings. The results (Table 11.3) indicated that especially the factor loading of drunkenness differed across countries. Yet, the differences were small: factor loading values of drunkenness were all above .60 and ranged from .61 (Denmark) to .83 (Iceland). As the model fit of the fully constrained model was still acceptable, we proceeded with the fully constrained model to test the path model across all countries. An overview of the exact factor loadings per country (in the freely estimated model) can be found in Table 11.4.

Table 11.4 Factor loadings per country in the freely estimated model¹

Country	Daily smoking	Drunkenness	Cannabis use	Sexual activity
Austria	.77	.69	.59	.72
Belgium	.84	.71	.88	.66
Canada	.79	.79	.89	.69
Czech Republic	.86	.67	.76	.81
Denmark	.86	.61	.92	.78
Estonia	.76	.64	.72	.67
Finland	.86	.81	.71	.71
France	.85	.74	.87	.67
Germany	.86	.63	.83	.75
Greece	.87	.68	.91	.62
Hungary	.85	.74	.85	.72
Iceland	.89	.83	.83	.68
Ireland	.84	.82	.89	.71
Latvia	.76	.72	.73	.65
Lithuania	.80	.69	.72	.71
Luxembourg	.85	.72	.86	.71
Netherlands	.82	.77	.74	.64
Poland	.83	.72	.80	.58
Portugal	.82	.76	.88	.57
Romania	.79	.70	.68	.65
Slovakia	.85	.74	.75	.75
Slovenia	.85	.77	.79	.63
Spain	.85	.73	.88	.60
Switzerland	.81	.75	.89	.66
Ukraine	.85	.68	.70	.62
Macedonia	.73	.76	.85	.67
UK	.85	.77	.86	.74

¹ $\chi^2(54) = 183.91, p = .000, CFI = .996, TLI = .989, RMSEA = .034$. All factor loadings are statistically significant ($p < .001$).

Associations between psychosocial factors and the risk behavior factor

Descriptive statistics of the risk behavior factor and its hypothesized psychosocial predictors (parent–adolescent communication, evenings out with friends, and school attachment) by country are presented in Table 11.5. The analyses of variance indicated significant between-group differences among all scores. Multiple risk behavior scores were highest in the UK and Austria and lowest in Portugal and Macedonia.

We tested the path model in which the risk behavior factor was associated with the psychosocial predictors. First, we tested the model on the total sample (across countries). This model had a good fit: $\chi^2(31) = 370.29, p = .000, CFI = .989, TLI = .980, RMSEA = .014$. All parameter estimates are shown in Figure 11.2. The findings provided evidence of a positive relationship between evenings out with friends and risk behavior. Risk behavior was negatively associated with positive parent–adolescent communication and school attachment. This model explained 43% of the variance in substance use and sexual activity.

To test for potential similarities or differences in the associations between psychosocial factors and adolescent risk behavior across countries, we completed multiple group path analyses. As can be seen in Table 11.6, no significant differences were found in model fit among the fully estimated, partially constrained, or fully constrained models. This indicates that the hypothesized associations in our model were similar across countries.

DISCUSSION

In the current study, we sought to test the cross-national applicability of a ‘risk behavior factor’ based on adolescent smoking, drunkenness, cannabis use, and sexual activity and its associations with a set of psychosocial predictors in 27 national samples of adolescents in Europe and North America. To date, only a very modest number of cross-national studies have addressed this topic. This was the first study to conduct large-scale cross-national comparative analyses.

Our analyses provide evidence of strong similarities between countries in the clustering of adolescent risk behaviors. Associations between these clustered risk behaviors and a set of psychosocial predictors (parent–adolescent communication, evenings out with friends, school attachment) were also found to be similar across countries. The identified similarities are remarkable particularly because of evident differences across contexts in the cultural, political, legal, demographical, social and religious domains. They are, however, consistent with the few existing studies that examined cross-national consistencies in the clustering of

Table 11.5 Means and standard deviations of adolescent risk behavior and psychosocial factors in 27 countries

Country	Parent-adolescent communication ¹			Evenings out with friends ¹			School attachment ¹			Risk behavior factor ¹		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Austria	-0.06	0.78	-0.02	0.93	0.17	0.82	0.15	1.03				
Belgium	-0.24	0.86	-0.40	0.95	-0.27	0.91	0.07	1.07				
Canada	-0.09	0.82	0.03	1.02	-0.04	0.90	0.08	1.10				
Czech Republic	-0.04	0.77	0.08	0.99	-0.03	0.81	0.11	1.11				
Denmark	0.02	0.79	-0.23	0.91	0.11	0.78	0.26	0.96				
Estonia	0.06	0.65	-0.05	1.00	-0.27	0.74	-0.06	0.89				
Finland	-0.00	0.74	0.09	1.07	-0.21	0.80	0.03	0.99				
France	-0.39	0.85	-0.27	0.99	-0.03	0.96	0.06	1.12				
Germany	-0.12	0.78	-0.13	0.92	0.12	0.75	-0.14	0.88				
Greece	-0.05	0.76	-0.09	0.95	-0.39	0.87	-0.13	0.87				
Hungary	0.22	0.65	-0.18	0.82	0.33	0.86	0.06	1.06				
Iceland	0.21	0.76	0.05	0.93	0.45	0.72	-0.17	0.83				
Ireland	0.04	0.82	0.01	1.05	-0.25	0.97	-0.01	1.04				
Latvia	0.02	0.74	0.26	1.06	0.05	0.89	0.10	1.04				
Lithuania	-0.10	0.81	0.29	1.04	0.16	0.92	0.11	1.03				
Luxembourg	-0.10	0.87	-0.12	0.91	-0.30	0.87	0.01	1.05				
Netherlands	0.30	0.68	-0.26	0.88	0.13	0.83	-0.09	0.96				
Poland	0.01	0.80	0.06	1.00	-0.19	0.92	-0.17	0.89				
Portugal	-0.13	0.81	-0.36	0.85	0.06	0.80	-0.24	0.80				
Romania	0.23	0.73	0.19	1.13	0.28	0.80	-0.01	0.90				
Slovakia	-0.14	0.82	0.30	1.08	-0.28	0.99	-0.15	0.91				
Slovenia	0.16	0.77	-0.02	0.94	0.24	0.91	0.11	1.09				
Spain	0.03	0.75	0.12	1.00	-0.31	0.93	0.05	1.09				
Switzerland	-0.14	0.83	-0.23	0.91	-0.14	0.85	-0.02	1.06				
Ukraine	0.18	0.64	0.37	1.02	0.23	0.81	-0.06	0.88				
Macedonia	0.33	0.77	0.34	0.94	0.39	0.92	-0.26	0.74				
UK	-0.03	0.81	0.06	1.00	-0.09	0.86	0.13	1.07				

¹ Standardized scores; subscales used different metrics.
Findings from analyses of variance indicated significant between-group differences across all scale scores ($p < .001$).

Table 11.6 Model fit statistics of the path model

Model	χ^2	df	p	CFI	TLI	RMSEA	$\Delta\chi^2(\text{df})$	$p \Delta\chi^2$	ΔCFI	ΔTLI	$\Delta RMSEA$
All paths freely estimated	1566.96	754	.00	.978	.956	.023	—	—	—	—	—
Parent-adolescent communication constrained	1584.25	780	.00	.978	.958	.023	37.72 (26)	.06	.000	-.002	.000
Evenings out with friends constrained	1568.88	780	.00	.979	.959	.023	19.33 (26)	.82	-.001	-.003	.000
School attachment constrained	1583.39	780	.00	.978	.958	.023	39.07 (26)	.05	.000	-.002	.000
All paths constrained	1757.49	832	.00	.975	.955	.024	235.37 (78)	.00	.003	.001	.001

CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean square error of approximations; Δ statistics indicate the difference with the default model (all paths freely estimated).

adolescent risk behaviors and their psychosocial correlates in a small number of countries. These studies compared the US, Taiwan, and China (Chen et al., 1998), US, China, Korea, and Czech Republic (Dmitrieva et al., 2004), US, Korea, and China (Greenberger et al., 2000), Georgia and Switzerland (Vazsonyi et al., 2008), China and the US (Jessor et al., 2003), or Hungary, the Netherlands, Slovenia, Spain, Switzerland, Taiwan, Turkey, and the United States (Vazsonyi et al., 2010).

This study extends the evidence for the (external) validity of Jessor's problem behavior framework, which states that adolescent risk behaviors do not occur randomly, but are likely to co-occur and share common psychosocial risk factors. It was important to test this specifically for substance use and sexual activity, as these behaviors are among the most prevalent risk behaviors among adolescents, and have been shown to form a special cluster of risk behaviors within PBS, potentially due to their adult-like status. Using large, population-based surveys, we found that the same clustering of adolescent substance use and sexual activity could be applied cross-nationally in 27 countries across Europe and North America.

While Jessor's PBT underlines the problematic nature of adolescent substance use and sexual activity in explaining their co-occurrence and associations with psychosocial factors, other theories have stressed the normative character of these behaviors. According to Moffitt (1993; 2006), for example, the three psychosocial predictors in this study (i.e., low family attachment, low school attachment, high peer attachment) as well as adolescent experimentation with substance use and sexual behaviors are indicative of normative adolescent development. As young people develop into adults, it is necessary that they break loose of their parents, turn away from conventional institutions like school, turn towards their peers, and experiment with different behaviors and lifestyles in order to achieve important developmental tasks, such as individuation and the development of an identity. As such, the results of our study may also be understood in the light of a globalized adolescent culture in which distancing from parents and more conventional institutions like school, intensifying peer contacts, and experimenting with new, adult-like behaviors reflect normative aspects of adolescent development.

Previous research has shown that experimentation with substance use and sexual behaviors is problematic for a small proportion of adolescents, especially those who start at an early age and those who engage in risk behaviors excessively (Monshouwer, 2008). However, for most adolescents, experimentation with these behaviors has been characterized as normative and temporary behavior that is not necessarily indicative of problematic development (Moffitt, 1993; 2006). Yet, engagement in substance use and sexual behaviors

involves risks also for this majority (Odgers et al., 2008). When interpreting the findings of our study, it is important to consider both the normative and problematic aspects of substance use and sexual activity during adolescence.

The strengths of the present study include the utilization of a cross-national comparative method, the use of an ecological–developmental framework, the use of nationally representative samples, and the combination of confirmatory factor analysis techniques and structural equation modeling. Limitations include the limited number of predictors, which was largely due to the limited availability of measures, the cross-sectional nature of the study, and its reliance on a single method of measurement.

Our findings have developmental implications for our understanding of not only how youth develop in general, but also of how similarly they develop in different countries. A theoretical implication of this study is that developmental processes with respect to adolescent substance use and sexual activity may be invariant across adolescents from different cultural groups. As such, substance use and sexual activity may be considered core features of globalized adolescent peer culture. An implication for the field of public health is that it may be beneficial for European and North American countries to collaborate in developing and implementing prevention programs aimed at reducing adolescent engagement in excessive and multiple risk-taking behaviors.

Chapter 12

Early risk behaviors and adolescent injury in 25 European and North American countries: A cross-national consistent relationship

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ABSTRACT

Injury is a leading cause of mortality and morbidity among adolescents in developed countries. Jessor and Jessor's problem behavior theory suggests an association between risk behaviors (e.g., smoking, drunkenness, cannabis use, and sexual intercourse) and adolescent injury. The present study examined whether early engagement in risk behaviors would predict injury at age 15. It also examined whether such associations were consistent in strength across countries. Based on the data from the 2005/2006 Health Behaviour in School-aged Children (HBSC) survey, a multigroup logistic regression analysis was conducted. Our findings demonstrate a cross-national consistent association (with relative odds of injury rising to 1.85 (95% CI = 1.70–2.02)). Based on our findings, early engagement in risk behaviors was considered a marker for a trajectory that places adolescents at higher risk for physical injury, independent of their national context.

