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Sexual Behavior in Adolescence

The role of depression, delinquency, and family-related factors

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ACADEMIC DISSERTATION
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To My Father

ABSTRACT

Earlier research has examined adolescent sexual behavior in relation, among other things, to mental disorders, parenting behaviors, substance abuse, and alcohol consumption, but mostly ignoring the reciprocal associations among these. Extensive population-based studies are needed to establish concurrent and unique associations in adolescents in general. This study was conducted in order to ascertain how parental involvement, family characteristics, self-reported depression, and delinquency are connected to adolescent early and risk-taking sexual behavior, and to what extent they modify each other.

It is known that adolescents engaging in early sexual intercourse suffer more commonly from internalizing and externalizing disorders, yet it remains unclear at what point in adolescent development these associations cease to be significant. Supposedly they do, since sexual activity becomes statistically more common in older age groups and thus can be assumed to be normative. Also, a connection can be seen between mental disorders and risk-taking sexual behaviors. Internalizing psychopathology dominates the literature on girls, whereas externalizing problems are more commonly researched in boys. Theoretical frameworks posit inept parenting as a cause of psychosocial adversities and maladjustment in adolescents. Research has not so far examined the overall connections between family factors and mental health or sexual behavior. This thesis addresses this gap in the research by scrutinizing all these factors simultaneously.

The study makes use of a population-based national sample of Finnish adolescents surveyed in school settings, the School Health Promotion Study from the years 2010-2011. This self-report survey comprised 186,632 adolescents (50.4% girls). The main outcomes were analyzed by chi2 test and logistic regression. At first, bivariate relationships were assessed, and thereafter multivariate analysis was conducted. The analyses were run separately for girls and boys, and across age groups covering the whole of adolescence.

The main finding of this study was that self-reported depression and delinquency were independently associated with adolescent sexual behavior even after parenting and family factors had been controlled for. Self-reported depression was associated with having experienced sexual intercourse in early and middle adolescence. This

association was strongest in younger adolescents, and diminished gradually towards late adolescence, even turning to the reverse in 19-year-old boys. Self-reported depression was associated with risk-taking sexual behaviors across adolescence and in both girls and boys. Delinquency across adolescence was associated with having experienced sexual intercourse and reporting multiple sexual partners in both girls and boys. Low parental involvement was associated with having experienced sexual intercourse and among the sexually active with reporting multiple sexual partners in early and middle adolescence. Low level of parental education was associated with sexual experience and multiple partners in early and middle adolescents. The most important of the family variables was living in a two-parent family, which showed the clearest inverse association with experience of sexual intercourse and multiple partners throughout adolescence.

When working with adolescents, their sexual health needs to be taken into account. Especially depressed adolescents, and those with conduct problems, warrant special attention. Also, adolescents from different living conditions are important targets of mental and sexual health work. Sexual behavior in adolescence is an important field for primary and secondary prevention.

TIIVISTELMÄ

Aiempi tutkimus on käsitellyt nuorten seksuaalikäyttäytymistä muun muassa suhteessa mielenterveyden häiriöihin, vanhempien kasvatustyyliin, päihteiden ja alkoholin käyttöön, mutta suurin osa on jättänyt huomiotta kyseisten muuttujien keskinäiset yhteydet. Laajoja väestöaineistoon perustuvia tutkimuksia tarvitaan näiden yhteyksien selvittämiseksi nuoruusikäisillä. Tässä väitöskirjatutkimuksessa selvitettiin vanhempien osallisuuden, perhetekijöiden, masennuksen ja rikekäyttäytymisen yhteyksiä nuoruusikäisten varhaiseen ja riskejä ottavaan seksuaalikäyttäytymiseen sekä näiden tekijöiden keskinäistä yhteyttä toisiinsa.

Nuoruusikäiset, jotka ovat aloittaneet yhdyntäelämän varhain, kärsivät vertaisiaan enemmän niin internalisoivista kuin eksternalisoivista mielenterveyden häiriöistä. Yhä on kuitenkin epäselvää, että missä kohtaa nuoruusiän kehitystä nämä yhteydet menettävät merkityksensä. Oletettavasti jälkinuoruusikää kohden yhteydet vaimenevat, koska seksuaalinen aktiivisuus muuttuu tilastollisesti yleisemmäksi, joten tätä voidaan pitää normatiivisena. Niin ikään mielenterveyden häiriöt on yhdistetty riskejä ottavaan seksuaalikäyttäytymiseen. Internalisoivien häiriöiden tutkimus on korostunutta tytöillä, kun taas eksternalisoivia häiriöitä on tutkittu enemmän pojilla. Teoreettiset viitekehykset asettavat puutteet vanhemmuudessa yhdeksi lähtökohdaksi psykososiaalisille haitoille ja ongelmille nuorten elämässä. Tutkimukset ovat arvioineet perhetekijöiden yhteyksiä joko mielenterveyteen tai seksuaalikäyttäytymiseen lähinnä erikseen. Tässä väitöskirjatutkimuksessa nämä puolet on huomioitu samanaikaisesti.

Väitöskirjatutkimuksen aineistona on suomalainen Kouluterveyskysely vuosilta 2010-2011. Tähän koululuokissa itse täytettävään lomakekyselyyn vastasi 186632 nuorta (50.4% tyttöjä). Päätulokset analysoitiin chi2-testillä ja logistisella regressiolla. Aluksi laskettiin kahdensuuntaiset suhteet, jonka jälkeen käytettiin monimuuttuja-analyysia. Analyysit tehtiin ikäryhmittäin, sekä erikseen tytöillä ja pojilla.

Tutkimuksen päätulos oli, että masennus ja rikekäyttäytyminen olivat itsenäisesti yhteydessä nuoruusikäisten seksuaalikäyttäytymiseen myös silloin, kun vanhemmuus- ja perhetekijät analysoitiin yhtäaikaisesti. Masennus oli yhteydessä yhdynnän kokemiseen varhais- ja keskinuoruusiässä. Yhteys oli voimakkain nuorimmassa ikäryhmässä, ja heikkeni asteittain jälkinuoruusikää kohden kääntyen

jopa päinvastaiseksi 19-vuotiailla pojilla. Masennus oli yhteydessä riskejä ottavaan seksuaalikäyttäytymiseen läpi nuoruusiän niin tytöillä kuin pojilla. Rikekäyttäytyminen oli yhteydessä sekä yhdynnän kokemiseen että riskejä ottavaan seksuaalikäyttäytymiseen niin tytöillä kuin pojilla läpi nuoruusiän. Vähäinen vanhempien osallisuus nuoren elämässä sekä vanhempien matala koulutustaso oli yhteydessä yhdynnän kokemiseen ja lukuisiin yhdyntäkumppaneihin varhais- ja keskinuoruusikäisillä. Merkitsevimmäksi tutkituista perhetekijöistä osoittautui kahden vanhemman perheessä asuminen, jolla oli selkein käänteinen yhteys yhdynnän kokemiseen sekä lukuisiin yhdyntäkumppaneihin läpi nuoruusiän.

Työskenneltäessä nuoruusikäisten kanssa on tärkeää kartoittaa seksuaaliterveyttä ja -käyttäytymistä. Masentuneiden ja käytösongelmista kärsivien nuorten kohdalla on syytä kiinnittää asiaan erityistä huomiota. Niin ikään muista kuin kahden vanhemman perheistä tulevat nuoret on tärkeää huomioida seksuaali- ja mielenterveystyössä. Primaari- ja sekundaaripreventiossa seksuaalikäyttäytyminen on tärkeä työalue.

CONTENTS

ABBREVIATIONS

BDI	Beck Depression Inventory
CI	Confidence Interval
DSM-V	Diagnostic and Statistical Manual of Mental Disorders, fifth edition
FSH	Follicle stimulating hormone
GnRH	Gonadotropin releasing hormone
ICD-10	International Classification of Diseases, tenth edition
LH	Luteinizing hormone
OR	Odds Ratio
SHPS	School Health Promotion Study
WHO	World Health Organization

LIST OF ORIGINAL PUBLICATIONS

I Savioja H, Helminen M, Fröjd S, Marttunen M, Kaltiala-Heino R. Sexual experience and self-reported depression across adolescent years. Health Psychology and Behavioral Medicine 2015:3(1):337-347.

II Savioja H, Helminen M, Fröjd S, Marttunen M, Kaltiala-Heino R. Parental involvement, depression, and sexual experiences across adolescence: a cross-sectional survey among adolescents of different ages. Health Psychology and Behavioral Medicine 2017:5(1):258-275.

III Savioja H, Helminen M, Fröjd S, Marttunen M, Kaltiala-Heino R. Delinquency and sexual experiences across adolescence: does depression play a role? European Journal of Contraception & Reproductive Health Care 2017:22(4):298-304.

IV Savioja H, Helminen M, Fröjd S, Marttunen M, Kaltiala-Heino R. Adolescent sexual behavior – family characteristics, parental involvement and associated mental disorders. International Journal of Sexual Health 2018:30(3):295-308.

1 INTRODUCTION

Research on adolescent health and sexuality has gradually increased yielding greater knowledge in the field of origins, risk factors, and consequences related to adolescent sexual behavior. However, simultaneous associations between various risk factors and the strengths of various unique associations require further scrutiny, taking due account of common correlates. Research in the field of adolescent sexual behavior and mental health is so far scarce, leaving a significant gap in the literature, see e.g. (Bromberg & O'Donohue 2013).

Adolescence is an especially vulnerable period given the constant familial, social, and bodily changes (Steinberg 2016). On the other hand, experimentation is to some extent considered normative and characteristic of adolescence (Smetana et al. 2006). Differences between sexes may be tremendous in some phases since girls tend to mature earlier than boys (Fechner 2002, Klimstra et al. 2009). Sexual maturation and involvement in romantic relationships are essential achievements of adolescence due to the onset of puberty and newfound sexuality (Seiffge-Krenke & Gelhaar 2008, Steinberg 2005, Waylen & Wolke 2004).