INTRODUCTION

In developed countries, injury is a leading cause of mortality and morbidity among young people (Chiolero & Schmid, 2000; Currie, Nic Gabhainn, et al., 2008; Danseco, Miller, & Spicer, 2000; Lescohier & Scavo Gallagher, 1996). In addition to negative physical and psychological effects on individuals, pediatric injury exacts a significant toll on society in terms of direct and indirect costs associated with treatment, rehabilitation, and long-term care, as well as loss of income and productivity due to disability (Krug, Sharma, & Lozano, 2000). The etiology of adolescent injury is, therefore, an obvious health research priority.

Researchers from different countries have related substance use with higher risk of adolescent injury (Jessor, 1998; Koven, McColl, Ellis, & Pickett, 2005; Pickett et al., 2006; Pickett, Garner, Boyce, & King, 2002; Pickett et al., 2005; Pickett, Schmid, et al., 2002). Whereas some studies have suggested that substance use (e.g., alcohol misuse) is a direct cause of injury (Pickett et al., 2005), another plausible theory is that substance use is related to injuries in an indirect manner. Jessor and Jessor (1977) for example proposed a theoretical framework, the problem behavior theory, which stated that a large variety of risk behaviors in adolescence are interrelated as they are all expressions of an underlying propensity for problem behavior. Whether or not a youth has this propensity depends on various factors including the adolescent's personality and his or her environment (e.g., peer influence, parental support, school system, neighborhood). Youth with a propensity for problem behavior are more likely to adhere to a high-risk lifestyle, which fosters both engagement in risk behaviors and the experience of adverse health outcomes such as injuries.

Sexual intercourse is rarely examined as a risk behavior in etiological studies of adolescent injury as it is obviously not a direct risk factor. However, early sexual intercourse has a prominent place in problem behavior theory. Moreover, recent studies (Bellis et al., 2008; Willoughby, Chalmers, & Busseri, 2004) demonstrated that early sexual activity is part of a special cluster within problem behavior theory, which also includes alcohol misuse, smoking tobacco, and illicit drug use. This cluster may be perceived as an expression of the underlying propensity of problem behavior, which is, according to the theory, predictive of adolescent injury.

While Jessor and Jessor's (1977) theoretical framework focused on risk behaviors of adolescents in general, the present work focused on risk behavior specifically in early adolescence. This choice was based on the assumption that risk behaviors are not, as a rule, problem behaviors. From a developmental perspective, adopting adult-like behaviors is part of the normal growing-up process (Moffitt, 2006). Since most adults use or have used

substances and are sexually active, it is not surprising that young people would adopt these behaviors (Luijpers, 2000). For them, such behaviors might fulfill important social functions and could be an essential aspect of psychosocial development (Moffitt, 2006). It is therefore important not to problematize risk behaviors. For early adolescents, however, engagement in smoking, drinking, cannabis use and sex is deviant; most early adolescents are not (yet) interested in these kinds of behaviors. The behaviors therefore do not fulfill the same social function they do for older youth. Indeed, previous research has shown that early onset of risk behaviors can be considered problematic. A famous study by Moffitt (1993) demonstrated that youth with an early onset of risk behaviors were more likely to become involved in problematic levels of substance use and engage in risky and unsafe sexual activities later in life compared to youth with a later onset of risk behaviors (Moffitt, 1993; 2006). While for late onset youth, engagement in risk behaviors during adolescence was perceived as a temporary phenomenon, it was considered the beginning of lifelong engagement in risk and other unhealthy behaviors for early onset youth. A variety of other studies, in different countries, confirmed that early onset risk behaviors are a marker for later adherence to a high-risk lifestyle (Basen, Edmundson, & Parcel, 1996; Bellis et al., 2008; DuRant, Smith, Kreiter, & Krowchuk, 1999; Gullone, Moore, Moss, & Boyd, 2000; Petridou et al., 1997).

To the authors' knowledge, no study to date has investigated the relationship between early onset of risk behaviors and later injury in a cross-national sample. As policies and attitudes toward risk behaviors, as well as prevalence rates of early risk behaviors and injuries, differ considerably cross-nationally, identification of a cross-national consistent association would be quite profound. Further, there is neither scientific evidence nor a logical rationale to assume that early risk behaviors, in some countries, would be more strongly related to the occurrence of injury, than in others. To date, only two studies have conducted cross-national analyses on the association between adolescent risk behavior and injuries. However, neither tested whether associations were consistent across countries. Moreover, these studies focused on concurrent risk behaviors (Pickett et al., 2005) or only one risk behavior, rather than the clustered risk behavior concept (i.e., alcohol misuse; Borges et al., 2006).

The present study investigated the association between injury and early engagement in alcohol, tobacco, and cannabis use and sexual intercourse in 25 European and North American countries. We first described the prevalence of medically attended injuries and early risk-taking in each country, then evaluated the association between injury at age 15 and the number of early risk behaviors youth had engaged in. We hypothesized that the more early risk behaviors youth had engaged in, the higher their likelihood of being injured at age

15. Based on our assumption, that early risk-taking might be a phenomenon with the same meaning in different populations of early adolescents, we expected our findings to be similar in strength across different countries and cultures.

METHOD

This study was based on international records from the 2005/2006 Health Behaviour in School-aged Children (HBSC) survey. The HBSC study is a World Health Organization (WHO) collaborative cross-national study on health and related behaviors and the social contexts of young people's health (Currie, Nic Gabhainn, et al., 2008). Students aged 11, 13 and 15 years were surveyed across Europe and North America. In the present study, we used reports from 15-year-old students. Data were collected using a questionnaire that was completed in the classroom. Participating countries and regions obtained institutional ethics approval.

Countries

In 2005/2006, 38 countries participated in the HBSC study. Countries were excluded from these analyses if they had not asked students about the age of onset of at least one of the four risk behaviors of interest (seven countries: Ireland, Norway, Poland, Spain, Sweden, Turkey, and the USA) or if they had at least 50% missing values on variables that were included in the analyses (six countries: Bulgaria, Greece, Greenland, Malta, Israel, and Macedonia). Included countries were: Austria, Belgium, Canada, Croatia, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Iceland, Luxembourg, the Netherlands, the Russian Federation, Switzerland, Ukraine, and the United Kingdom (England, Scotland, Wales). Additionally, eight countries (Hungary, Italy, Latvia, Lithuania, Portugal, Romania, Slovakia and Slovenia), which had very few students who reported engagement in all four early risk behaviors, were included in the analysis but with a limited range of early risk indicators (at most three). National sample sizes for 15-year-olds ranged from 1,191 to 5,006.

Sampling

The HBSC sampling methods are described extensively in the international protocol (see Currie, Samdal, Boyce, & Smith, 2001; Roberts et al., 2009). Cluster sampling was conducted in accordance with the structure of national education systems within each country. Sampling

was stratified by region or school type, as appropriate. The primary sampling unit was the school class, or the whole school where a sample frame of classes was not available.

Measures

Injury. Occurrence of injury was measured via a single question that asked how often students experienced an injury event in the past 12 months that required medical attention from a doctor or a nurse. The question was preceded by the following statement: ‘Many young people get hurt or injured from activities such as playing sports or fighting with others at different places such as on the street or at home. Injuries can include being poisoned or burned. Injury does not include illnesses such as Measles or the Flu.’ Response options were: *I was not injured in the past 12 months, one time, two times, three times, four or more times*. The outcome was dichotomized into not injured or injured at least once as per existing precedents (Pickett, Garner, et al., 2002; Pickett, Schmid, et al., 2002).

Early risk behaviors. Participants were asked to report if and at what age they first engaged in (1) smoking a cigarette, (2) being drunk, and (3) having sexual intercourse. Although drunkenness is a subjective term, we focused on drunkenness rather than the age of the participants’ first time drinking alcohol because drunkenness indicates alcohol misuse. Participants were also asked whether they had ever used cannabis. Of note, asking youth to report the age at which they first engaged in cannabis use was considered a sensitive topic in many countries; therefore, it was not included as a question in the mandatory international questionnaire. Early initiation was defined as having smoked a cigarette before age 13, having been drunk before age 14, having had sexual intercourse before age 15, and having used cannabis by age 15. We selected these cut-offs based on literature-based precedents (see Baumeister & Tossmann, 2005; Currie, Nic Gabhainn, et al., 2008; Zimmer & Helfand, 2008) and on the average age of onset of these behaviors in the 25 countries (see Table 12.1). The average age of onset per risk behavior across countries provided an indication of the age of onset that would be considered early for each risk behavior. Finally, a summary score was created by adding the four dummy variables for early engagement in the risk behaviors (values ranged from 0 to 4).

Covariates. Additional variables included in the HBSC database and selected as potential confounders were gender, physical exercise frequency, and socioeconomic status as measured by the Family Affluence Scale (FAS; Currie, Molcho, et al., 2008; Williams, Currie, Wright, Elton, & Beattie, 1997). Existing studies have demonstrated that boys are more likely to be injured than are girls (Koven et al., 2005) and that high family affluence is related to

an increased risk for injury, mainly via participation in organized sports (Pickett, Garner, et al., 2002; Mazur, Scheidt, Overpeck, Harel, & Molcho, 2001). Although physical activity is part of a healthy lifestyle, it also increases the risk for injury through an increased exposure to injury-causing activities (King, Pickett, & King, 1998; Riley et al., 1996).

Imputation of missing values

As our sample was very large and the number of missing values was rather small (2.9% to 37.5% across countries; mean 25.9%) missing values were imputed using multiple imputation in Amos (version 17: Arbuckle, 2008). The Bayesian imputation method was selected, which is considered an appropriate approach with large samples (Schafer, 1997). With multiple imputation, missing values are replaced by several simulated values. In this study, six simulated values were used, which resulted in six complete data sets. Based on the results of these six analyses, pooled model parameter estimates were computed following Schafer's (1997) guidelines.

Imputed values for missing data are generated within a so-called imputation model that contains all the variables from the final research model. When possible, variables that are assumed to be related to missingness are added to the model. In the present study, several variables (i.e., gender, academic achievement, self-rated health, and involvement in physical fights) were added to the imputation model for this purpose. To ensure an adequate model fit as well as ensure that the data were consistent with observed values, the imputation model was defined as a saturated multivariate regression model with risk behaviors as dependent variables and the other variables as independent variables. Further, this model was applied to the original data set of each country. Subsequently, the data sets of the countries were merged to allow for multigroup analyses across countries.

Statistical analyses

Descriptive statistics from each country were presented to estimate the average age of onset of each of the four early risk behaviors (based on youth reporting the behaviors). Next, percentages of children who reported early risk behaviors were presented, as were country-specific rates of injury.

Subsequently, we performed a series of logistic regression analyses to predict injury at age 15 based on the additive risk behavior score. We also analyzed a multi-group model with country as a grouping variable, using the software package Mplus (version 4.0: Muthén &

Muthén, 2006). We included all 25 countries and examined the number of early risk behaviors (0, 1, 2, and 3 risk behaviors) as a predictor of injury. To test whether associations were similar across countries, the model was analyzed initially with all regression paths constrained. We subsequently allowed regression paths to vary across countries and compared the fit of the two models. Because the sample size was very large and as the chi square statistic is sensitive to sample size, we focused on the Tucker-Lewis Index (*TLI*) and Root Mean Square Error of Approximation (*RMSEA*) values as evidence of model fit (Chen, 2007). The *TLI* is related to the total variance accounted for in the model and corrects for model complexity; values larger than .90 are desired (Kline, 2010). Additionally, the *RMSEA* is related to the residual variance; values less than .05 indicate a good fit (Kline, 2010). Comparison of fit for the current analysis was based on Chen's (2007) guidelines (i.e., the fit of the two models differs significantly if $\Delta TLI > .010$ and $\Delta RMSEA > .005$). If the fit of the freely estimated model was significantly better than the fit of the constrained model, then the freely estimated model was preferred, which would indicate that associations between early risk behaviors and injury differed in strength across countries. If this was not the case, then the constrained model was preferred, which would indicate that the associations were similar across countries.

Next, we performed a multigroup analysis with those countries ($n = 17$) that had sufficient students who reported engagement in four early risk behaviors, following the same procedures as described above. Based on our findings, we defined a final model for presentation.

Finally, as an additional analysis, we performed a multigroup analysis for boys and girls to determine whether the associations differed by gender.

Since the type of cluster sampling varied from one country to another, commonly applied sandwich estimator methods were not possible. A decomposition of the variances revealed that school and class levels accounted for only 1.3% and 0% of the variance in injury, respectively. To be conservative in our analyses, we therefore applied the 0.1% alpha-error threshold rather than the usual 5% threshold.

RESULTS

In total, 47,106 adolescents were included in our analyses. Each country had a large, nationally representative sample, 48.5% of whom were boys. The rate of engagement in physical activity each day differed substantially across countries, ranging from 9.2% (Iceland) to 26.9% (Russian Federation). Table 12.1 presents the mean age of onset of risk behaviors in the 25 countries

Table 12.1 Ages of onset of risk behaviors among 47,106 children in 25 countries^a

Country	Smoking			Drunkenness			Sexual intercourse		
	N	M	SD	M	SD	M	SD	M	SD
Austria	1,495	12.58	1.28	13.55	1.02	13.83	1.03		
Belgium	3,030	13.06	1.29	13.92	1.06	14.38	0.87		
Canada	2,299	13.21	1.32	13.84	1.08	14.09	1.02		
Croatia	1,630	13.20	1.42	13.86	1.16	14.18	1.17		
Czech Republic	1,666	12.65	1.30	13.71	1.13	14.50	0.75		
Denmark	1,556	13.38	1.25	13.92	0.96	13.28	0.92		
Estonia	1,589	12.43	1.37	13.61	1.24	14.41	0.86		
Finland	1,686	13.06	1.34	13.72	1.08	14.27	0.91		
France	2,223	13.10	1.32	14.06	0.98	14.15	0.98		
Germany	2,554	12.84	1.26	13.97	0.95	14.06	0.97		
Hungary	1,191	13.09	1.27	14.07	0.96	14.40	0.83		
Iceland	1,886	13.69	1.27	14.21	0.97	14.21	0.91		
Italy	1,340	13.66	1.23	14.45	0.87	14.31	0.97		
Latvia	1,330	12.84	1.44	13.83	1.20	14.55	0.83		
Lithuania	1,861	13.03	1.43	13.89	1.14	14.37	1.05		
Luxembourg	1,513	12.93	1.24	13.93	1.08	13.90	1.15		
Netherlands	1,365	12.86	1.28	13.88	1.04	14.16	0.94		
Portugal	1,383	13.15	1.32	14.07	1.08	14.08	1.10		
Romania	1,605	13.51	1.45	14.01	1.29	14.29	1.07		
Russian Federation	2,754	13.05	1.42	13.82	1.25	14.38	0.96		
Slovakia	1,252	12.89	1.32	13.76	1.09	14.29	1.03		
Slovenia	1,561	13.25	1.34	13.99	1.05	14.45	0.84		
Switzerland	1,502	12.98	1.30	13.82	1.02	14.16	0.94		
Ukraine	1,829	13.14	1.49	14.17	1.12	14.35	1.03		
UK	5,006	13.12	1.30	13.85	1.09	14.23	0.97		
Mean	1,884	13.10	1.33	13.80	1.08	14.20	0.96		

Note. Cannabis was excluded from this table as no data on exact age of onset for cannabis use were available. Means and standard deviations are pooled estimates of the six imputed files (Schafer, 1997). ^a Means are restricted to those youth who reported engagement in the behaviors.

Table 12.2 Percentage of adolescents reporting early risk behaviors and injuries

Country	Early smoking (age < 13)	Early drunkenness (age < 14)	Early cannabis use (age ≤ 15)	Early sexual intercourse (age < 15)	At least one early onset risk behavior	Multiple early onset risk behaviors (2+)	At least one medically attended injury
Austria	33.2	24.0	14.1	21.1	50.9	25.8	44.7
Belgium	15.4	12.5	22.7	13.5	38.7	16.3	44.2
Canada	10.1	16.3	36.2	14.7	44.4	20.5	45.0
Croatia	20.1	18.2	14.5	9.6	38.5	15.5	41.1
Czech Republic	27.8	18.2	25.8	8.2	44.8	22.3	49.5
Denmark	12.0	20.2	17.9	35.4	48.6	23.4	48.5
Estonia	40.2	28.0	25.3	9.6	55.6	30.0	36.3
Finland	19.1	22.8	8.6	13.8	36.9	18.0	40.6
France	16.7	8.4	28.1	16.3	43.6	17.2	41.4
Germany	22.2	11.1	18.1	15.2	39.7	17.2	47.2
Hungary	20.4	11.9	14.2	10.7	36.3	13.6	42.3
Iceland	6.4	9.3	10.3	17.3	25.9	10.3	54.2
Italy	9.8	4.2	23.4	11.9	33.0	12.0	47.0
Latvia	30.3	21.5	23.1	6.1	49.3	21.6	44.9
Lithuania	27.8	24.1	15.2	6.8	46.3	19.5	49.6
Luxembourg	21.0	11.4	24.1	19.3	42.8	20.2	42.9
Netherlands	19.2	11.8	24.2	14.5	38.4	19.2	36.5
Portugal	14.3	8.5	9.9	12.8	29.7	10.9	41.1
Romania	12.1	12.6	3.3	10.0	26.6	8.5	30.0
Russian Federation	23.0	19.7	18.4	12.7	42.9	20.1	37.1
Slovakia	21.8	18.6	18.5	4.9	38.3	17.0	42.5
Slovenia	15.9	14.4	18.6	8.5	35.7	14.8	34.3
Switzerland	20.7	12.3	33.9	12.3	45.7	20.7	50.0
Ukraine	23.4	14.5	16.8	10.8	39.8	17.4	33.4
UK	15.7	22.8	28.7	15.9	45.0	23.6	45.8
Mean	19.9	15.9	19.2	13.3	40.7	18.2	42.8

Note. Percentages are pooled estimates of the six imputed files (Schafer, 1997).

included in this study (based on youth reporting the behaviors). Smoking tobacco yielded the lowest mean age of initiation (13.1), followed by drunkenness (13.8), and sexual intercourse (14.2). The percentage of children reporting engagement in early risk behaviors and injuries within countries differed substantially cross-nationally (see Table 12.2). Overall, 40.7% of the adolescent population in the 25 countries engaged in at least one early risk behavior; 18.2% engaged in multiple early risk behaviors.

A multi-group model that examined the number of early behaviors (0, 1, 2, 3), as a predictor of injury in the 25 countries, had a good model fit when all regression paths were constrained (see Table 12.3). Model fit did not improve when regression paths were allowed to vary across countries ($\Delta TLI = .003$ and $\Delta RMSEA = .001$), which indicated that the cumulative association between early risk behaviors and injury was consistent across countries. Odds ratios were 1.17 (95% CI = 1.13–1.21), 1.34 (95% CI = 1.29–1.40) and 1.49 (95% CI = 1.41–1.57) for early engagement in one, two, and three risk behaviors, respectively.

The second multigroup analysis included only those countries that had sufficient students reporting engagement in four early risk behaviors ($n = 17$). This model had a good fit with all paths constrained. Allowing the paths to vary across countries did not improve the fit ($\Delta TLI = .008$ and $\Delta RMSEA = .002$), which supported the consistency of our findings across countries. Adolescents who engaged in multiple early risk behaviors were up to 1.85 fold more likely to report medically attended injuries compared to adolescents who did not engage in early risk behaviors (see Table 12.4). As the odds ratios of engagement in one, two and three early risk behaviors were comparable to those in the previous model ($N = 25$), we assumed that the odds ratio of engagement in four early risk behaviors in the final model ($n = 17$) was also applicable to the eight countries that did not have sufficient students engaging in four early risk behaviors. The final model also revealed that (a) boys were more likely to be injured than were girls, (b) increasing frequency of physical activity was associated with increasing chances of becoming injured, and (c) adolescents with higher family affluence were more likely to be injured.

Finally, to test whether the current findings were similar in strength for boys and girls, we defined and tested a multigroup model with two groups defined by gender. Both the model where regression paths were constrained across gender and the model where they were freely estimated had a perfect fit ($RMSEA = .000$, $TLI = 1.00$ and $RMSEA = .001$, $TLI = .999$, respectively). As there was no significant difference between the fit of the models ($\Delta TLI = .001$ and $\Delta RMSEA = .001$), we chose the most parsimonious model, which was the model with constrained paths. This indicates that there were no observed gender differences in the association between early risk behaviors and injury.

Table 12.3 Model fit statistics

Predictors	Model	Model specification	χ^2 ³	df	TLI	RMSEA	Δ TLI	Δ RMSEA
Early onset of 1, 2 or 3 risk behaviors ¹	1	Risk1-3 fixed across countries	280.59-288.63	171	.930	.018	.003	.001
	2	Risk1-3 free	171.78-185.73	106	.927	.019	—	—
Early onset of 1, 2, 3 or 4 risk behaviors ²	1	Risk1-4 fixed across countries	199.33-216.42	126	.946	.018	.008	.002
	2	Risk1-4 free	104.53-114.55	69	.954	.016	—	—

RMSEA = root mean square error of approximations; TLI = Tucker-Lewis index. Δ statistics indicate the difference with Model 1.

¹ Countries included: Austria, Belgium, Canada, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Iceland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Portugal, Romania, Russian Federation, Slovakia, Slovenia, Switzerland, Ukraine, UK.

² Countries included: all countries under (a) except for Hungary, Italy, Latvia, Lithuania, Portugal, Romania, Slovakia and Slovenia.

³ As Mplus does not provide pooled estimates of the χ^2 value, the range of values of the individual imputed files was reported ($p < .001$ for all files and models).

Table 12.4 The cumulative effect of early risk behaviors on medically treated injuries at age 15: model estimates

Predictor	B ¹	SE	OR (95% CI)
Early engagement in 1 risk behavior	0.19	0.02	1.21 (1.17–1.26)
Early engagement in 2 risk behaviors	0.32	0.02	1.38 (1.32–1.48)
Early engagement in 3 risk behaviors	0.44	0.03	1.56 (1.46–1.66)
Early engagement in 4 risk behaviors	0.62	0.04	1.85 (1.70–2.02)
Gender (being a boy)	0.17	0.01	1.19 (1.15–1.22)
Physical exercise each day ²	0.45	0.02	1.57 (1.50–1.64)
Physical exercise 4–6 days a week ²	0.40	0.02	1.49 (1.44–1.55)
Physical exercise 2–3 days a week ²	0.21	0.02	1.23 (1.19–1.28)
High FAS ³	0.21	0.02	1.23 (1.17–1.29)
Medium FAS ³	0.11	0.02	1.11 (1.07–1.16)

Note. FAS = Family Affluence Scale.

¹ All predictors were significant at $p < .001$.

² Reference category: physical exercise one day per week or less.

³ Reference category: low FAS.

DISCUSSION

This study resulted in two major findings. First, it profiled the prevalence of early risk-taking in 25 countries in terms of smoking, drunkenness, cannabis use, and sexual intercourse. Second, it demonstrated a cross-national consistent and cumulative association between the number of early risk behaviors that adolescents engaged in and the occurrence of injury at age 15. The fact that we found an association is remarkable, as much time had passed between the engagement in some risk behaviors (e.g., smoking before age 13) and the experience of injury at age 15.

Because of the cross-sectional design of the current study, we cannot make inferences regarding causality. However, a causal pathway between early risk behaviors and injury has been questioned in previous studies that had found a high correlation between psychosocial characteristics, stress, risk-taking, and injuries (Macdonald, Erickson, Wells, Hathaway, & Pakula, 2008). It seems likely that a third variable (i.e., a high-risk lifestyle) explains both adolescent early risk behavior and injury at age 15. This conclusion is consistent with Moffitt's (1993; 2006) findings in that early onset of risk behavior is related to unhealthy behaviors and negative outcomes later in life.