The onset of adolescence is followed by increases in multiple mental disorders, both internalizing and externalizing (Kessler et al. 2005, McGee & Newcomb 1992, Merikangas et al. 2009). Research on adults has shown that the roots of mental disorders typically lie in childhood or adolescence (Kessler et al. 2005). Parenting practices and family circumstances, but also genetic and biological factors, play a decisive role in either psychosocial adversities or enhancing future prospects (Puura & Laukkanen 2016, Simons et al. 2016, Wickrama & Kwon 2014). Also, the risk of later reoccurrence of adolescent mental disorders, especially depression, is relatively high (Patton et al. 2014). On the other hand, adolescence is a crucial period for resolving childhood problems because of the growing emotional capacity (Blos 1962). Thus adolescence is crucial time between childhood and adulthood to amend former and current impairment, but also to forestall the development of later mental disorders.

Mental disorders are connected to both early and risk-taking sexual behavior (Hallfors et al. 2004, 2005; Kotchick et al. 2001). Internalizing disorders, such as depression, can cause adolescents to seek closeness or make them indifferent to

protect themselves, thus leading to early or risky sex (Kaltiala-Heino et al. 2003a, Kosunen et al. 2003, Wickrama & Wickrama 2010). Externalizing disorders may coincide especially with risk-taking sexual behaviors or place adolescents at risk of these, since risk-taking sexual behavior can also be seen as a form of externalization (Boislard P & Poulin 2011, Epstein et al. 2014, Ramrakha et al. 2007, Schofield et al. 2008). On the other hand, mental disorders may also be consequences of sexual behaviors later regretted or perhaps the sexual experiences are even traumatic (Kaltiala-Heino et al. 2015).

This study aims to identify the associations between parenting and family characteristics, internalizing and externalizing problems, and adolescent sexual behavior at population level. To contribute to the currently scarce literature in this field, a large nationally representative data was analyzed separately in girls and boys and year-by-year across adolescence in order to establish concurrent and unique associations and to determine directions for the prevention and recognition of disorders, and for helping at-risk adolescents.

A few issues were excluded from the scope of this study. Since the roots of mental health lie in childhood and family relationships, child sexual abuse, an extreme form of traumatization, has a considerable effect on both mental and sexual health in adolescence. However, since the main focus of this study is on general population-related issues this specific issue is not addressed. Not all the various facets of internalizing and externalizing disorders are considered as comprehensively as self-reported depression and delinquency, which are fairly ample representations of internalization and externalization. In addition, specific questions concerning sexual minority youth, cultural differences, ethnic minorities and immigrants were likewise excluded. To conclude, this study focuses on revealing the mental health and family-related risk and protective associations with adolescent early or risk-taking sexual behavior. Thus the implications of healthy sexuality and sexual behaviors to enhance mental health, or the opposite, are not considered equally thoroughly.

2 REVIEW OF THE LITERATURE

The review of the literature covers in detail the research on adolescent sexual behavior and its associations with mental disorders and psychosocial adversities. The studies introduced are referred to as either cross-sectional or longitudinal; studies involving fewer than a hundred participants are classified as small, between hundred and thousand participants medium sized, and over a thousand participants large.

2.1 Adolescence

Many of the definitions of adolescence connect it to incipient puberty. However, adolescence entails considerably more than reaching physical sexual maturation, as numerous other factors, such as socio-cultural environment and family context, contribute significantly to the phase of adolescence. Developmental psychology has long recognized adolescence as a distinct period of rapid development and since ancient times adolescence has been described as a transitional stage of life between childhood and adulthood (Lerner & Steinberg 2004).

2.1.1 Characteristics

Different age limits have been proposed for adolescence. Hall's (1904) long-established conception of adolescence comprised 14 to 24-year-olds, whereas more recent research has suggested age 10-24 as definitive for adolescence (Sawyer et al. 2018). The World Health Organization defines adolescents as 10 to 19-year-olds, youth as 15 to 24-year-olds, and young people as 10 to 24-year-olds (World Health Organization 2019). In research adolescence is often divided into early, middle, and late adolescence. Peter Blos, a prominent developmental researcher who continued the work of Freud, has divided adolescence as follows: early adolescence 13-15 years, adolescence proper 15-18 years, and late adolescence 18-20 years (Blos 1962). However, other age distributions of adolescence have also been proposed. Elliot et al. (1990) defined early adolescence as 10-14 years, middle as 15-17 years, and late

adolescence as 18 to the mid-20s. Nienstein et al. (2008) identified early adolescence as 10-13 years, middle as 14-16 years, and late adolescence as 17-21 years. Steinberg (2016) proposes age 10-13 as early adolescence, 14-16 years as middle adolescence, and 19-22 year as late adolescence. In this work, based on the distributions above, 10 to 14-year-olds are referred to as early adolescents, 15-17 as middle adolescents, and 18-early 20s as late adolescents.

Some distinctions have been proposed between the terms "development" and "maturation". Maturation has been used to refer to the manifestation of innate potentials, such as movement, memory, growth, and puberty. These processes are autonomic and the timing is specific to humans. By contrast, developmental processes are not deemed autonomic. These processes begin, intensify, and are preserved in the interaction between an organism and its environment. The synchronization of developmental and maturational processes is a prerequisite for normal development. (Blos 1974)

Puberty is defined as a process resulting in the capability for sexual reproduction occasioned by the secretion of sex hormones, developing secondary sexual characteristics, oigarche for males, and menarche for females. On average, girls enter puberty a few years earlier than boys. (Chumlea et al. 2003; Marshall & Tanner 1969, 1970)

2.1.2 Development in adolescence

Adolescence is characterized by increased changes and vulnerability (Steinberg 2005). Physical changes occurring first, emotional development lags behind the physical development throughout adolescence. Hence the various facets of development mature unsynchronized, placing an adolescent under a constant need to readjust. Relatively rapid changes occur in physical, cognitive, and emotional systems, but also in the social domain. Parents are the main source of regulatory structure and guidance for a child, while there is an increase in responsibility and the autonomous regulation of affect and behavior during adolescence (Steinberg 2016). Developmental tasks during adolescence comprise normative milestones which an individual is assumed to reach at a given developmental stage, originally formulated by Havighurst (1948). Progression presupposes success in previous tasks. Havighurst introduced eight tasks: accepting new body image, achieving a feminine or masculine social role, establishing emotional independence from parents, establishing mature relationships with peers of both sexes, preparing for marriage and family life,

preparing for a career, developing a personal system of values or ethics, and acquiring socially responsible behavior. More recent research considers these tasks still salient (Seiffge-Krenke & Gelhaar 2008). A Finnish textbook on child and adolescent psychiatry presents the developmental tasks more concisely (see Table 1) (Aalberg 2016). Successful adolescent passage requires enough social support from parents and peers as well as timely adjustment and the capability to coordinate the changes occurring in the various developmental facets. Unsuccessful coordination of emotional, intellectual, and behavioral processes may underlie psychopathology in adolescence. (Steinberg 2005, 2016)

Table 1. Developmental tasks of adolescence

Psychological separation from parents
Peer relationships as a growth environment
Accepting and adapting to new body image and sexuality
Autonomy, identity development

2.1.2.1 Physical development

Puberty is a sequence of physical changes during which a child's body matures into an adult body. This biological and physical developmental process typically takes from two to five years and is about reaching capability for sexual reproduction. Timetables of growth and development vary individually, and partly due to heredity, affecting the timing, rapidity, and sequence of development. However, general outlines can be given and the differences between girls and boys are especially obvious.

The visible pubertal changes are caused by a number of hormonal changes vital to successful pubertal maturation. Adrenarche leads to the development of pubic hair due to an increase in the secretion of androgens from the adrenal gland. Typically, adrenarche precedes puberty and the androgen secretion increases further in puberty. Before puberty, the amounts of gonadotropin are scarce, because there is a strong inhibition of pituitary gland secretion mediated by the central nervous system. The actual onset of puberty is related to GnRH pulsing, but the details of this progression are not known. In most healthy boys this inhibiting effect continues longer than in girls. To simplify the sequence of hormonal puberty, hypothalamus begins to release GnRH pulses, which is followed by a rise in sex hormones LH and

FSH secreted from the anterior pituitary. Increasing amounts of LH and FSH cause the ovaries to produce estradiol, and the testes to produce testosterone. For girls the main hormone in pubertal maturation is estradiol, which accounts for changes in the body. For boys, the main hormone leading to changes in the body is testosterone. (Hall & Guyton 2011, Tanner 1955)

In terms of sexual maturation, breasts and pubic hair start to grow in girls around 10-12 years of age. Normally, menarche is experienced between 11 and 16 years. Boys' genitals and pubic hair start to grow around 12-14 years of age. Spontaneous ejaculations, uncontrolled erections and swelling of the breasts start around 14-16 years of age. Other changes also occur in an adolescent's body. Physical increases in height and weight are remarkable. Among girls, on average, peak growth occurs slightly before menarche. Instead, boys' growth peaks towards the end of puberty. Thus girls stop growing about two years before boys. Girls start to gain subcutaneous fat earlier than boys. Both girls and boys develop a stronger body odor quite early on. Furthermore, boys' voices change due to the prominent growth of the larynx. Pubertal development is usually completed earlier and in a shorter period of time among girls than among boys. (Chumlea et al. 2003; Marshall & Tanner 1969, 1970; Tanner 1955)

Tanner (1955) developed a staging of pubertal development for clinical use. For boys, there are six stages for pubic hair development (P1-P6) and five stages for genitals (G1-G5). Typically, Tanner's G-stage goes numerally ahead of P-stage among healthily developing boys (Marshall & Tanner 1970). For girls, there are five stages for pubic hair assessment (P1-P5), and five stages for breast development (M1-M5). Among healthy girls, M-stage numerically precedes P-stage at the beginning of pubertal development, but towards the end of puberty the stages tend to develop hand in hand (Marshall & Tanner 1969). In research other instruments are also used to assess pubertal development. For instance, there are various assessment scales (Davila et al. 2009, Goldstein et al. 2007, Hershenberg & Davila 2010, Michaud et al. 2006, Patton et al. 2007), but timing of menarche/oigarche is also widely used (Copeland et al. 2010, Kaltiala-Heino et al. 2003a, Kosunen et al. 2003, Ruuska et al. 2003).