It should be noted that, due to the cross-sectional nature of the current data, the temporal sequence between some reported risk behaviors and injury remains unclear. To illustrate, the 15-year-old youth were asked whether they had experienced injuries in the year before this study; however, participants were also asked whether they had ever used cannabis. Participants, thus, may have experienced an injury prior to using cannabis. However, this was not viewed as a major issue for the interpretation of our findings as we placed both behaviors in the context of a high-risk lifestyle.

The cross-national relationship as demonstrated by our modeling is important. Specifically, the consistency of our findings is remarkable in that there are many factors that could potentially eliminate the associations between early risk behaviors and injury. For example, there are large variations in access to medical care for the treatment of injuries across countries (Schoen & Doty, 2004). Furthermore, cultural factors are likely to influence individual adolescents' decision to seek medical assistance when injured. Existing studies have demonstrated that cultural dimensions play an important role in medicine use (Deschepper et al., 2008), medical communication (Meeuwesen, van den Brink-Muinjen, & Hofstede, 2009) and medical compliance (Larsen, Stovring, Kragstrup, & Hansen, 2009). All these factors may cause an injured adolescent in one country to visit a doctor and be treated, while an adolescent in a different country with a similar injury might not be treated or might not even seek medical assistance. Finally, countries differ considerably in terms of prevalence rates and policies with respect to young people's substance use and sexual activity. Sex education strategies for youth in European and North American countries differ noticeably concerning educational curricula and approach taken in the classroom (e.g. Lewis & Knijn, 2003). Similar differences in approach can be found with respect to substance use policies. For example, while alcohol is prohibited for youth up to age 20 in Iceland, youth from age 16 onwards are legally allowed to purchase and drink alcoholic beverages in Italy and Portugal (International Center for Alcohol Policies, January 2011). Because so many differences exist concerning laws on substance use, it is noteworthy that we observed a cross-national consistent relationship between early risk behavior and injury.

Past efforts have focused on the detection of cross-national differences in risk behaviors and their relation to health outcomes. Therefore, it is significant that the current results yielded similarities in associations across countries. They suggest that the relation between early risk behaviors and physical injuries may not be significantly influenced by cultural factors. The possibility remains, however, that mediating effects vary between countries; future research is encouraged to investigate these mechanisms in more detail.

A secondary finding that deserves attention in this discussion is that youth from more affluent families were more likely to be injured, independent of their engagement in early risk behaviors, physical exercise, and gender. A possible explanation for this is that youth from more affluent families have better access to medical facilities compared to youth from less affluent families. This may especially be the case in countries with large socioeconomic inequities. In addition, youth from more affluent families are more likely to engage in injury-producing sports frequently than are youth from less affluent families (Gorely, Atkin, Biddle, & Marshall, 2009; Seabra, Mendonça, Thomis, Peters, & Maia, 2008; Walters, Barr, Wall, & Neumark, 2009).

Limitations of this study include the self-reported nature of our data, which are subject to social desirability and recall bias (Aday & Cornelius, 2006). While far from perfect, self-administered surveys are virtually the only practical method that can be used to simultaneously obtain a broad range of health indicators for a study of this size. Our questionnaire items were developed iteratively over many years and were supported by validation efforts (Currie, 2000; Currie et al., 2002; Currie, Nic Gabhainn, et al., 2008; Roberts et al., 2009). Furthermore, the effect estimates in our final model were modest, which may lead one to conclude that the associations are not important. However, the estimates should be interpreted with caution as they were conservative; specifically (1) the association tested was indirect and (2) our outcome variable of injury was broadly defined. Rather than focusing on severe injuries, we included any type of injury an adolescent had experienced for which they received medical attention. This broad definition of injury likely biased our results toward no effect. A final limitation of the current study was the cross-sectional nature of the study design and no causal inferences could be made. Therefore, longitudinal confirmation of the observed relationships is encouraged.

The current study is unique in several respects. First, our examination of the cumulative versus individual effects of the four risk behaviors, while consistent with problem behavior theory (Jessor & Jessor, 1977), has rarely been the focus of past etiological studies of injury in adolescent samples. Second, the current focus on early risk behaviors was unique in comparison to other research that has predominantly focused on concurrent risk behaviors as well as a more direct link between risk behaviors and the occurrence of injury. Third, the quality of our analyses was considered high due to our application of modern imputation techniques, which minimized the potential for bias from missing data. Finally, a major strength of this study was its international scope; it included populations of young people from diverse cultures. Our confirmation of a cross-national consistent pattern that links early risk behaviors with later occurrence of injury is noteworthy.

Our findings have implications for prevention as they provide confirmation that early engagement in risk behaviors may be related to a lifestyle that includes a high risk for injury. Public health interventions may need to consider the multiple risk behavior phenomena during early adolescence as an important determinant of health and focus on this clustered risk behavior phenomenon, as opposed to focusing on individual risk behaviors in isolation. At a societal level, this may affect the content of health promotion campaigns. At an individual level, children who engage in a number of early risk behaviors may benefit from individual, focused interventions that promote a healthier lifestyle in general. Our list of risk behaviors provides a basis for a useful administrative tool that may be used in the early screening for at-risk adolescents.

Chapter 13

Discussion

Study aims and major findings

This thesis examined the social and cultural context of adolescent substance use and sexual activity. Based on Bronfenbrenner's (1979) theory of the ecology of human development, it addressed social and cultural factors that are associated with adolescent substance use and sexual activity at different layers of the social and cultural environment, including the micro-system (i.e., educational track and parenting practices), the macro-system (i.e., national context), and the chrono-system (i.e., changes over time). To date, research projects investigating the context of adolescent risk behavior at so many different layers of the environment are rare. Moreover, in contrast to previous studies, which stressed predominantly the problematic aspects of adolescent substance use and sexual behavior, this thesis aimed to provide a balanced perspective by discussing both their normative and risky aspects.

The aim of this thesis was to a) explain educational differences in adolescent substance use and sexual activity by looking at factors related to the transition to adulthood; b) examine how parents can protect their adolescents against the risks involved in substance use and sexual behavior; c) discuss how the broader socio-cultural, national context can create or limit opportunities for adolescents to engage in these behaviors; and d) address cross-national similarities and differences in the clustering of adolescent substance use and sexual activity as well as their social and health correlates. All studies in this thesis are based on the Health Behaviour in School-aged Children (HBSC) study, which is a large cross-national study on health, health behaviors, and the social context of health conducted among 11- to 16-year-old adolescents in Europe and North America (Currie et al., 2012).

Part I: The role of educational track in adolescent substance use and sexual activity

The first two studies of this thesis aimed to explain educational differences in adolescent substance use and sexual activity. In line with previous studies conducted in various countries (Friestad & Klepp, 2006; Geckova, Van Dijk, Groothoff, & Post, 2002; Hagquist, Sundh, & Eriksson, 2007; Richter & Leppin, 2007; Vereecken, Maes, & De Bacquer, 2004), we found that vocational students in the Netherlands were more likely to engage in substance use and sexual activity, compared to academic students. While previous studies sought explanations for these educational differences by looking at elevated levels of socio-emotional and behavioral problems among vocational students (Schrijvers & Schoemaker, 2008), we found that factors related to the timing of the transition to adulthood could explain this association. As such, the

studies in Part I provide an additional explanation for the observed educational differences. Specifically, we found that individuation-separation processes during adolescence (i.e., creating a more distant relationship with parents and having more frequent peer contacts; Chapter 2) and adolescent expectations and conceptions of adulthood (Chapter 3) mediated the association of educational track with adolescent substance use and sexual activity.

The results of Chapter 2 showed that compared to academic students, vocational students engage more in substance use and sexual activity because their parents were less aware of their daily activities and whereabouts and because they spent more time with peers. While previous studies have suggested that low parental knowledge and frequent peer contacts are indicators of ineffective parenting styles (e.g., Morawska, Winter, & Sanders, 2009), they can also be perceived as normative processes that characterize a healthy transition to adulthood (Meeus, Iedema, Maassen, & Engels, 2005). In Chapter 2, we suggested that vocational students may experience the transition at an earlier age compared to academic students and hence may undergo these separation-individuation process earlier in life. This is consistent with previous ethnographic (Willis, 1977) and demographic research (Beets, Dourleijn, Liefbroer, & Henkens, 2001; Berzin & De Marco, 2010; Gillis, 1981; Raymore, Barber, & Eccles, 2001; Scherger, 2009) suggesting that vocational students adopt adult roles, such as having a full-time job or having a first child, earlier in life compared to academic students. As the transition to adulthood and separation-individuation processes typically coincide with increased experimental behavior (Blos, 1979), this may also explain why vocational students engage more in substance use and sexual activity, compared to academic students.

The literature often interprets the decreasing levels of parental knowledge and intensification of peer contacts in the course of adolescence negatively. For example, secrecy from parents has been identified as poisonous for mutual trust and understanding, and it has been negatively related to the quality of the parent-child relationship (Finkenauer, Engels, & Kubacka, 2008; Finkenauer, Frijns, Engels, & Kerkhof, 2005; Hinde, 1997; Vangelisti, 1994). Yet, intentional acts of concealing information from parents (Bok, 1989; Kelly, 2002) might play an important facilitating role in the process adolescents' separation from their parents (Finkenauer et al., 2008; Finkenauer, Engels, & Meeus, 2002; Keijsers, Branje, Frijns, Finkenauer, & Meeus, 2010; Masche, 2010). If adolescents have some degree of secrecy from parents while staying connected to them, lower levels of parental knowledge can also be interpreted as a reflection of a healthy separation-individuation process. Similarly, the increase in time that adolescents spend with peers (often unsupervised) can be perceived as a reflection of normative processes in adolescents' transition to adulthood. By increasingly forming their

own social networks outside the family (Grotevant & Cooper, 1986), adolescents develop their social competence and learn to become independent individuals.

It is important to note that, based on the cross-sectional results presented in Chapter 2, it cannot be concluded whether the lower levels of parental knowledge and higher frequency of peer contacts among vocational students actually reflect an earlier transition to adulthood for vocational students. To make such a conclusion, longitudinal research is needed. Chapter 2 can therefore be perceived as an initial step toward a better understanding of the role of the transition to adulthood in explaining educational differences in adolescent risk behavior.

Chapter 3 elaborated on the findings of Chapter 2 by exploring the explanatory role of adolescent expectations and conceptions of adulthood in educational differences in adolescent substance use and sexual activity. We asked adolescents in vocational and academic tracks about the age at which they expected to experience several major life transitions, such as getting a full-time job and getting married. In addition, we asked them to indicate the extent to which they perceived substance use and sexual activity as typical mature behaviors. The results indicated that vocational students expected to experience major life transitions earlier in life compared to academic students. This is in line with demographic studies on the timing of vocational and academic students' transitions (Beets et al., 2001; Berzin & De Marco, 2010; Raymore et al., 2001; Scherger, 2009). In addition, vocational students were more likely to perceive substance use and sexual activity as typical mature behaviors, compared to academic students. Both factors also contributed to explaining the higher levels of engagement in these behaviors among vocational students.

The results of Chapter 3 can be explained in different ways. First, as vocational students expect to assume adult roles in society sooner, they may have a stronger desire to engage in behaviors they consider typically mature or adult-like during adolescence already. At the same time, the expectation of a relatively short youth may trigger vocational students to enjoy it as much as they can. They may be tempted to engage in fun, exciting behaviors because they realize that "you're young only once" (Ravert, 2009, p. 376). They may believe that, as soon as they have a life full of adult responsibilities (e.g., as an employee or a parent), they may not be able to engage in these kinds of behaviors anymore. This latter explanation is consistent with life history theories (Roff, 1992; Stearns, 1992). These theories suggest that individuals who expect a higher pace of life (in this instance, vocational students) are more likely to prioritize short-term goals, such as direct fun and satisfaction, while individuals expecting a slower pace of life (in this instance, academic students) are more likely to prioritize the attainment of long-term goals (McDade et al., 2011). Accordingly, vocational students may

be more likely to be present-time oriented and adopt a fun morality (i.e., engage in substance use and sexual behaviors) while academic students are more likely to prioritize the attainment of long-term goals, such as getting a University degree.