2.1.2.2 Cognitive and brain development

Psychological development in adolescence includes both cognitive and emotional influences. Brain development can be seen as a part of physical development in adolescence, but it is also a prerequisite for cognitive development. The outlines of

brain development and the significant implications for adolescent development are explored below.

Due to the plasticity of nerve cells and hormonal factors both micro- and macrolevel changes occur in the nervous system leading to maturation of behavioral and cognitive functions (Paunio & Lehtonen 2016). Nerve cells carry information the faster the more axon cells are covered under myelin. This myelinization of sensorimotor nerve fibers occurs fairly early in development, whereas the associative cerebral cortex and frontal cortex continue to be myelinated throughout adolescence (Paunio & Lehtonen 2016). The frontal lobes are largely in charge of action and cognitive processes, such as executive function, memory, language, behavioral inhibition, and regulation of attention (Blakemore & Choudhury 2006, Chayer & Freedman 2001, Paus et al. 1999).

The maturation of different brain areas occurs at different pace and times. The amygdala, largely responsible for emotional regulation, develops as early as in childhood in girls, whereas among boys it typically develops gradually until late adolescence. The hippocampus tends to increase in size during adolescence, whereas the nucleus caudatus and putamen decrease in size. (Paunio & Lehtonen 2016) The frontal regions, including frontal and anterior cingulate cortices, which are mostly in charge of emotional, attentional, and cognitive control, develop considerably bound with pubertal maturation. In comparison to subcortical structures, these areas show more congruent associations with gonadal hormones. (Vijayakumar et al. 2018)

As a result of myelinization, there is continuous increase in the white matter both locally and globally in the brain. Together with localized synaptic pruning this makes information processing more efficient and has important implications for adolescents' behavioral expressions (Blakemore 2012, Paus et al. 1999). The connections between the prefrontal cortex and limbic system expand during adolescence affecting evaluation and response to risk and reward (Spear 2000). What is more, environment and social context may also influence brain and cognitive development in the early stages of life, and potentially also in adolescence (Francis et al. 2002, Paunio & Lehtonen 2016, Whittle et al. 2014).

Cognitive development in adolescence is about achieving a more conscious, self-regulating, and self-directed mind (Keating 2004). In early adolescence the capacity for information processing and deductive reasoning improve significantly (Steinberg 2005). This process is crucial in long-term planning, and multidimensional, abstract, and hypothetical thinking, usually developed by middle adolescence (Eisenberg & Morris 2004, Steinberg 2005). Nevertheless, reasoning about real-life problems is usually not as advanced as reasoning about hypothetical dilemmas. Internal motives

and desires affect judgment and the level of agreement regardless of the validity of an argument (Sobesky 1983, Steinberg 2005). Social cognition appears to be more sophisticated in girls due to stronger interconnections between the hemispheres and different lobes of the brain. Correspondingly, spatial processing and performance in sensorimotor tasks are typically strengths of boys due to stronger inner connections within a hemisphere. (Paunio & Lehtonen 2016).

Specifically, judgment involves risk-taking and decision-making. These cognitive processes in particular are not separate from emotion. The frontal cortex is not mature enough to facilitate an emotional reaction triggered by an immediate stimulus. The amygdala transmits these impulses, activates the nucleus accumbens, and impulsive behavior may result. For similar reasons, depression and emotional outbursts have a strong neurobiological base. (Paunio & Lehtonen 2016) The reward system develops until adulthood, and together with immature frontal cortex there is increased risk for poor decision-making, especially under social pressures and strong emotions (Gardner & Steinberg 2005, Paunio & Lehtonen 2016, Steinberg 2016). Even though adolescents understand the consequences of the risks they take, impulsivity and susceptibility to reward render adolescents prone to risk-taking (Reniers et al. 2016). Some research has attempted to explain adolescent decision-making through "hot" and "cold" cognitions. "Low emotion" thinking is referred as to "cold" cognition and conversely "hot" cognition refers to thinking while experiencing strong feelings (Steinberg 2005). Many routine decisions are made under these affective influences, actually largely unconsciously (Bechara et al. 1999, 2000). Moreover, cognitive development has important implications for emotion-related behavior. Efficient affect regulation consists in part of the ability to modify or inhibit the expression of emotions as required by the situation (Steinberg 2005).

As such, the acquisition of integrated and fully controlled executive functions occurring later in development implies more opportunities for suboptimal developmental trajectories. In terms of psychopathology, inordinate down-regulation of mood and motivation reflects internalizing problems, whereas insufficient control of arousal is associated with externalizing problems (Chayer & Freedman 2001, Keating 2004, Steinberg 2005). It has also been hypothesized that puberty may initiate a similar sensitive period in brain development as seen in early sensory systems (like sound categorization in language acquisition) and that executive functions and social cognitive skills may be more difficult to incorporate into brain networks since they are established after puberty (Blakemore & Choudhury 2006). Moreover, specific brain areas are connected to impaired mental health. For instance, Whittle et al. (2014) found that greater frequency of positive maternal behavior in

early adolescence is connected to growth of amygdala that may further serve to protect against depression, for example.

2.1.2.3 Emotional development

As has been established, emotional development is part of psychological development and demands some brain development, especially in the amygdala and prefrontal cortex regions (Silvers et al. 2017). Facets of social development are also closely connected to this and sometimes even referred to as socio-emotional development (Bohlin & Hagekull 2009). Besides developmental aspects, changing emotional behavior in adolescence also reflects an increased number of stressors and changing environments (Gilbert 2012, McLaughlin et al. 2015). Dysregulation of emotions has been suggested to be one of the main causes of the lifetime peak for onset of psychopathology in adolescence (Gilbert 2012). Also, more frequent negative emotional states exposes adolescents to the development of psychopathology (Gilbert 2012, Larson et al. 1990).

Early adolescence is bound to incipient puberty, which triggers anxiety and confusion due to the rapidly changing body. Adaptation and acceptance of the new body image are important for psychosexual development. Pubertal maturation influences the development of sexual motivation and romantic interest (Neemann et al. 1995, Richards et al. 1988).

A part of emotional development is a normative psychosocial regression, whereas cognitive development simultaneously advances quite straightforwardly. Psychosocial regression is about the reactivation of early experiences. Developmentally appropriate, many of the psychosocial problems of childhood can be solved in adolescents' progression towards autonomy, and through advanced emotional capacity. However, the partly or total irreversibility, or the absence, of psychosocial regression may be a sign of developmental problems. For example, severe anxiety or agitation may result from problems with regression. (Blos 1962, Freud 1976)

During adolescence, emotional regulation seems to pass through greater changes than emotional reactivity (Silvers et al. 2012). Since cognitive control increases progressively, one form of effortful emotional regulation is cognitive reappraisal (McLaughlin et al. 2015). Younger adolescents are capable of emotion regulation using reappraisal, but do not do so as effectively as older adolescents (Silvers et al. 2012). Silvers et al. (2012) put forward two potential explanations. First, older adolescents may have more experience of reappraisal due to more encounters with

negative life events demanding adaptation and self-regulation. Second, among younger adolescents, regulatory competence may be limited by on-going brain development, as the frontal cortex is one of the last parts to be fully developed.

Responses to emotional antecedents exhibit complex trajectories (McLaughlin et al. 2015). Adolescents assess their own affect and emotional state, which counts as subjective level. At psychological level arousal and stress occur through the peripheral nervous system, and at regulatory level motivation and success, for example. Whereas some emotional behaviors, such as cognitive reappraisal, tend to increase quite linearly, some do so less. For example, the risk for psychopathology stays relatively high during adolescence (Gilbert 2012, McLaughlin et al. 2015). Adolescents experience emotional peaks due to daily stressors, but there is evidence that emotional stability, on average, increases towards late adolescence (Larson et al. 2002). Early adolescents typically experience a downward shift towards more negative emotional states, which does not continue into late adolescence (Larson et al. 2002). The emotional turbulence of early and middle adolescence changes shape in late adolescence. Choices concerning the future are made and preparation for career and family life become the main developmental tasks (Havighurst 1948).

To summarize the psychological development, a significant change occurs especially in brain structure and functioning related to information processing and regulation of emotion and behavior. In early adolescence puberty typically heightens emotional arousability, sensation-seeking, and reward orientation. Middle adolescence is characterized as a time of increased proneness to risk-taking and problems in regulation of affect and behavior. It is a constant challenge for an adolescent to continually adapt to the gaps between changes in arousal and motivation and regulatory competence. It is not until late adolescence that maturation of the frontal lobes facilitates regulatory competence. (Blakemore & Choudhury 2006, Steinberg 2005)

2.1.2.4 Social development

In the social context there are two main aims to be achieved in adolescence. Firstly, psychological separation from parents is key to successful adolescent passage. Middle adolescence is the phase characterized by most separation ambivalence (King 2002). Secondly, peers become increasingly important for an adolescent. The peer group is a major training ground for social interaction and developing romantic relationships (Smetana et al. 2006, Steinberg 2005). Moreover, adolescence provides room for engagement in the community and in society. Civic engagement is known

to engender a greater sense of compassion and interdependence and strengthen civic and moral identity (Smetana et al. 2006).

Parent-adolescent relationships

It is normative for children to utilize parents as a source of comfort and regulation of emotions, whereas adolescence is the time for developing individual regulatory methods (Grusec 2011, Steinberg 2005). As such, adolescence may be referred to as a second individuation process. Normatively, a child internalizes his/her primary caretaker to feel safe, even when the caretaker in physically absent. In order to establish a firm sense of self, an adolescent has to relinquish the internalized other. This individuation cannot be done through physical, geographical or ideological distance, but only through intrapsychic restructuring. (Blos 1967)

Compared to authoritarian, permissive, or rejecting-neglecting families, authoritative parenting is deemed to have the best effect on adolescents' psychosocial competence (Steinberg 2001). Parental monitoring has been suggested to be of great importance in adolescent lives (DiClemente et al. 2001b, Markham et al. 2010, Meschke et al. 2002, Wight et al. 2006). However, Stattin & Kerr (2000) shed new light on this view by suggesting that most of the monitoring outcomes have actually been based on adolescents' disclosure and willing solicitation, and thus have meant parental knowledge. Also, parents are more inclined to elicit information from adolescents already engaged in problem behavior (Kerr & Stattin 2000, Smetana et al. 2006).

Adolescents usually feel closer to their mothers than their fathers, perhaps due to experiencing more direct interaction with them. What is more, private issues are preferably discussed with mothers, whereas more impersonal matters with either parent. Arguments between parents and adolescents typically become more common in early adolescence. (Smetana et al. 2006) A moderate amount of conflict is deemed relatively normative, whereas frequent conflicts or no conflict at all predict poorer adjustment over time (Adams & Laursen 2001). Despite the significant changes occurring in parent-adolescent relationships during adolescence, there is a consensus that major rejection of adult authority and values and extreme alienation from parents are problematic rather than normative (Smetana et al. 2006). Most of the theoretical frameworks explain parent-adolescent conflicts as adolescent's pursuit of greater independency from parents (Smetana et al. 2006). Changes in family structure, such as divorce, temporarily disrupt parent-adolescent relationships and trigger further conflicts (Smetana et al. 2006).

As has been established, authoritative parent-adolescent relationship, closeness and feeling connected to parents provide the basis for mature moral reasoning, better psychosocial competence, higher self-esteem, and identity development (Smetana et al. 2006). Excessive psychological control is associated with both internalizing and externalizing problems (Smetana et al. 2006). As adolescent development progresses, adolescents tend to distance themselves from parents and the parent-adolescent relationship cohesion declines (Smetana et al. 2006). By late adolescence, hierarchical family relationships have transformed into more egalitarian relationships (Smetana et al. 2006). Over the course of adolescence, progressively more time is spent with peers and less with parents (Larson et al. 1996).

Peer relationships

Peer relationships grow in importance over time. During adolescence, friendships grow in terms of closeness, intimacy, disclosure, and support. These relationships play a key role in acquiring social skills and competence (Smetana et al. 2006). Also, better sibling relationships suggest better psychosocial adjustment during adolescence (Stocker et al. 2002). However, deviant peer groups are also training grounds for antisocial behavior and risk-taking behaviors learnt from peers (Coie & Kupersmidt 1983, Dishion & Tipsord 2011, Dodge 1983, Hirschi 1969). It has been suggested that co-rumination may be the link between findings that girls have more intimate friendships, but also more internalizing problems than do boys, since typically early adolescent girls tend to focus on negative feelings and issues within otherwise healthy relationships (Rose 2002). Typically withdrawn adolescents are at greater risk for internalizing disorders, whereas aggressive and rejected adolescents are at risk for externalizing disorders (Rubin et al. 1995).

Among early and middle adolescents, and especially among girls, peer cliques are characteristic. At first consisting of same-sex adolescents these cliques typically change during middle adolescence towards more mixed-sex groups, providing an essential context for establishing romantic relationships (Smetana et al. 2006, Steinberg & Morris 2001). In early adolescence, romantic involvement and relationships are relatively self-centered and intended to meet needs for social status and sexual experimentation. Later, romantic relationships are more about fulfilling needs for support and companionship (Smetana et al. 2006). However, romantic involvement in early, and perhaps also in middle adolescence may have negative consequences (Neemann et al. 1995, Smetana et al. 2006). Parental responsiveness

or monitoring may affect adolescent romantic relationships through social competence and self-esteem gained (Smetana et al. 2006).

2.1.2.5 Sexual identity development

Gender development at large is influenced by biological, cognitive, and social factors at any given time point (Lerner & Steinberg 2004, Steensma et al. 2013). Biologically, prenatal sex hormones explain some of the different biological characteristics between girls and boys, but do not explain variations within sex or change across development. There are also developmental cognitive differences between girls and boys (Paunio & Lehtonen 2016). Moreover, social, cultural, and hormonal influences do modify gene expression, but also predispose girls and boys to differential treatment (Lerner & Steinberg 2004). Recent research has proposed gender identity to be composed of five dimensions (Steensma et al. 2013, Tobin et al. 2010): membership knowledge of a gender category, gender connectedness, felt pressure for gender conformity, gender typicality, and gender centrality (the importance one attaches to gender as a component of one's self-concept. Since the interconnections of gender development are numerous, only a narrower perspective, sexual identity development, is addressed here. Psychoanalytic theories of development present three main notions of sexual identity development: core gender identity, gender-role identity, and sexual-partner orientation (Tyson & Tyson 1990).

Biological sex and the exploration of it are seen as a base for primary feminine/masculine identity. Developing body image and forming mental representations of the "body-self" are related to core gender identity. Gender-role identity is about interaction with other people, especially parents. Identifications with mother and father, as well, as idealization and imitation of them, are ways to establish a gender-role identity. (Tyson & Tyson 1990)

Since core gender identity is usually formed in infancy and childhood, and gender-role identity in childhood and adolescence, sexual-partner orientation is primarily an adolescent issue. The events of puberty and discovering one's own sexuality in a new way are important for psychosexual development and may cause some former issues to resurface. Pressures of adolescence lead to the resolution of former conflicts over a chosen love object, between identifications and admirations between mother and father. A certain mix of femininity and masculinity is deemed optimal. This conflict resolution leads to sexual-partner orientation, which is usually firmly established by late adolescence or early adulthood. However, it is possible to change the orientation, and some do so even fairly late in life. (Tyson & Tyson 1990)

2.2 Sexuality and sexual behavior

Differing definitions for sexuality and sexual behaviors have been proposed. WHO has given definitions for sexuality and sexual health and these are presented below alongside the definitions used in this review for sexual and risk-taking sexual behavior.

WHO defines sexuality as: *"…a central aspect of being human throughout life encompasses sex, gender identities and roles, sexual orientation, eroticism, pleasure, intimacy and reproduction. Sexuality is experienced and expressed in thoughts, fantasies, desires, beliefs, attitudes, values, behaviors, practices, roles and relationships. While sexuality can include all of these dimensions, not all of them are always experienced or expressed. Sexuality is influenced by the interaction of biological, psychological, social, economic, political, cultural, legal, historical, religious and spiritual factors."* (World Health Organization 2006)

WHO defines sexual health as: *"…a state of physical, emotional, mental and social well-being in relation to sexuality; it is not merely the absence of disease, dysfunction or infirmity. Sexual health requires a positive and respectful approach to sexuality and sexual relationships, as well as the possibility of having pleasurable and safe sexual experiences, free of coercion, discrimination and violence. For sexual health to be attained and maintained, the sexual rights of all persons must be respected, protected and fulfilled."* (World Health Organization 2006)

Sexual behavior can be defined as the ways in which sexuality is expressed, as behavior, and actions. In a wider perspective sexual behavior can be seen as one's way of signaling sexual orientation and interest. In a narrower perspective sexual behavior can mean erotic acts, such as kissing, masturbation, or intercourse. The latter perspective is applied in this review with the focus on heterosexual and interpersonal behaviors.

Risk-taking sexual behavior can be defined as such behavior that may cause harm to oneself or to a partner. For example, omitting to use contraception when not intending pregnancy, having sex under the influence of alcohol or other substances, or having multiple and frequently changing partners for sexual intercourse (Wellings et al. 2001). These behaviors may also occur concurrently, since, for example, under the influence of alcohol contraception is more likely to be neglected. As a result, unintended pregnancies and sexually transmitted diseases may have a negative effect on mental health. For very young people, engaging in non-age-appropriate sexual activities may be risk-taking sexual behavior for an adolescent or sexual exploitation for a child, or both. In the research field multiple sexual partners is often used as a sign of risk-taking sexual behavior, because it is relatively easy to quantify.

2.2.1 Sexuality and sexual development across the lifespan

There are few comprehensive presentations of normative sexual development across the lifespan. One of these, Steps of Sexuality, presented by the Family Federation of Finland, takes into account the emotional, biological, and social aspects of sexual development (Korteniemi-Poikela & Cacciatore 2015). Each step consists of characteristic emotional and behavioral features. Typically, the development proceeds quite straightforwardly from one step to the next. Nevertheless, some variation is normative. These steps are introduced next and thereafter another more compact model of progression in romantic involvement is presented.

According to the Steps of Sexuality, childhood consists of four steps. The first one is for 0-4-year-olds and is about becoming acquainted with oneself and requiring a lot of care and affection. Children are interested in their own sex and compare themselves to others. Typical features are accepting and loving oneself, enjoying one's own body, and being curious. The second step occurs around 3-8 years of age. A child has friends and infatuations and learns appropriate ways to show emotions. The meanings of friendship, privacy, and boundaries are learnt. It is typical to show emotions and become attached to many things and people. The third step overlaps the previous one. It occurs around 3-9 years of age and it is about admiration of parents. A child may fall in love with a close adult and typically it is the child's own parent to whom the love is expressed. The child also begins to consider how babies are made. The fourth step in childhood takes place around 6-12 years of age. It is about hero-worship. A child may have a crush on an esteemed and admired adult. Identification with the crush is typical.

The fifth step occurs around 8-13 years of age. The object of love and infatuation is a known and close peer. The feelings are strong, but are kept secret. A child/adolescent learns to control feelings and behavior related to them. Also, some may contemplate their own sexual identity. The sixth step takes place around 9-14 years of age. A crush is confided to some friend(s). Support and acceptance from a friend give permission to dream about future relationships. Friends may talk about dating, although it may only be dreams they really talk about. The seventh step occurs around 10-15 years of age. Courage is plucked up and the infatuation is confided to the actual crush. The dream of a relationship strengthens.