An additional explanation for the finding that vocational students perceived substance use and sexual activity more often as mature behaviors compared to academic students is that vocational students may have fewer resources to attain a high peer status. While academic students may acquire high peer status by getting high grades, for example, vocational students have fewer academic resources; therefore, they may use other resources, such as engagement in adult-like behaviors, as a means to attain status among peers. As such, smoking, drinking, using drugs and engaging in sexual behaviors are much more than simple forms of teenage experimentation; they can also serve as key resources for defining the self, acquiring status and making social distinctions within adolescent social worlds (Haines, Poland, & Johnson, 2009).

Taken together, Chapter 2 and 3 suggest that the transition to adulthood plays an important role in adolescent substance use and sexual activity. The higher levels of engagement in substance use and sexual activity among vocational students do not necessarily reflect problematic processes. Rather, they may also be expressions of normative processes associated with an early transition to adulthood.

Part II: The role of parenting practices in adolescent substance use and sexual activity

The second part of this thesis addressed the role of parents in adolescent substance use and sexual behaviors. It showed that, even when taking into account the strong effect of educational track, parents play an important role in whether, when, and with what intensity their children engage in substance use and sexual behaviors. Regardless of whether adolescents are 12 or 16, whether they are a boy or a girl, and whether they attend vocational or academic tracks at school, parents can make a difference. More specifically, they can guide their children's engagement in substance use and sexual behaviors by setting clear rules and by communicating with their children about these behaviors in a pleasant way.

The three studies in Part II were conducted in the Netherlands, a country that is known internationally for its liberal values and policies with respect to sexuality and substance use. In this cultural context, we first examined the role of alcohol-specific parenting practices in adolescent alcohol use. While Dutch parents have traditionally practiced lenient alcohol-specific parenting practices (Monshouwer, 2008), Chapter 4 showed that Dutch parents have increasingly adopted strict alcohol-specific parenting practices between 2007 and 2011.

Compared to 2007, they perceived adolescent drinking as more harmful, and perceived a higher quality of parent–adolescent communication about alcohol in 2009 and 2011. They were also more likely to set restrictive rules on their adolescents’ alcohol use. The only exception was that parents of 16-year-old adolescents did not set stricter rules. Trends in adolescent alcohol use indicated that lifetime and last month alcohol use decreased between 2007 and 2011, except among 16-year-olds. The quantity of alcohol consumed by adolescents did not change during that period. Strict alcohol-specific parenting practices were associated with low levels of adolescent alcohol use.

While the causal nature of the association between alcohol-specific parenting practices and adolescent alcohol use remains unclear due to the cross-sectional nature of our data, intervention studies demonstrated that stricter alcohol-specific parenting practices could lead to a reduction in adolescent alcohol use (Foxcroft & Tsertsvadze, 2011; Koning, 2011). This suggests that the increase in strict alcohol-specific parenting practices among Dutch parents between 2007 and 2011 may have contributed to the observed reduction in adolescent alcohol use during that period. Still, future longitudinal and experimental research, investigating whether adolescent alcohol use increases less over time if their parents adopt stricter alcohol-specific parenting practices, is needed to draw conclusions on the (causal) effect of alcohol-specific parenting practices on adolescent alcohol use.

The observed changes in alcohol-specific parenting practices and adolescent alcohol use occurred during a period in which massive campaigns and prevention programs aimed at reducing adolescent alcohol use were implemented in the Netherlands. These campaigns targeted specifically parents of adolescents under the age of 16 and stimulated them to adopt stricter alcohol-specific parenting practices with the goal to delay the onset (not the quantity) of adolescent alcohol use at least until the age of 16. It is notable that the findings of Chapter 4 reflect the focus of the prevention campaigns.

Chapter 5 adds to Chapter 4 by specifying that parental restrictive rules on adolescent alcohol use are associated not only with a reduced likelihood of adolescent alcohol use, but also with a reduced likelihood of adolescent sexual activity. In addition, it showed that parental rules on smoking are associated not only with a reduced likelihood of adolescent tobacco use, but also with a reduced likelihood of adolescent cannabis use. These findings confirmed the close interrelatedness of substance use and sexual activity during adolescence, as described by Jessor (1977) and Moffitt (1993; 2006) and demonstrated in a number of empirical studies (e.g., Willoughby et al., 2004). Further, as the findings of Chapter 5 suggest that a limited number of behavior-specific parenting practices, in combination with high levels of parental

support and control, may influence adolescent substance use as well as sexual activity, this study may be the starting point for future research on the effectiveness of interventions that target parents with an aim to reduce multiple risk behaviors among adolescents.

Finally, Chapter 6 examined the association of parent–adolescent sexual communication with adolescent sexual initiation as well as condom and contraceptive pill use among sexually active adolescents. Dutch parents were more likely to discuss sexual topics, especially protection and contraception, with sexually active adolescents, rather than with adolescents who were not (yet) sexually active. Although causal inferences cannot be made because of the observational nature of our data, this finding seems to suggest that sexual communication between parents and adolescents intensifies when adolescent sexual debut “moves from the hypothetical to the real” (Schalet, 2011, p. 140). Furthermore, we identified a positive association between adolescent contraceptive pill use and parent–adolescent sexual communication. Parent–adolescent communication regarding protection and contraception may effectively motivate adolescents to use the contraceptive pill. Nevertheless, the identified positive association may also reflect the fact that adolescents, most likely girls, approach their parents if they want to start using the pill, for example because they are concerned about the health consequences of contraceptive pill use and because they need to visit a doctor to get a subscription (Schalet, 2011). Interestingly, we did not identify an association between parent–adolescent sexual communication and adolescent condom use. The non-significant results for condom use may be explained by the widespread public health safe-sex campaigns and easy access to condoms in the Netherlands (Schalet, 2011). This makes adolescents less dependent on their parents with respect to information about or access to protection and contraception. Naturally, this does not mean that parents cannot have a protective influence on adolescents’ condom use. Their influence may, however, be embedded in a socio-cultural context that is already supportive of the use of protection.

In sum, the studies described in Part II suggest that parents play an essential role in their adolescents’ engagement in substance use and sexual activity. By communicating with their adolescents on various topics related to these behaviors, including – but not limited to – the potential dangers they involve, parents can explain why they allow certain things but not others, discuss their concerns, and at the same time listen to the needs, desires, and concerns of the adolescent. In addition, by setting clear rules and providing support and control, parents can convey the message to their adolescents that they support and love them, but set boundaries to their freedom because they want to protect them. This way, parents can guide their children through the exciting, but vulnerable phase of adolescence.

Part III: The role of national context in adolescent substance use and sexual activity

Besides educational track and parenting practices at the micro-level, the broader socio-cultural context in which adolescents live can have a profound influence on their engagement in substance use and sexual behavior. The studies in Part III examined the role of national wealth (Chapter 9) and cultural norms (Chapter 10) in explaining cross-national differences in adolescent substance use and sexual activity. In addition, they described trends over time in Europe and North America in adolescent daily smoking (Chapter 7), alcohol use (Chapter 8) and cannabis use (Chapter 9) between 2002 and 2010.

Overall, higher rates of tobacco, alcohol, and cannabis use were found in wealthier countries compared to less wealthy countries. However, between 2002 and 2010, substance use became less characteristic of wealthy countries due to a strong decrease in adolescent substance use in these wealthy countries. Daily tobacco use among adolescents even started to characterize poorer European countries in 2010. In Chapter 9, we referred to these observations as ‘trickling down effects’ as adolescent substance use appears to be trickling down from the wealthier to developing countries. These trickling down effects may be the result of differential health policy performances in wealthier versus poorer countries across Europe. According to Mackenbach and McKee (2013), “people in more advanced industrialized countries have been shown to shift their priorities from basic economic and physical security towards subjective well-being, self-expression and quality of life” (p. 196). This implies that they “look more to the future and invest in measures that will enhance future health” (p. 196). While wealthy countries in the 80s and 90s used to provide opportunities for adolescents to engage in substance use, for example due to the presence of flourishing modern youth cultures and easy access to substances, their governments nowadays appear to prioritize the implementation of prevention efforts with an aim to reduce adolescent substance use (Anderson & Baumberg, 2006; European Commission, 2009).

Notably, adolescent substance use appears to ‘trickle down’ not only at the national level, but also at the individual level. Within countries, adolescent tobacco use became increasingly characteristic of adolescents in vocational tracks compared to adolescents in academic tracks (Chapter 7). In addition, cannabis use became increasingly characteristic of adolescents from poor families compared to adolescents from wealthy families (Chapter 9). This may reflect that the shift in priorities toward a high quality of life (and the consequent drive to invest in measures that enhance future health) may also occur at the individual or familial level.

While the overall decline in adolescent substance use in Europe and North America from 2002 to 2010 suggests a decreased risk of experiencing the negative effects of risk behaviors among European and North American adolescents, the finding that adolescent substance use is becoming more characteristic of countries and individuals with lower levels of wealth may be worrisome. The health and wellbeing of adolescents living in less affluent circumstances are already less positive compared to the health and well-being of their peers from richer countries and families because of less developed health infrastructures in poorer countries and systematically unhealthier lifestyles in poorer families (Currie et al., 2012). For public health purposes, our findings underline the importance of paying attention to increasing social inequalities in adolescent health in Europe and North America.

Besides national wealth, we found that cultural norms are a second important factor at a macro-level that may influence adolescent risk behavior. In Chapter 10, we found that girls living in countries with conservative (i.e., high) age norms on the acceptability of sexual initiation were less likely to be sexually active before the age 15, compared to girls living in countries with more liberal norms. This association remained robust even after controlling for additional individual-level factors, including adolescent socioeconomic status, substance use, parenting practices and school attachment. Notably, we did not find an association for boys. These findings add to the existing literature in that they show that adolescent sexual behavior is not only influenced by adolescents' own or perceived peer norms on sexuality, as shown in previous research (Kinsman et al., 1998; O'Donnell et al., 2003; Santelli et al., 2004), but also by the dominant norms of their country of residence, which adolescents may not even support. Moreover, they show that such cultural norms interact with individual characteristics, such as adolescent gender. Our findings confirm the continued persistence of a sexual double standard in Europe in which boys are permitted greater sexual freedom compared to girls.

Although reducing early sexual intercourse among girls can be thought of as a positive outcome, the effects of more conservative (i.e., higher) age norms on the context of first and future sexual experiences may be negative, especially among early initiators. Higher country-level age norms for the timing of sexual initiation are likely part of a larger conservative cultural framework, and research suggests that this cultural framework may be associated with lower rates of condom and contraceptive pill use (Rosenbaum, 2009) and higher teen birth rates and STIs (Cavazos-Rehg et al., 2012; Darroch et al., 2001; Schalet, 2004). Further research on the implications of macro-level cultural norms on other adolescent sexual health outcomes, such as contraceptive use and number of sexual partners, is warranted.

Taken together, the studies described in Chapters 7 to 10 demonstrated that macro-level factors related to national context may influence adolescent substance use and sexual behavior. Moreover, this influence may change over time. This thesis showed that high national wealth is associated with decreasing rates of adolescent risk behavior, and that conservative cultural norms on adolescent sexuality are associated with a lower likelihood of early sexual initiation for girls. These findings suggest that societies, just like parents, can play an important role in providing a healthy developmental context for adolescents by gradually granting them more autonomy, while protecting them from the risks that may be involved in experimental, adult-like behaviors.

Part IV: Cross-national similarities in the clustering and correlates of adolescent substance use and sexual activity

The studies in Part IV of this thesis addressed cross-national similarities in the clustering and psychosocial and health correlates of adolescent substance use and sexual activity. The strong interrelations among adolescent tobacco, alcohol, and cannabis use and sexual activity became clear already in the first two parts of this thesis, based on the confirmatory factor analysis of these four behaviors in Chapters 2 and 3 and the observed associations of parental rules on smoking and drinking with adolescent cannabis use and sexual activity in Chapter 5. The studies in Part IV tested whether the close connectedness of adolescent tobacco, alcohol and cannabis use and sexual activity as observed in the Netherlands in Part I and II can be generalized to other European and North American countries.