The eighth step is considered relevant to 12 to 16-year-olds. It is about having a dating partner and holding hands. This is the first time that love is filled with great emotion. One of the goals is to practice tolerating both intimacy and distance. The ninth step is for 14 to 18-year-olds, and it is about kissing. There is also sexual arousal

connected to kissing and touching. An adolescent learns the boundaries between public and private. The tenth step applies to 15 to 20-year-olds. At this stage, sexual pleasure is shared. Adolescents practice communication and boundary-setting. Biology, feelings, and reasoning co-occur. The eleventh and final step is achieved around 16-25 years of age and is about making love. The young person is familiar with his/her own body to the extent of being able to engage in sexual intercourse. There is also a need to consider how to address the risks. Reciprocal respect and readiness for sexual intercourse are important. (Korteniemi-Poikela & Cacciatore 2015)

Another more compact model of adolescent romantic development is that proposed by Seiffge-Krenke (2003), who introduced a model of four adaptive stages. Former preference being same-sex social groups, 11 to 13-year-olds start to engage with opposite sex peers. This is called the initiation phase, which is characterized by short and less intimate relationships with the main focus on oneself. The next stage is a status phase, usually occurring around 14-16 years. The main focus is on the peer acceptance of romantic relationships, and the existence of a partner is primary. In the third stage, the affection phase around 17-20 years, the attention turns to the romantic relationship itself. In this phase the relationship may become more intimate and committed. The final stage occurs from around 21 years of age. In this quasi-adult phase relationships are long-term and exclusive. During the progression of these stages romantic partners become increasingly the source of emotional support.

2.2.2 Sexual behavior in adolescence

Sexual behavior in adolescence is typically expressed as a gradually advancing sequence of more intimate behaviors. Research has been conducted on behaviors such as kissing or dating, but most of the research focuses on experience of sexual intercourse or risk-taking sexual behaviors. These are also clinically relevant, since they predispose to sexually transmitted infections and unintended pregnancies (Edgardh 2000, 2002; Kotchick et al. 2001).

The line between normative and risk-taking sexual behavior is blurred in adolescence. Early sexual activity has been seen as problem behavior, because it often occurs in the context of other risk-taking adolescent behaviors (Elliot & Morse 1987, Madkour et al. 2010) and young people engage in sexual activity prematurely in relation to their psychological maturity. Risk-taking sexual behaviors commonly emerge and peak during adolescence (Fergus et al. 2007, Mahalik et al. 2013). Wight

et al. (2000) found that 50% of sexually active adolescents had had their first sexual encounter under the influence of alcohol, and only 13% of them had used contraception. Risk-taking in adolescence has been explained by both weak impulse control and unfinished development (Moshman 2011, Reniers et al. 2016, Winnicott 1984).

Since girls mature earlier than boys (Fechner 2002, Klimstra et al. 2009), research suggests that adolescent boys engage in more risk-taking sexual behaviors than girls (Epstein et al. 2014, Lohman & Billings 2008). What is more, the demand for chastity still applies more widely to girls than boys, despite sexual liberation. A double standard may prevail allowing boys social gains by being sexually experienced, while girls' sexual activity may be met with disapproval (Bordini & Sperb 2013, Crawford & Popp 2003). Peer acceptance is deemed higher among boys with greater number of sexual partners, whereas the association is the reverse in girls (Kreager & Staff 2009).

During the latter half of the 20th century sexual debut has occurred ever earlier, and the average age has dropped 3-4 years among both girls and boys (Goodson et al. 1997, Wellings & Field 1996). Further statistics about adolescent sexual experiences are presented below.

2.2.2.1 Early adolescence

Among U.S. adolescents the average age for first kiss was 14 years (Smiler et al. 2011). In some Finnish data from 2015, 54.4% of 14-16-year-old secondary school students had kissed on the lips (National Institute for Health and Welfare 2015). Kissing and petting typically precede sexual intercourse for several years (Moore & Rosenthal 1993, Schwartz 1999, Wellings & Field 1996). In a Finnish study 18% of 14-15-year-old girls were dating regularly (Kosunen et al. 2000). In some more recent Finnish data on 14 to 15-year-old adolescents, 17.4% of girls and 14.2% of boys were dating regularly (National Institute for Health and Welfare 2017a).

Slightly different numbers have been presented regarding the age of first sexual intercourse. Sexual intercourse under the age 14 is relatively uncommon and reported only by 6% of U.S. adolescents (Centers for Disease Control and Prevention 2012), whereas some have found that 13-15% experience sexual intercourse in early adolescence (Schofield et al. 2008). Of Finnish secondary school students, aged 14-16, 18.8% report having experienced first sexual intercourse. Not having used any contraception at latest sexual intercourse was reported by 11.2% of

sexually active Finnish secondary school students. (National Institute for Health and Welfare 2017b)

2.2.2.2 Middle adolescence

U.S. girls begin dating approximately 2.5 years after menarche (Phinney et al. 1990). For boys, the first relationship considered serious is experienced around 16 years of age (Smiler et al. 2011). In a Finnish study 41% of 17-18-year-old girls were dating regularly (Kosunen et al. 2000). Around 20% of 16-year-old girls use oral contraception (Falah-Hassani et al. 2006).

Studies in Western populations have shown that there is a steep increase in prevalence of having experienced sexual intercourse around the turn from early adolescence to middle adolescence (Edgardh 1993, Kosunen et al. 1998). A large Finnish school sample of 16-year-olds showed that 30% of girls and 24% of boys had experienced sexual intercourse (Kosunen et al. 1998) and international studies confirm that about 20-40% of Western adolescents have experienced sexual intercourse by the age of 16 (Centers for Disease Control and Prevention 2012, Wellings et al. 2001). In the USA, 45% of adolescents have experienced first sexual intercourse before age 17 (Schofield et al. 2008).

2.2.2.3 Late adolescence

About 30-40% of 18-year-old girls use oral contraceptives (Centers for Disease Control and Prevention 2012, Falah-Hassani et al. 2006). Most recent Finnish statistics about contraception used at last intercourse among 18-34-year-olds show a decline in the use of oral contraceptives, and correspondingly an increase in the use of condoms and intrauterine devices from 1999 to 2015 (Family Federation of Finland 2019). In a large sample of 17 to 20-year-old U.S. university students, only 14% reported that they had never kissed on the lips (Lefkowitz et al. 2018). Among U.S. adolescents, 60% have experienced sexual intercourse by age 18 and 65-70% by age 19 (Centers for Disease Control and Prevention 2012, Martinez et al. 2011, Schofield et al. 2008). Up to 90% have experienced sexual intercourse by the age of 21 in Western countries (Madkour et al. 2010, Wellings et al. 2001).

2.2.3 Main theories on adolescent passage and risk-taking sexual behavior

The psychoanalytic theories of Freud and Erikson, pioneers in the field of psychosocial development, have had an enormous impact on modern day developmental psychology. Theories of social, cognitive, and emotional development comprise aspects of learning, social cognition, and attachment to mention only a few. Theories having important implications for understanding adolescent risk-taking sexual behavior, internalizing and externalizing problems, and family context are reviewed below.

Sigmund Freud's psychoanalytic theory was decisive in the formation of developmental psychology. Freud emphasized the meaning of early experiences to personality and social development. Psychoanalytic theory recognizes five stages of psychosexual development (oral, anal, phallic, latency, genital). At each stage psychic energy is focused on different body areas and the child confronts conflicts which need to be resolved in order for development to proceed. (Freud 1976)

Erik Erikson developed a theory of psychosocial development by extending Freud's psychoanalytic theory. Erikson identified eight stages of psychosocial development across the life span. Five of these stages comprise the years of infancy, childhood, and adolescence: Basic Trust versus Mistrust, Autonomy versus Shame and Doubt, Initiative versus Guilt, Industry versus Inferiority, and Identity versus Role Confusion. (Erikson 1968) What is more, more recent research proposes an additional stage, Affiliation versus Abandonment has been suggested to exist to cover early adolescence more thoroughly (Kroger 2006). Sexual identity formation is an essential part of identity development. Similar to Freud's theory, each of these stages involves a developmental crisis to resolve in order to proceed further and successful resolution of a crisis also predicts success in future crises. There may be negative consequences, such as inability to form intimate relationships if a healthy sense of sexual self does not begin to develop in adolescence. On the other hand, sexual activity at a premature stage may be disadvantageous. (Chapman & Werner-Wilson 2008, Erikson 1968, Marcia et al. 1993)

Whereas Freud suggested psychic energy and sexual impulses to be the key forces in development, Erikson emphasized more the social factors. Both theories maintain family context and early experiences as factors having long-term and important effects on close relationships throughout life. This fact has remained a key factor in modern attachment research. (Siegler et al. 2010)

2.2.3.1 Problem behavior theory

Problem behavior theory by Jessor and Jessor (1977) is one of the most cited in the research field of risk-taking sexual behavior. The core of the theory is that problems accumulate because of a common latent factor, suggested to be ineffective parenting (Jessor 1991, Simons et al. 2016). Problem behaviors tend to cumulate in adolescence, sometimes even referred to as a problem behavior syndrome, which may continue from early adolescence to adulthood (Donovan & Jessor 1985, Jessor & Jessor 1977, McGee & Newcomb 1992).

Problem behavior theory considers sexual activity in adolescence as one of the problem behaviors in addition, for example, to substance abuse, delinquency, and poor academic performance (Jessor 1991). The co-occurrence and co-variation of the various problem behaviors is notable and social and contextual variables may also influence them (Jessor 1991). Moreover, delinquency or antisocial behavior may also serve as mediators between poor parenting practices, such as low parental monitoring and inconsistent discipline, and risk-taking sexual behaviors (Capaldi et al. 2002, Dogan et al. 2007, Loeber & Dishion 1983, McCauley et al. 2016, McCord et al. 1961).

2.2.3.2 Attachment theory

Attachment theory was originally proposed by Bowlby (1969), and extended by Ainsworth (1978). The base of attachment theory lies in the psychoanalytic idea of the importance of infant's early relationships. Bowlby's view of the primary caregiver as a secure base has its roots in the evolutionary context, suggesting that the attachment process increases the infant's chances of survival. Ainsworth formed four attachment categories: secure attachment, insecure/resistant (or ambivalent) attachment, insecure/avoidant attachment, and disorganized/disoriented attachment. Caregiver's sensitivity and responsiveness influence attachment security.

Children internalize attachment patterns from their relationships with caregivers, thus forming mental representations, internal working models of attachment (Dykas & Cassidy 2011, Pietromonaco & Barrett 2000). These working models affect the interaction between child and environment (Bowlby 1973). Children with secure internal working models are able to process a wide range of different experiences and end up in a coherent integration of these experiences (Bowlby 1969, Pietromonaco & Barrett 2000). Conversely, insecure internal working models exist due to internalized negative experiences with parents (Blatt & Homann 1992). This

may lead to disintegration of information about attachment experiences possibly causing impaired communication, poor mentalizing abilities, and negative self-concept (Barriga et al. 2000, Cassidy et al. 1996, Dodge 1993, Fonagy & Target 1997, Shumaker et al. 2009).

The attachment style an adolescent has developed contains mental representations of self and others and thus affects social, psychological, and cognitive functioning (De Vries et al. 2016, Fonagy & Target 1997). Adolescents with secure attachment style have more close relationships with peers and are more socially competent (Siegler et al. 2010), and these are factors protective against early or risk-taking sexual behaviors (Kotchick et al. 2001). Negative self-concept may buffer aggression or other forms of antisocial behavior (Barriga et al. 2000), which are further connected to early and risk-taking sexual behaviors (Boislard P & Poulin 2011, Epstein et al. 2014, Ramrakha et al. 2007, Schofield et al. 2008). Parental depression is connected to insensitive and non-responsive parenting, and may lead to low attachment security, which predisposes to adolescent depression and risk-taking sexual behavior (Ainsworth et al. 1978, Santona et al. 2015).

2.2.3.3 Social learning theory

Bandura's social learning theory (1971) emphasizes the role of cognition and the active role of children in their own development and social learning. Thus, most of the learning occurs from observation of other people as reciprocal determinism between child and social environment. Perceptual and cognitive factors are mediators between social variables and future behavior, and a stimulus, such as an environmental event, must be perceived before being coded into memory as cognition (Bandura 2001, Walters 2015). A number of cognitive and emotional factors mediate the association between parenting practices and delinquency. Simons et al. (2016) suggested that the effects of parental monitoring and parental hostility/rejection on conduct problems and deviant peer networks to be mediated by low self-control, hostile perceptions of relationships, and acceptance of deviant norms.

According to social learning theory, learning from peers and parents leads to imitation of their behavior (Bandura 1971). For example, an adolescent learns antisocial behavior from parents and peers, and inept parenting practices reinforce coercive behaviors, which in turn lead to rejection by the normal peer group. Deviant peer networks are a major training ground for delinquent behaviors (Coie & Kupersmidt 1983, Dodge 1983, Hirschi 1969). Also, caregiver's risk-taking sexual

behavior is related to adolescent's risk-taking sexual behavior via social learning mechanisms (Brakefield et al. 2012).

Perceived self-efficacy is also one of Bandura's constructs to describe a person's beliefs about how effectively s/he is able to control his/her own behavior and emotions in order to achieve a desired goal (Bandura 1994, 1997). Adolescents with low self-efficacy for affect regulation are more likely to engage in delinquency or risk-taking sexual behaviors due to the fact that feeling incapable of regulating their own behavior undermines their ability resist negative peer pressures (Bandura 1971, Siegler et al. 2010).

2.2.3.4 Social control theory

Social control theory by Hirschi (1969) suggests that children assimilate parents' norms and values. Thus parents or other primary social bonds are the main source of learning to control behavior, and school and other aspects of society also serve to diminish susceptibility to deviant behaviors (Hirschi 1969). While other theories seek to explain why deviant behaviors occur, social control theory seeks to explain why one refrains from offending (Akers & Sellers 2004). Maintaining the social bonds is the primary way to avoid criminality. Hirschi (1969) posits that these bonds are based on four aspects of social control: attachment to family and other social relations; commitment to activities in which time and energy have been invested; involvement in activities that serve to engage one more with others, thus leaving less time to become involved in deviant activities; and belief in wider social values. Insecure attachment style may lead to hostility towards parents causing adolescents to discard conventional norms and engage in delinquent behaviors (Allen et al. 1998, Hirschi 1969). Also, alienation from society impairs conformity with social norms, thus increasing delinquency (Hirschi 1969). Supportive parenting is connected to discarding deviant norms, such as risk-taking sexual behaviors.

2.2.3.5 Self-control theory

Self-control theory, widely known as the general theory of crime, is an extension of social control theory proposed by Gottfredson and Hirschi (1990), and can also be seen as appropriate for explaining adolescent's risk-taking sexual behavior. While social control theory posits social bonds as the main factor protecting against criminal involvement, self-control theory holds low self-control as a key factor of

criminality and non-criminal problem behaviors. Hence, it focuses on internalized control rather than social control. According to self-control theory, the origins of self-control lie in family socialization. Thus, inadequate care and punishments in a family may lead to low self-control. Parental rearing behavior mediates the effect of other family factors, such as single parenthood and neglect and the other factors of self-control leading to delinquent or analogous behavior. That is, the effect of parenting on deviance is mediated by self-control. Also, impulsiveness and sensation-seeking being forms of low self-control may lead to risk-taking sexual behavior. (Gottfredson & Hirschi 1990)

2.2.3.6 Summary of the theories

Theoretical frameworks posit parenting and family factors as a main source of adolescent maladjustment and the development of risk-taking behaviors. Most of these theories suggest mental disorders, especially externalizing problems, to be mediators between parenting and adolescent risk-taking sexual behaviors. Problem behavior theory focuses on the accumulation of various problems rather than reasoning the co-occurrence of these (Jessor & Jessor 1977). Attachment theory emphasizes early experiences (Bowlby 1969, 1973). The theory proposes that secure attachment style reduces early and risk-taking sexual behaviors via better mental health and social skills (De Vries et al. 2016, Kotchick et al. 2001, Siegler et al. 2010). Social learning theory views adolescents' behavior as imitation of parents and peers, who are also significant mediators of delinquency in social control theory (Bandura 1971, Hirschi 1969). The latter, together with self-control theory, focus on the development of delinquency, which can further serve as a mediator of risk-taking sexual behaviors (Schofield et al. 2008, TenEyck & Barnes 2015, Tubman et al. 1996).

2.3 Sexual behavior, mental health, and mental disorders

Mental health is defined by WHO as *"a state of well-being in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community."* (World Health Organization 2014). Some severe psychiatric disorders especially have genetic background. However, the environment where the child is raised mainly determines whether the gene is expressed or not (Puura & Laukkanen 2016). The base for mental

health is formed in childhood. There is evidence from studies conducted on adults that the roots of mental disorders typically lie way back, either in childhood or adolescence (Kessler et al. 2005). Poor parenting practices and insecure attachment place an adolescent at risk for both mental disorders and risk-taking sexual behaviors (de Kemp et al. 2006, DiClemente et al. 2001b, Hui Yap et al. 2014, Markham et al. 2010, McCauley et al. 2016, Meschke et al. 2002, Moffitt et al. 2002, Wight et al. 2006).

Mental disorders can further be divided into internalizing and externalizing problems (Leadbeater et al. 1999). Internalizing problems generally involve mood disorders, whereas externalizing problems refer to dysregulation in behavior (Graber et al. 2004). However, this distinction is not always clear and comorbidity between internalizing and externalizing disorders is relatively common (Angold & Costello 1993, Graber et al. 2004, Leadbeater et al. 1999). Both early and risk-taking sexual behaviors are connected to both internalizing and externalizing disorders (Hallfors et al. 2004, 2005). Early sexual activity is twice as likely among internalizing adolescents and five times more likely among externalizing adolescents, compared to others (Donenberg et al. 2011).

The timing of puberty and the bodily changes have important implications for mental health and sexuality. Adolescents reporting early puberty tend to engage more in sexual intercourse and are prone to risk-taking sexual behavior (Baams et al. 2015, Copeland et al. 2010, Edgardh 2000, 2002; Kaltiala-Heino et al. 2003a, Michaud et al. 2006, Phinney et al. 1990). Early sexual initiation precedes subsequent risk-taking sexual behaviors (Sandfort et al. 2008, Wellings et al. 2001). For both sexes, early puberty also increases the risk of psychosocial problems (Copeland et al. 2010; Kaltiala-Heino et al. 2003b, 2011; Michaud et al. 2006), and it has been explained as achieving physical maturity before emotional maturity (Ge et al. 2003). In puberty sex hormones stimulate sexual drive, which in turn has an effect on behavior, also acting out, and on parental and peer relations (Cameron 2004, Kaltiala-Heino et al. 2003b, Michaud et al. 2006). Also, stress may have an effect on pubertal timing (Wierson & Long 1993). Body image, constantly changing in adolescence, shares common correlates with self-esteem and mental health making assessment of pubertal timing on the occurrence of psychopathology even more complicated (Kaltiala-Heino et al. 2003a, Michaud et al. 2006). Since puberty is about developing sexual maturity and age at pubertal timing is gradually lowering in Western countries (Brix et al. 2019, Sørensen et al. 2012) it could be expected that adolescents are emotionally able for sexual debut all the earlier. However, mental disorders and problems seem to remain intact despite the lowering of pubertal timing (Mendle et

al. 2007). Thus there is a growing length of time, a maturational gap, for an adolescent between biological maturation and achievement of adult social status (Michaud et al. 2006, Moffitt 1993). Moreover, this mismatch is more marked in early maturing adolescents, placing them at a greater risk for mental health and behavioral problems, whose effect can last at the very least until early adulthood (Michaud et al. 2006). Also, it is known that late puberty is connected to poorer psychosocial adjustment and both internalizing and externalizing mental disorders, especially among boys (Graber 2013, Kaltiala-Heino et al. 2003a, Mendle & Ferrero 2012, Negriff & Susman 2011, Negriff et al. 2011, Nottelmann et al. 1987).