Overall, we found strong evidence for similarities across countries. Both the clustering of adolescent substance use and sexual activity as well as their associations with psychosocial and health factors did not differ cross-nationally. The identified similarities are remarkable particularly because of evident differences across contexts in the cultural, political, legal, demographical, social, and religious domains. Yet, they are consistent with few existing studies that examined cross-national similarities and differences in a small number of countries. These studies compared the US, Taiwan, and China (Chen et al., 1998), US, China, Korea, and Czech Republic (Dmitrieva et al., 2004), US, Korea, and China (Greenberger et al., 2000), Georgia and Switzerland (Vazsonyi et al., 2008), China and the US (Jessor et al., 2003), or Hungary, the Netherlands, Slovenia, Spain, Switzerland, Taiwan, Turkey, and the United States (Vazsonyi et al., 2010). Based on our findings, we can conclude that while *prevalence* rates of adolescent substance use and sexual behavior differ considerably across countries, the *developmental processes and contexts* in which these behaviors take place may be similar.

The identified cross-national similarities may be a result of a strong influence of biology on behavior. As Rowe (1997) phrased it, “In light of the many biological commonalities shared by all *Homo sapiens*, different developmental processes should be the exception rather than the rule” (p. 222). In addition, our results potentially speak to the importance of a globalized spread of an adolescent culture (Vazsonyi et al., 2010). Although adolescents around the world have unique aspects of their own culture, one can also find great similarities, perhaps in part due to shared Western influences (Schlegel, 2000; 2009; Vazsonyi et al., 2010).

The studies in Part IV have developmental implications for our understanding of not only how adolescents develop in general, but also how similarly they develop in different countries. If developmental processes with respect to adolescent substance use and sexual activity are invariant across adolescents from different countries and different cultural groups, experimentation with substance use and sexual behaviors may be considered core features of globalized adolescent peer culture. Thus, developmental processes identified in national studies may be generalizable to other countries and cultures. However, it is important to note that more research is needed to support this conclusion. The studies in this thesis are based on cross-sectional data and our selection of psychosocial and health correlates is limited. Therefore, longitudinal, multi-method research that would include a larger variety of psychosocial and health correlates is needed to replicate our findings and provide additional support for our conclusions.

Theoretical implications

The findings in this thesis show that substance use and sexual behavior during adolescence are complex and dynamic behaviors. Adolescent substance use and sexual behaviors are associated with social and cultural factors at different layers of the environment (i.e., the micro-, macro-, and chrono-system). Moreover, these factors interactively influence adolescents’ behavior. As such, this thesis provides support for Bronfenbrenner’s (1979; 1989; 1994; Bronfenbrenner & Morris, 1998; 2006) theory of the ecology of human behavior, stating that one must consider the entire ecological system in which growth occurs in order to understand human development. While previous research is often limited to factors from a single system, this thesis suggests that the predictors and mechanisms that influence adolescent risk behavior might be best understood when examining factors from multiple systems simultaneously.

The second theoretical implication is that adolescent substance use and sexual behavior are closely interrelated. The clustering of these behaviors provides evidence supporting both Jessor’s problem behavior theory (PBT, 1977) and Moffitt’s (1993; 2006) theory on the

maturity gap. During the transition to adulthood, adolescents become increasingly interested in adult-like behaviors. These behaviors may all be an expression of important developmental processes that occur during adolescence, for example with respect to their search for an identity, the intensification of peer contacts, and the desire for more autonomy (Moffitt, 1993; 2006). However, these behaviors also involve serious risks (Jessor & Jessor, 1977; Jessor, 1991; 1998; *in press*). Parents play an important role in protecting adolescents from these risks by limiting their opportunities to engage in these behaviors. Similarly, societies may provide or limit adolescents' opportunities to engage in substance use and sexual behaviors through national wealth, social policies, and cultural norms.

Third, not only the clustering of adolescent substance use and sexual activity emerged as invariant across countries in Europe and North America, but also the associations of this cluster with psychosocial and health factors did not differ cross-nationally. Thus, although adolescents grow up in different cultural contexts within Europe and North America, similar social and cultural factors influence them in similar ways. For example, adolescents who experience much support from their parents are less likely to engage in substance use and sexual activity, regardless of whether they live in Sweden, Italy, Canada, or Romania. This might have implications for the cross-national generalizability of national findings on social and cultural processes that are associated with adolescent substance use and sexual behavior – or with adolescent behavior in general.

Practical implications

The results of this thesis are not only of scientific interest, but they are also of societal importance. Although all findings are based on cross-sectional data and thus no causality can be inferred, the set of associations between adolescent risk behavior and factors in adolescents' socio-cultural environment identified in this thesis may provide a starting point for intervention research aimed at reducing excessive and early substance use and sexual behaviors among adolescents. Specifically, this thesis suggests that interventions at multiple levels (i.e., targeting adolescents themselves, their parents, their schools, and the larger socio-cultural environment in which they live) are most effective in reducing early and excessive engagement in substance use and (risky) sexual behaviors during adolescence. Second, this thesis might contribute to the debate on whether interventions aimed at reducing adolescent substance use and sexual risk behavior should be behavior-specific (i.e., a single intervention per behavior) or broad (i.e., targeting multiple behaviors simultaneously). The findings on the close interrelatedness of adolescent substance use and sexual behavior suggest that

broad interventions might be effective in reducing multiple risk behaviors simultaneously. Third, this thesis suggests that specific interventions have to be developed particularly for vocational students as they are more likely to engage in early risk behaviors. Consequently, they are more likely to experience the potentially hazardous effects of these behaviors. This can have a large negative effect on their future health and on their professional and social development. Concerning the specific situation in the Netherlands, vocational students may be easily reached through schools, because schools generally specialize in teaching either vocational or academic educational tracks. Interventions targeting vocational students should not focus exclusively on the risks that are potentially involved in substance use and sexual behaviors; they should also address adolescents' expectations of their future and their conceptions of risk behaviors being mature, adult behaviors.

Besides practical implications for future interventions and intervention studies, this thesis has also implications for parents. Strict rules, in combination with high parental support, monitoring, and high-quality parent–adolescent communication, were associated with lower levels of engagement in substance use and sexual risk behaviors for all adolescent age groups. While parents may believe that their influence on adolescents' behavior decreases with age, their influence remains substantial. It is important that parents are aware of this, as it might increase parental confidence and, in turn, the effectiveness of parenting.

Finally, this thesis has implications for the public health domain in Europe and North America. Decreases in adolescent substance use were identified between 2002 and 2010, suggesting that European and North American adolescents might be at a decreased risk of experiencing the potentially hazardous effects of substance use. Overall, this is a positive development. However, Eastern European countries appeared to face the smallest decrease in adolescent substance use, with patterns being inconsistent across countries. Moreover, substance use is becoming increasingly characteristic of lower income countries and of lower socioeconomic groups within countries, which leads to the widening of socioeconomic inequalities. This development deserves attention from the public health domain.

Methodological issues

The findings reported in this thesis should be interpreted in the light of its strengths and limitations. Strengths of using the data collected in schools using self-administered questionnaires include that they offer good protection of the respondents' anonymity, thereby promoting the willingness to report norm-breaking or intimate behaviors. Other ways of data collection, such as face-to-face interviews or household surveys (where relatives may be

present during the survey administration; Gfoerer, Wright, & Kopstein, 1997), may inhibit reporting the (illegal) use of substances and engagement in sexual behaviors. Furthermore, school surveys yield high response rates, which is a second important advantage. Finally, by using school surveys, it was possible to obtain a large, representative sample of adolescents. Our data were representative of adolescents in the Netherlands and other European and North American countries, which contributes to the robustness of the findings and strengthens the interpretation of the results.

A limitation of self-administered questionnaires in school surveys is that the formulation of questions must be kept simple. While students in a class situation can ask the research assistant or teacher to clarify questions they do not understand, they can clarify their responses better in face-to-face interviews. Second, school surveys result in cluster samples, as all the students in the same class are drawn as a single cluster of observations. Observations from a cluster sample are not independent, since students from the same class share a number of characteristics. For example, they have the same teachers and they are exposed to the same set of school related risk factors for substance use and onset of sexual behavior. Clustered data can be analyzed by means of a multilevel analysis or by means of a design-based analysis that explicitly accounts for the effect of clustering, possibly in combination with corrective weighting (Skinner, Holt, & Smith, 1989). Both techniques were applied in the studies presented in this thesis.

All studies in this thesis were conducted using cross-sectional datasets. Although these datasets provide excellent opportunities for identifying risk groups and studying trends over time, a major limitation is that it is not possible to make inferences on causality. Since longitudinal and experimental studies are generally expensive, complicated, and demanding, the findings in the present thesis are useful for deciding whether further longitudinal research on cause and effect relationships is worth while.

Finally, although the HBSC study provides many opportunities for studying the social and cultural context of adolescent substance use and sexual behaviors, it is limited in terms of the age range of the adolescents (11 to 16 years old), the countries included (Europe and North America), and social and cultural factors that might be associated with adolescent substance use and sexual behaviors. Accordingly, no conclusions can be drawn about adolescent substance use and sexual behavior among young people older than 16 years old or adolescents who live outside Europe and North America. Further, it was not possible to include all aspects of Bronfenbrenner's model, as the HBSC questionnaire does not assess any factors in the meso- and exo-system. Future research may address this limitation by studying

a more elaborate set of social and cultural factors and their associations with adolescent risk behavior as well as interactions with factors at different levels.

Directions for future research

Future research should address, first of all, the limitations discussed above. Thus, a combination of different methods may be used to collect data on adolescent substance use and sexual activity in order to verify the prevalence rates and associations identified in this thesis. Furthermore, intervention studies may shed more light on the nature of the association of adolescent substance use and sexual behavior with social and cultural factors. Moreover, the study of the role of the transition to adulthood in explaining individual differences in adolescent substance use and sexual activity may be extended by means of longitudinal research, which would start in early adolescence or even earlier and continue at least until emerging adulthood. In general, the context of macro-level indicators and their association with adolescent behavior need to be investigated in more detail to better understand the mechanisms through which macro-level factors play a risk-increasing or protective role in adolescent substance use and sexual behavior. The studies in this thesis are among the first to show that such associations may change over time; therefore, nationally representative trend data may be used to replicate our findings and test related hypotheses in other samples and with different measures or methods of data collection. Finally, future research may benefit from taking a more balanced approach in terms of the normative and risky aspects of substance use and sexual activity among adolescents. Acknowledging the normative aspects of these behaviors may increase our understanding of why adolescents start engaging in these behaviors, which may eventually lead to the development of effective interventions aimed at reducing the risks that are involved in these behaviors.

Conclusion

This thesis investigated the social and cultural context of adolescent substance use and sexual activity in 11- to 16-year-old adolescents in the Netherlands and other European and North American countries. It argues that the relatively early timing of the transition to adulthood for vocational students may explain their higher levels of engagement in substance use and sexual activity compared to academic students. Although engagement in substance use and sexual behaviour, as such, can be considered normative from a developmental perspective, adolescents who engage in these behaviors are at risk of experiencing serious risks. Parents

and the society in which adolescents live can play a crucial role in protecting adolescents from these risks. Parents can guide their children by setting restrictive rules and by communicating with their children about these behaviors while remaining supportive and understanding of the adolescents. The national context, through national wealth and cultural norms, can restrict or create opportunities for adolescents to engage in substance use and sexual behaviour. Finally, the results of this thesis showed that, although prevalence rates of adolescent substance use and sexual behaviour differ considerably across countries, their clustering as well as their psychosocial and health correlates are identical across countries in Europe and North America.