2.3.1 Family-related factors

Adolescents' social domain includes parents, peers, siblings, teachers and other school workers. Because nearly every adolescent, at least early and middle adolescent, has lived with either one or two parents since birth, and not everyone has siblings, parent-adolescent dyads are the main focus of this chapter. The associations between parenting and development of mental disorders are dealt within the later chapters.

Research on adolescence has utilized many different concepts of parenting and family variables. Widely used concepts have been parental monitoring, parent-child relationship quality, parental behavioral management, and parent-adolescent communication. Significantly, parenting is influenced by contextual factors, such as culture, socioeconomic status and neighborhood context (Jo & Zhang 2014, Kotchick & Forehand 2002), and research has accounted for these factors in various ways. Parental involvement has been defined as parents' active role in children's lives, such as in social and academic aspects (Pearson et al. 2006). Research has suggested perceived parental knowledge to decrease across adolescence (Laird et al. 2003), probably as a part of normative developmental sequence in which adolescents disclose themselves more to peers than parents.

Attachment style is connected to the peer networks an adolescent spends time in (Benson et al. 2006, Warr 1993). Parents being the main source of emotion regulation in childhood, those representations of relationships also shape the way one deals with emotions in adolescent relationships, such as friendships (Bowlby 1973). Insecurely attached adolescents spend greater amounts of time in unsupervised peer settings and less time in parental company (Kerr & Stattin 2000).

Adolescents experiencing multiple contextual risks, such as prenatal alcohol exposure, poverty, or single parenthood, during early development become most

vulnerable (Mason et al. 2016). A large Finnish longitudinal study found that such cumulative contextual risk at birth results in positive associations with conduct disorder, substance abuse, and in girls also risk-taking sexual behavior in middle adolescence (Mason et al. 2016). Their findings concur with the problem behavior theory suggesting the co-occurrence of adolescent problem behaviors to be due to a common latent factor (Jessor & Jessor 1977). Early exposure to cumulative risk factors may even accelerate pubertal development (Belsky et al. 2010), and since early maturation is a risk factor for early sexual activity and risk-taking sexual behavior (Copeland et al. 2010, Michaud et al. 2006, Phinney et al. 1990, Savolainen et al. 2015) it is possible that part of the explanation for the specific effect of cumulative risk on risk-taking sexual behavior lies in this process (Mason et al. 2016).

The divorce rate has about doubled during the past fifty years both in the USA and in Finland (Schor 2003, Statistics Finland 2016, US Census Bureau 2012), causing a disruptive stressor in adolescents' lives. In the last thirty years the number of divorces has remained relatively stable in Finland, but Finland's divorce rate was among the highest in the European Union in the 2000s (Statistics Finland 2016). Children who have experienced parental divorce tend to suffer more from emotional and behavioral problems and difficulties in parent-child relationships (Kelly 2000, Robbers et al. 2012).

2.3.2 Sexual behavior and family-related factors

Family can influence adolescent sexual behavior through e.g. acceptability, communication or parental monitoring, in keeping with the social control theory (Bersamin et al. 2008, Kotchick et al. 2001, Miller 2002). Parental disapproval of adolescent sexual behavior has been connected to decreased rates of sexual intercourse (Dittus & Jaccard 2000, McNeely et al. 2002), perhaps due to shared values. Also, more family rules about dating are associated with less likelihood of experiencing sexual intercourse until middle adolescence (Ethier et al. 2016). Low parental monitoring, but also excessive parental control, are connected to early sexual activity, multiple partners, and less condom use, while higher levels of parental monitoring are deemed protective (DiClemente et al. 2001b, Kalina et al. 2013, Markham et al. 2010, Meschke et al. 2002, Wight et al. 2006). Cohen et al. (2002) found that US adolescents spending time alone at home with less supervision are more likely to be sexually active than their peers. Also, among boys more unsupervised time also correlated with higher number of sexual partners. These

findings suggest authoritative parenting style to have a positive influence, whereas authoritarian or permissive styles are rather of negative.

A meta-analysis of parenting and adolescent sexual behavior found that greater parental knowledge was associated with lower probability of sexual initiation, and increased condom and other contraceptive use (Dittus et al. 2015). Also, greater parental knowledge is associated with postponing first sexual intercourse and fewer risk-taking sexual behaviors (Coley et al. 2009, Ethier et al. 2016, McCauley et al. 2016, Stanton et al. 2000).

Positive and open parent-adolescent communication is connected to postponing sexual debut (Madkour et al. 2010, Rai et al. 2003), and fewer risk-taking sexual behaviors, such as greater use of contraceptives (DiClemente et al. 2001a, Stanton et al. 2002, Wang et al. 2013). Family connectedness and good parent-adolescent relationship, especially mother-daughter relationship among depressed girls, protect against early sexual debut and risk-taking sexual behaviors (Deptula et al. 2010, Markham et al. 2010, Nogueira Avelar e Silva et al. 2016, Rink et al. 2007, van de Bongardt et al. 2014). Van de Bongardt et al. (2014) found that frequent parent-adolescent sexual communication reduced the effect of sexually active friends and peer pressures regarding intentions to have sex. Thus, parenting behaviors can also act as moderators between adolescent and peers.

Lyerly et al. (2013) found in their large cross-sectional study on middle and late adolescents that adolescents experiencing family conflicts, such as family members often fighting or criticizing each other, were more likely to have neglected contraception at last intercourse, and to have had two or more sexual partners during the past year. Socioeconomic disadvantage is related to more parent-adolescent conflicts (Smetana et al. 2006). Also, low family socioeconomic status is associated with early sexual activity and risk-taking sexual behaviors (Blum et al. 2000, Boislard P & Poulin 2011, Kotchick et al. 2001, Madkour et al. 2010, Miller et al. 2001, Wight et al. 2006).

Both parental and adolescent educational attainments being at low levels are independently connected to early sexual debut and risk-taking sexual behaviors (Bailey et al. 2008, Cavazos-Rehg et al. 2010, de Looze et al. 2012). Low level of parental education suggests having children with low educational attainment, e.g. many of teenage mothers are themselves born to adolescent parents, and a history of poor academic performance exists (Klein 2005, Upchurch & McCarthy 1990). High level of parental education, social support, and adolescent's own future plans including high-level education are connected to postponing first sexual intercourse (Valle et al. 2009).

Living in a one-parent family compared to two-parent household increases the risk for early sexual debut and risk-taking sexual behaviors (Oman et al. 2005, Santelli et al. 2000, White & Warner 2015, Young et al. 1991). Shared physical custody has been appraised to afford greater protection against early sexual debut compared to single parenthood (Carlsund et al. 2013). Parental separation is associated with adolescent early sexual intercourse (Miller et al. 2001, Zimmer-Gembeck & Helfand 2008), and Waldron et al. (2015) found this association to persist when parental alcoholism was controlled for.

Social learning theory suggests that imitation of others is more likely to occur when a model is powerful, nurturing, and shares similar characteristics (Bandura 1971). Hence, parents, peers, but also siblings may have an important influence on adolescent sexual behavior (McHale et al. 2009, Wheeler et al. 2016). Wheeler et al. (2016) found in their medium sized longitudinal study that older siblings' involvement in a dating relationship or marriage increased the likelihood for younger siblings' relationship experiences thereafter.

Associations between parenting practices or parent-adolescent relationship and adolescent sexual behaviors are relatively well documented (Markham et al. 2003, Miller et al. 2001). Nonetheless, research on the mediating factors between parent-adolescent relationship quality and risk-taking sexual behaviors is rather scarce, although mental disorders offer a potential link (de Kemp et al. 2006, DiClemente et al. 2001b, Hui Yap et al. 2014, Markham et al. 2010, McCauley et al. 2016, Meschke et al. 2002, Moffitt et al. 2002, Wight et al. 2006). Kahn et al. (2015) found delay discounting to be a mediating factor among adolescents with low levels of self-control. Delay discounting is suggested to be one of the factors driving into impulsive decision-making (Madden & Bickel 2010), and occurs in such situations in which one places less value on a reward due to a delay in achieving it. Moreover, one potential mediating factor is the adolescent's locus of control, which is largely derived from parents and peers. Adolescents with an internal locus of control feel responsible for the consequences of their own behavior, whereas those with external locus of control explain the effects of their own behavior as chance or circumstances beyond their control (Ahlin & Lobo Antunes 2015). Moreover, internal locus of control is associated with positive behaviors and external locus with negative, such as violence or other risk-taking behaviors (Ahlin 2014).

2.3.3 Internalizing disorders

There is a lifetime peak for onset of internalizing psychopathology, including depression, anxiety, bipolar disorder and eating disorders in adolescence (Häfner et al. 1989, Kessler et al. 2005). Adolescent depression has even been considered a global health concern since there is a remarkable rise in prevalence when moving from childhood to adolescence. Hence, depression being one of the most common internalizing disorders in adolescence, the main focus of this chapter is on depression.

The association between adolescent depression and stressful life events is well established (Evans et al. 2015). Especially relevant to developing depressive symptoms are events in the interpersonal domain (Herres & Kobak 2015, Nicolai et al. 2013). Higher levels of parental support may decrease adolescent depressive symptoms through attenuation of negative effects of stress (Cohen & Wills 1985). Similarly, family cohesion and maternal support buffer against depressive symptoms (Anderson et al. 2015, Rubin et al. 1992). Conversely, inadequate parenting and poor parent-adolescent relationship quality are risk factors for adolescent depression (Fröjd et al. 2007, Schwartz et al. 2012, Yu et al. 2006). Difficulties in parent-adolescent communication are more common among depressed adolescents (Fletcher 2004, Fröjd et al. 2007, Schwartz et al. 2012, Stanton et al. 2000, Yu et al. 2006), and those adolescents also perceive parental monitoring to be at lower levels than do non-depressed adolescents (Yu et al. 2006). Adolescents whose parents know their friends and whereabouts suffer less from depressive symptoms (Fröjd et al. 2007, Hamza & Willoughby 2011).