This thesis contributes to a better understanding of the social and cultural correlates of adolescent substance use and sexual activity. By addressing these correlates at different “layers” of the environment (e.g., micro *versus* macro; Bronfenbrenner, 1979), it illustrates the complexity of the processes that determine whether, when, and with what intensity adolescents engage in substance use and sexual behaviors. Further, by discussing both the normative and risky aspects of adolescent risk behaviour, this thesis aimed to provide a balanced perspective that provides new insights into the aetiology of adolescent risk behaviour.

Summary

Adolescence, the transitional phase between childhood and adulthood, is a unique period of discovery and experimentation. It is an exciting, but also complex phase of life. As adolescents increasingly desire more autonomy and freedom to make their own decisions, they typically distance themselves from their parents and start spending more time with peers, for example at school, while playing sports, or during leisure activities in bars and pubs at night. In the course of this process, many adolescents start experimenting with adult-like behaviors, such as tobacco, alcohol, and cannabis use as well as sexual behaviors. For some adolescents, this experimentation turns into excessive rates of substance use and engagement in risky sexual behaviors.

Previous research underlines the importance of the social and cultural context in which adolescents live with regard to their engagement in substance use and sexual behavior. Bronfenbrenner's (1979) theory of the ecology of human development suggests that social and cultural factors may influence adolescent substance use and sexual activity across different "layers" of the environment. He thereby distinguishes the following layers: the micro-system (the adolescent's immediate surroundings, such as family, school, and peers), the meso-system (the connection between two or more micro-systems, such as the relationship between parents and teachers), the exo-system (the larger social system in which the child does not directly function, but is influenced by, such as parental work experiences), the macro-system (cultural values, customs, and laws), and the chrono-system (changes in age or in socio-historical circumstances). Since these systems interact in influencing the individual, it is necessary to address social and cultural factors at different layers simultaneously to fully understand adolescent behavior.

The Health Behavior in School-aged Children (HBSC) study provides a unique opportunity to study social and cultural influences on adolescent substance use and sexual behaviors at different layers of the environment. The HBSC study is a World Health Organization (WHO) collaborative cross-national study on health and well-being, social environments, and health behaviors among 11- to 16-year old adolescents (Currie et al., 2012). This large-scale cross-sectional study has been conducted every four years in a growing number of European and North American countries. As such, it enables the examination of the influence of social and cultural factors from the different environmental systems – and their interactions – on adolescent substance use and sexual behavior.

The aim of this thesis is to increase our understanding of the social and cultural context of adolescent substance use and sexual behavior. Specifically, it looks at the roles of educational track and parenting practices (micro-system), national wealth and cultural norms



(macro-system), and changes of these influences across time (chrono-system). All chapters in this thesis are based on the HBSC study; Part I and II are based on the HBSC study in the Netherlands in 2005 and 2009, and Part III and IV are based on the international HBSC study in 2001/2, 2005/6, and 2009/10.

The chapters in Part I show that educational track is a strong predictor of adolescent substance use and sexual activity in the Netherlands, with vocational students being more likely to engage in these behaviors compared to academic students. While previous studies sought explanations for these educational differences by assessing elevated levels of socio-emotional and behavioral problems among vocational students, this thesis suggests that this relationship might also be explained by the relatively early timing of the transition to adulthood for vocational students. Vocational students adopt adult roles, such as having a full-time job or having a first child, earlier in life compared to academic students. Hence, they may also become interested in engaging in adult-like behaviors, such as substance use and sexual activity, at an earlier age. In line with this hypothesis, Chapter 2 shows that vocational students have distanced themselves more from their parents and spend more time with their peers. This potentially implies that they are in a more advanced phase of the transition to adulthood. In addition, Chapter 3 demonstrates that vocational students expect an earlier transition to adulthood and are more likely to perceive substance use and sexual activity as mature behaviors compared to academic students (Chapter 3). All of these differences between vocational and academic students contribute to explaining the higher levels of engagement in substance use and sexual activity among vocational students.

Part II of this thesis shows that parents can play an important role in their children's substance use and sexual behaviors, independent of the educational track of their child. Parents have a challenging task to, on the one hand, acknowledge their children's increasingly mature status and gradually allow them more autonomy, and on the other hand, protect them against the risks that are potentially involved in their explorative and experimental behaviors. Parents can guide their children's substance use and sexual behaviors by setting clear rules and by communicating with their children about these behaviors in a way that both parent and adolescent perceive as pleasant. Specifically, adolescents whose parents set restrictive rules on tobacco use are less likely to smoke tobacco and use cannabis (Chapter 5). Moreover, adolescents whose parents set restrictive rules on alcohol use are less likely to drink alcohol (Chapter 4 and 5) and to be sexually active (Chapter 5). Adolescents are also less likely to drink alcohol if their parents indicate that they have pleasant conversations with their children about alcohol use and acknowledge the potentially harmful effects of alcohol on adolescents.

(Chapter 4). The association between parenting practices and adolescent behavior is similar for boys and girls, for adolescents of different age groups, and for adolescents attending different educational tracks. Finally, Chapter 4 shows that Dutch parents have become stricter in regards to the alcohol use of their children between 2007 and 2011.. This might reflect a change in the Dutch national alcohol policy during this period.

Besides rule-setting and parent-adolescent communication about substance use, this thesis also addresses the role of parent-adolescent sexual communication with respect to adolescent sexual behavior in the Netherlands (Chapter 6). Dutch parents indicate to regularly discuss sexual topics with their children. Parents whose child is sexually active are more likely to discuss sexual topics with their child compared to parents whose child is not (yet) sexually active. Furthermore, among sexually active adolescents, parent-adolescent sexual communication is associated with a higher likelihood of contraceptive pill use, but it is not associated with condom use. These findings are discussed in the context of Dutch culture, which, compared to many other countries, is characterized by a relative accepting attitude towards adolescent sexuality, combined with widespread public health safe-sex campaigns and easy access to protection and contraception.

In addition to social and cultural factors at the micro-level of the environment, the broader socio-cultural context in which adolescents live (i.e., the macro-system) can have a profound influence on their engagement in substance use and sexual behaviors. Part III of this thesis addresses the potential influence of such macro-level factors. Specifically, it looks at the role of national wealth and cultural norms in European and North American countries. Overall, adolescents living in wealthy countries are more likely to smoke tobacco, drink alcohol, and use cannabis, compared to adolescents living in less wealthy countries. However, the strength of the association between national wealth and adolescent substance use became weaker between 2002 and 2010 (Chapter 7-9). In other words, in the beginning of the 21st century, adolescent substance use has become less characteristic of wealthy countries. Daily tobacco use in 2010 was even more characteristic of adolescents in less wealthy countries (Chapter 7). In Chapter 9, these observations are referred to as ‘trickling down effects’ as adolescent substance use appears to be trickling down from the wealthier to developing countries. These trickling down effects may be the result of differential health policy performances across countries, with wealthier countries investing more in the implementation of prevention efforts aimed at reducing adolescent substance use.

Notably, adolescent substance use appears to not only ‘trickle down’ from wealthy to less wealthy countries; it also appears to become increasingly characteristic of adolescents of



low socioeconomic status within countries. While adolescent tobacco use was already more prevalent among vocational students compared to academic students in 2002, it had become even more characteristic of vocational students in 2010 (Chapter 7). Similarly, cannabis use has become increasingly characteristic of adolescents coming from poor families compared to adolescents coming from richer families (Chapter 9).

With respect to cultural norms, Chapter 10 shows that girls in Europe are less likely to be sexually active before the age 15 if they live in countries with conservative age norms on the acceptability of sexual initiation (e.g., Ukraine) compared to countries with more liberal norms (e.g., Austria). This association remains robust even after controlling for additional individual-level factors, including adolescent socio-economic status, substance use, parenting practices, and school attachment. Notably, this association did not exist for boys. These findings appear to confirm the continued persistence of a sexual double standard in Europe in which boys are permitted greater sexual freedom compared to girls.

The last part of this thesis, Part IV, addresses cross-national similarities in the co-occurrence and psychosocial and health correlates of adolescent substance use and sexual activity. Overall, there is strong evidence for similarities across countries. Both the co-occurrence of adolescent substance use and sexual activity (Chapter 11) as well as their associations with psychosocial factors (relationships with parents, peers, and school; Chapter 11) and health factors (Chapter 12) do not differ cross-nationally. The identified cross-national similarities may be a result of a strong influence of biology (puberty, hormones) on behavior. In addition, our results potentially speak to the importance of a globalized spread of an adolescent culture, in which experimentation with substance use and sexual behaviors is considered a core feature of adolescents' transition to adulthood.

This thesis contributes to a better understanding of the social and cultural context of substance use and sexual activity among adolescents in Europe and North America. By addressing social and cultural factors at different "layers" of the environment, it demonstrates that adolescent substance use and sexual behavior are predicted by a complex interplay of factors. Moreover, the influence of these social and cultural factors is not the same for all individuals. The findings of this thesis have implications for future research, policy, and prevention programs targeting adolescents, parents, and schools.

Samenvatting

(Summary in Dutch)

De adolescentie, de overgangsperiode van de kindertijd naar de volwassenheid, is een unieke periode waarin jongeren experimenteren met nieuwe gedragingen. Het is een bijzondere, maar ook een complexe levensfase. Omdat adolescenten steeds meer autonomie en vrijheid willen om hun eigen keuzes te kunnen maken, distantiëren zij zich doorgaans van hun ouders en brengen zij steeds meer tijd door met leeftijdsgenoten, bijvoorbeeld op school, bij het sporten, of bij het uitgaan. In de loop van dit proces experimenteren zij vaak met 'volwassen' gedragingen, zoals het roken van tabak, het drinken van alcohol, en het gebruiken van cannabis. Ook experimenteren zij met seksuele gedragingen. Voor sommige adolescenten leidt dit experimenteer gedrag tot intensief middelengebruik en riskant seksueel gedrag.

Onderzoek heeft laten zien dat de sociale en culturele context waarin adolescenten leven een belangrijke rol speelt in hun middelengebruik en seksueel gedrag. Bronfenbrenners (1979) theorie over de ecologie van het menselijk gedrag suggereert dat sociale en culturele factoren het gedrag van adolescenten op verschillende niveaus kunnen beïnvloeden. Hij onderscheidt daarbij de volgende systemen: het micro-systeem (de directe omgeving van de adolescent, zoals ouders, school en leeftijdsgenoten), het meso-systeem (de interactie tussen twee micro-factoren, zoals de relatie tussen de ouders en leerkracht van de jongere), het exo-systeem (het grotere sociale systeem waarin jongeren niet direct functioneren, maar waar zij wel door beïnvloed worden, zoals de werkomgeving van ouders), het macro-systeem (culturele normen en waarden, wetten), en het chrono-systeem (de invloed van tijd; veranderingen in leeftijd of in sociaal-historische leefomstandigheden). Omdat deze systemen elkaar ook onderling beïnvloeden, is het nodig om sociale en culturele factoren uit de verschillende systemen tegelijkertijd te onderzoeken om een goed beeld te krijgen van risicogedrag bij jongeren.

Het Health Behaviour in School-aged Children (HBSC) onderzoek biedt een unieke mogelijkheid om sociale en culturele invloeden op middelengebruik en seksueel gedrag van adolescenten te bestuderen. Het HBSC-onderzoek is een grootschalig internationaal onderzoek naar gezondheid, welbevinden en risicogedrag bij jongeren in de leeftijd van 11 tot 16 jaar (Currie et al., 2012). Dit cross-sectionele onderzoek vindt iedere vier jaar plaats in een groeiend aantal Europese en Noord-Amerikaanse landen onder auspiciën van de Wereldgezondheidsorganisatie (WHO). Het biedt daardoor de mogelijkheid om de relatie van sociale en culturele factoren uit de verschillende omgevingssystemen met middelengebruik en seksueel gedrag bij jongeren te bestuderen. Bovendien biedt het de mogelijkheid om te onderzoeken of de invloed van sociale en culturele factoren hetzelfde is voor verschillende groepen jongeren.

Het doel van dit proefschrift is om inzicht te geven in de sociale en culturele context van middelengebruik en seksueel gedrag bij adolescenten. Er is specifiek gekeken naar de



rol van het opleidingsniveau van jongeren en de opvoedingspraktijken van ouders in Nederland (micro-systeem), de mogelijke invloed van nationale welvaart en culturele normen in Europa en Noord-Amerika (macro-systeem), en naar veranderingen van deze invloeden door de tijd heen (chrono-systeem). Alle hoofdstukken in dit proefschrift zijn gebaseerd op het HBSC-onderzoek; Deel I en II zijn gebaseerd op het HBSC-onderzoek in Nederland in 2005 en 2009, en Deel III en IV zijn gebaseerd op het internationale HBSC-onderzoek in 2001/2, 2005/6 en 2009/10.

De hoofdstukken in Deel I laten zien dat opleidingsniveau in Nederland een sterke voorspeller is van middelengebruik en seksueel gedrag bij adolescenten. Jongeren in lagere opleidingsniveaus (vmbo) gebruiken vaker middelen en zijn vaker seksueel actief in vergelijking met jongeren in hogere opleidingsniveaus (havo-vwo). Eerdere onderzoeken probeerden dit effect van opleidingsniveau te verklaren door te wijzen op het vaker vóórkomen van sociale en gedragsproblemen bij jongeren in lagere opleidingsniveaus. Dit proefschrift suggereert dat het effect ook verklaard kan worden door de relatief vroege transitie naar volwassenheid bij jongeren in lagere opleidingsniveaus. Jongeren in lagere opleidingsniveaus nemen op jongere leeftijd een volwassen rol aan in de maatschappij (bijvoorbeeld als werknemer of als ouder), in vergelijking met jongeren in hogere opleidingsniveaus. Daardoor zou het kunnen dat zij op jongere leeftijd geïnteresseerd raken in – wat zij zien als – ‘volwassen’ gedrag, zoals middelengebruik en seksuele gedragingen. Consistent met deze hypothese laat Hoofdstuk 2 zien dat jongeren in lagere opleidingsniveaus twee gedragingen in sterkere mate vertonen dan jongeren in hogere opleidingsniveaus: zij hebben zich meer van hun ouders gedistansteerd en brengen meer tijd door met leeftijdsgenoten. Dit geeft mogelijk aan dat zij zich in een verder stadium bevinden van de transitie naar volwassenheid dan jongeren in hogere opleidingsniveaus. Daarnaast laat Hoofdstuk 3 zien dat jongeren in lagere opleidingsniveaus verwachten op een jongere leeftijd volwassen te worden en middelengebruik en seksueel gedrag vaker zien als typisch volwassen gedrag. Deze verschillen tussen jongeren in lage en hoge opleidingsniveaus dragen bij aan het verklaren van het vaker vóórkomen van middelengebruik en seksueel gedrag bij jongeren in lagere opleidingsniveaus.

Deel II van dit proefschrift laat zien dat ouders een belangrijke rol spelen in het middelengebruik en seksuele gedrag van hun kinderen, ongeacht het opleidingsniveau van hun kind. Ouders zijn voor de uitdaging gesteld om hun kinderen aan de ene kant de ruimte te geven om zich te ontwikkelen tot zelfstandige volwassenen en hen in dat proces geleidelijk meer autonomie te geven, en hen aan de andere kant te beschermen tegen de mogelijk schadelijke gevolgen van middelengebruik en seksueel gedrag. Ouders kunnen invloed hebben

op het middelengebruik en seksuele gedrag van hun kinderen door duidelijke regels te stellen en door met hun kinderen te praten over deze gedragingen op een manier die zowel ouder en kind als prettig ervaren. Zo roken jongeren wier ouders regels stellen over het tabakgebruik van hun kind minder vaak sigaretten. Ook gebruiken zij minder vaak cannabis (Hoofdstuk 5). Verder drinken jongeren wier ouders regels stellen over alcoholgebruik minder vaak alcohol en zijn zij minder vaak seksueel actief (Hoofdstuk 4 en 5). Tot slot drinken jongeren minder vaak alcohol als hun ouders aangeven dat zij goed met hun kinderen kunnen praten over alcoholgebruik en als zij op de hoogte zijn van de mogelijk schadelijke gevolgen van alcoholgebruik voor jongeren (Hoofdstuk 4). De relatie tussen deze opvoedingspraktijken en het gedrag van adolescenten is hetzelfde voor jongens en meisjes, jongeren uit verschillende leeftijdsgroepen, en voor jongeren in alle opleidingsniveaus. Tot slot liet Hoofdstuk 4 zien dat Nederlandse ouders strenger zijn geworden tussen 2007 en 2011 wat betreft het alcoholgebruik van hun kinderen. Dit reflecteert mogelijk een verandering in het Nederlandse alcoholbeleid in deze periode.

Naast regels en ouder-kind communicatie met betrekking tot middelengebruik kijkt dit onderzoek ook naar de manier waarop ouder-kind communicatie over seks is gerelateerd aan het seksuele gedrag van jongeren in Nederland (Hoofdstuk 6). Nederlandse ouders geven aan regelmatig seksuele onderwerpen te bespreken met hun kinderen. Als hun kind seksueel actief is, bespreken zij dit soort onderwerpen vaker dan wanneer hun kind (nog) niet seksueel actief is. Onder seksueel actieve jongeren is ouder-kind communicatie over seks gerelateerd aan een hogere kans op pilgebruik, maar niet op condoomgebruik. Deze bevindingen zijn besproken in de context van de Nederlandse cultuur, die in vergelijking met andere landen gekenmerkt wordt door een relatief open houding ten opzichte van seksualiteit bij jongeren, in combinatie met de ruimschootse aanwezigheid van voorlichtingscampagnes die het gebruik van voorbehoedmiddelen stimuleren.

Naast sociale en culturele factoren in het micro-systeem kan de wijdere sociaal-culturele context (i.e., het macro-systeem) waarin adolescenten leven invloed hebben op hun middelengebruik en seksuele gedrag. Deel III van dit proefschrift richt zich op de mogelijke invloed van dit soort macro-level factoren. Specifiek kijkt het naar de rol van nationale welvaart en culturele normen in Europese en Noord-Amerikaanse landen. Jongeren in landen met een hoge welvaart hebben een grotere kans om te roken, alcohol te drinken, en cannabis te gebruiken, in vergelijking met jongeren in landen met een lager welvaartsniveau. Dit effect van nationale welvaart is echter minder sterk geworden tussen 2002 en 2010 (Hoofdstuk 7-9). Met andere woorden, in het begin van de 21^e eeuw is middelengebruik steeds minder kenmerkend geworden van



jongeren in landen met een hoge welvaart. Dagelijks roken kwam in 2010 zelfs vaker voor bij jongeren in minder welvarende landen (Hoofdstuk 7). In Hoofdstuk 9 wordt deze observatie het ‘trickle down effect’ genoemd, omdat middelengebruik bij jongeren lijkt te verschuiven van de welvarende naar minder welvarende landen. Dit is mogelijk het gevolg van verschillen tussen landen in gezondheids- en jongerenbeleid, waarbij rijkere landen vaker investeren in preventieprogramma’s met als doel het verminderen van middelengebruik bij jongeren.

Middelengebruik lijkt niet alleen te verschuiven van jongeren in welvarende naar minder welvarende landen; het lijkt ook steeds kenmerkender te worden voor jongeren met een lage socio-economische status binnen landen. Hoewel dagelijks roken al vaker voorkwam bij jongeren met een laag opleidingsniveau in vergelijking met jongeren met een hoger opleidingsniveau in 2002, laat Hoofdstuk 7 zien dat het nog kenmerkender is geworden voor lager opgeleiden in 2010. Op een vergelijkbare manier is cannabisgebruik steeds kenmerkender geworden voor adolescenten die uit een minder rijke familie komen in vergelijking met jongeren die uit een rijkere familie komen (Hoofdstuk 9).

Met betrekking tot culturele normen laat Hoofdstuk 10 zien dat meisjes in Europa minder vaak seksueel actief zijn voor hun 15e levensjaar als zij wonen in landen met conservatieve seksuele normen (bijv. Oekraïne) in vergelijking met landen met meer liberale normen (bijv. Oostenrijk). Dit effect is robuust; ook als er rekening gehouden wordt met individuele verschillen in socio-economische status, middelengebruik, opvoedingspraktijken en schoolbeleving, blijft het bestaan. Opvallend genoeg bestaat dit effect niet voor jongens. Deze bevinding lijkt te bevestigen dat er in Europa nog steeds een dubbele seksuele standaard bestaat waarin jongens meer seksuele vrijheid genieten dan meisjes.

Het laatste deel van dit proefschrift, Deel IV, richt zich op crossnationale verschillen en gelijkenissen in het samen vóórkommen van middelengebruik en seksueel gedrag bij jongeren. Ook kijkt het naar crossnationale verschillen en gelijkenissen in de relatie van dit cluster van gedragingen met psychosociale en gezondheidsfactoren. Er blijken grote gelijkenissen tussen landen te bestaan. Zowel het samen vóórkommen van middelengebruik en seksueel gedrag (Hoofdstuk 11) als de manier waarop dit cluster van gedragingen is gerelateerd aan psychosociale factoren (relatie met ouders, vrienden en school; Hoofdstuk 11) en gezondheidsfactoren (Hoofdstuk 12) verschillen niet tussen landen. De gelijkenissen tussen landen worden mogelijk verklaard door een sterke invloed van biologische factoren (puberteit, hormonen) op gedrag. Ook is het mogelijk dat zij een weerspiegeling zijn van de verspreiding van een globale jongerencultuur waarin het experimenteren met middelengebruik en seksueel gedrag een essentieel onderdeel is van de transitie naar volwassenheid.

Dit proefschrift draagt bij aan het vergroten van het inzicht in de sociale en culturele context van middelengebruik en seksueel gedrag bij adolescenten in Europa en Noord-Amerika. Door sociale en culturele invloeden op micro-, macro-, en chrono-niveau te bestuderen, laat het zien dat middelengebruik en seksueel gedrag worden voorspeld door een complex samenspel van factoren. Bovendien is de invloed van deze factoren niet voor iedereen hetzelfde. De bevindingen van dit proefschrift hebben implicaties die relevant zijn voor toekomstig onderzoek, beleid, en voor de ontwikkeling van preventieprogramma's die zich richten op jongeren, ouders en scholen.

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About the author

ABOUT THE AUTHOR

Margaretha de Looze (1984) obtained her Bachelor of Arts (BA) at University College Utrecht, the international honors college of Utrecht University, the Netherlands, in 2006. She graduated with summa cum laude, majoring in Social Sciences, with a minor in Neuroscience and a minor in Methodology and Statistics. In 2008, she obtained her Master of Science (MSc) in Child and Adolescent Psychology (cum laude) at Utrecht University. During her MSc, she spent two months at the University of Connecticut, USA, working on a cross-national research project on parental ethnotheories and child rearing practices with prof. dr. Sara Harkness and prof. dr. Charles Super. After the completion of her MSc, she started a five-year PhD project at Utrecht University. In the first two years, she contributed to the data collection of the Health Behaviour in School-aged Children (HBSC) study in the Netherlands. In 2010, she became one of the writers of the Dutch HBSC report. In 2011, she spent two months at the University of St. Andrews, Scotland, where she contributed to writing and editing the study's International Report. In 2012, she spent two months at the University of California at Berkeley and the Public Health Institute in Oakland, where she worked on a research project on adolescent sexuality with prof. dr. Norman Constantine. After the completion of her PhD, she was invited to work on a research project on neighborhood crime and adolescent cannabis use at Queen's University in Kingston, Canada. Upon her return, she was employed as a postdoctoral researcher at the Department of Interdisciplinary Social Sciences at Utrecht University and as a psychology lecturer at University College Utrecht.

SCIENTIFIC PUBLICATIONS (PUBLISHED OR IN PRESS)

In this thesis

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