Depression prevalence is less than 3% among children (<13 years) (Costello et al. 2006, Egger & Angold 2006, Wichstrøm et al. 2012) but up to 12 % in adolescents when using structured diagnostic interviews (Costello et al. 2006) and even somewhat higher, up to 15%, according to various depression self-rating scales (Connelly & Johnston 1993, Ehrenberg et al. 1990, Olsson & von Knorring 1997). Depression prevalence among adolescent girls is almost twice that among boys (Angold et al. 1998, Patton et al. 2014), and past depressive symptoms are a strong predictor for current depressive symptoms (Tram & Cole 2006). Also, girls carry a greater risk for recurrent depressive episodes in young adulthood (Patton et al. 2014). One reason for greater depression prevalence during adolescence, and especially in girls, may be the pubertal changes related to sex hormones (Forbes & Dahl 2010). Depression may cluster in families (Beardslee et al. 1996, Merikangas et al. 1988, Pilowsky et al. 2008), and parental depressive symptoms can be used as a predictor

for adolescent depressive symptoms (Mason et al. 2017). Depressive symptoms in adolescence are connected to multiple other health-related outcomes, such as substance abuse, antisocial behavior, and more frequent health service use (Rice et al. 2007).

Children who have lost a parent to death have lower self-confidence and suffer more often from posttraumatic stress disorder than their peers (Boelen & Spuij 2013, Mack 2001). Psychopathology may differ between adolescents with a history of either parental divorce or parental death because family difficulties more commonly precede parental divorce than parental death (Bachar et al. 1997). Tebeka et al. (2016) found in their large, over 43,000 U.S. adults covering cross-sectional study, that 70% of those with a history of parental divorce reported a psychiatric disorder after age 17, whereas those with a history of parental death did not report more mental disorders than their peers.

2.3.4 Sexual behavior and internalizing disorders

Some outcomes of adolescent sexual behavior, such as unintended pregnancies and sexually transmitted infections, may lead directly to depressive symptoms, whereas sexual behavior in general is likely to affect development of depression via cognitive meaning-making processes. Thus the events themselves are probably not associated with mental health, but cognitive theories of depression suggest that it does matter how one perceives and evaluates these events (Abramson et al. 1989, Beck 1987, Kovacs & Beck 1978, Oatley & Bolton 1985). Vasilienko et al. (2014) found that evaluating own sexual behavior negatively and feeling guilt or shame can lead to depressive symptoms. Thus cultural norms or attaching different meanings to adolescent sexual behaviors at different ages may influence the interpretation of own behaviors (Vasilenko & Lanza 2014). For instance, sexual activity in advance of peers may be associated with depressive symptoms, whereas sexual activity in late adolescence may have more positive consequences due to more tolerant environments (Arnett 2000, Lefkowitz 2005, Meier 2007).

Romantic involvement in adolescence can be seen as a developmental task (Seiffge-Krenke 2003, Waylen & Wolke 2004). However, such a relational stressor, especially in personal relationships, may also trigger mental disorders (Exner-Cortens et al. 2013, Joyner & Udry 2000). Incongruence between feelings and actions in relationships influences adolescent mental health (Impett et al. 2008, Soller 2014). When this kind of relationship inauthenticity occurs, girls are at especially greater

risk for depression and suicidal thoughts and attempts (Soller 2014). Romantic involvement increases the risk for early sexual intercourse, but it can also disrupt peer and parent-child relationships and increase the risk for depression due to break ups, rejection and dating violence (Exner-Cortens et al. 2013, Joyner & Udry 2000, Monroe et al. 1999).

Dating in adolescence is associated with both concurrent and subsequent depressive symptoms, especially in girls (Davila et al. 2004, Joyner & Udry 2000, Quatman et al. 2001). Anderson et al. (2015) found in their medium sized longitudinal study that stress related to romantic relationships is linked to higher levels of depressive symptoms and that maternal support moderates this association for both sexes. They found that romantic stress in middle adolescence was associated with both concurrent and subsequent depressive symptoms in late adolescence (Anderson et al. 2015). Higher levels of maternal and paternal support in middle adolescence decreased the likelihood for both concurrent and subsequent depressive symptoms in late adolescence (Anderson et al. 2015).

Large cross-sectional studies suggest an association between internalizing disorders and reporting early puberty by girls and either early or late puberty by boys (Graber et al. 1997, Kaltiala-Heino et al. 2003a, Michaud et al. 2006). Early puberty is associated with early sexual activity (Copeland et al. 2010; Edgardh 2000, 2002; Kaltiala-Heino et al. 2003a, Michaud et al. 2006, Phinney et al. 1990). Both early puberty and early sexual activity are connected to internalizing problems, such as depression and eating disorders (Kaltiala-Heino et al. 2001, 2003b,a; Ruuska et al. 2003), and these findings persisted when pubertal timing, likely affecting both sexual behavior and mental health, was controlled for. Thus advanced sexual behavior in middle adolescence is suggestive of internalizing disorders (Kaltiala-Heino et al. 2003a). Since depression is increasing in prevalence among the youngest age cohorts (Leon et al. 1993, Prosser & McArdle 1996), research has suggested earlier pubertal timing to be a contributing factor (Kaltiala-Heino et al. 2003a). Kaltiala-Heino et al. (2003a) found support for the social model for interpreting the impact of puberty development on depression. Going through pubertal changes without support from peers in a similar situation places an adolescent in a highly stressful situation, thus predisposing to depression (Kaltiala-Heino et al. 2003a). On the contrary, Stattin & Magnusson (1990) have suggested early maturation to be protective in terms of psychosocial adjustment.

Sexual activity in early and middle adolescence is connected to depressive symptoms and disorders and suicidal ideation (Hallfors et al. 2004, 2005; Heidmets et al. 2010, Jamieson & Wade 2011, Kaltiala-Heino et al. 2003a, Kosunen et al. 2003,

Oshri et al. 2011, Valle et al. 2009, Vasilenko 2017). Vasilenko (2017) found in her large longitudinal study that sexual activity is associated with increases in subsequent depressive symptoms in adolescents, especially girls, but this association grows weaker towards adulthood (Vasilenko 2017). However, consensus is lacking as to whether depression predicts early sexual activity or is a consequence of it (Davila et al. 2009, Hallfors et al. 2005, Jamieson & Wade 2011, Lehrer et al. 2006, Wickrama & Wickrama 2010). Depressed adolescents may engage in intimate sexual relationships before being emotionally mature for it in an attempt to seek support and closeness. On the other hand, early sexual activity without sufficient capacity to deal with the emotions related to the experience may expose adolescents to depression, especially if the sexual experience has occurred under external pressures (Kaltiala-Heino et al. 2003a, Kosunen et al. 2003).

Moreover, risk-taking sexual behavior has been connected to depression throughout adolescence (Hallfors et al. 2004, 2005; Lehrer et al. 2006, Mazzaferro et al. 2006, Ramrakha et al. 2000, Rubin et al. 2009, Vasilenko & Lanza 2014). Vasilenko et al. (2014) found that having multiple sexual partners for intercourse was significantly associated with depressive symptoms until age 28 for females and age 18 for males. Nevertheless, different pathways are also true in the case of risk-taking sexual behavior. Depressed adolescents may have less motivation to protect themselves or seek intimacy (with multiple partners) to alleviate distress, and thus depression may be followed by risk-taking sexual behaviors (Wickrama & Wickrama 2010). Sexual risk taking may also lead to later regrets and hence depression as a consequence (Kaltiala-Heino et al. 2015).

2.3.5 Externalizing disorders

The externalizing behaviors addressed here are conduct disorder and antisocial behavior, which can be further divided into aggressive and delinquent behavior. The main focus is on delinquent behavior, which is also a key element of conduct disorder even by definition (Capaldi et al. 1996, Diagnostic and statistical manual of mental disorders (5th ed.) 2013, The ICD-10 classification of mental and behavioural disorders: Clinical descriptions and diagnostic guidelines. 1992). Many of the externalizing disorders rise in prevalence in adolescence, and problem behaviors start to cumulate (Donovan & Jessor 1985, Jessor & Jessor 1977, McGee & Newcomb 1992). Conduct disorders are typically become more common in early adolescence (Merikangas et al. 2009). Traces of antisocial behavior, especially aggressive behavior,

often derive from early life and continue to adolescence and adulthood (Fergusson et al. 2005, Patterson et al. 1989, Stanger et al. 1997). Delinquent behavior rises in prevalence until nearly late adolescence (Stanger et al. 1997). Delinquency is associated with multiple problems, such as substance abuse, academic failure, poor economic outcomes and a history of peer violent victimization (Abram et al. 2003, Carroll et al. 2009, Fazel et al. 2008, Healey et al. 2004, Jackson et al. 2013, Mun et al. 2008, Patterson et al. 1989). Boys are involved in antisocial behavior and suffer from conduct disorders more often than girls (Merikangas et al. 2009, Moffitt et al. 2001, Zheng & Cleveland 2013). However, the sex difference has been contradicted, and suggested to derive from the process used to generate and validate the diagnostic criteria largely on male samples, thus sex difference is an artifact of this process (Moffitt et al. 2008).

Moreover, many classifications of adolescent psychopathology make a distinction between aggressive and delinquent behaviors, because they are distinct at the etiological level. Genetic influence plays a greater role in the development of aggressive behavior, whereas environmental or social influences are suggested to be of greater importance for delinquent behavior (Edelbrock et al. 1995, Eley et al. 2003, Tackett et al. 2005). The etiology of delinquency is not so straightforward. Adolescent-onset delinquency is suggested to be triggered when experiencing the maturational gap between early biological maturation and achievement of adult status (Moffitt 1993). A way of coping with the discomfort of the maturational gap is involvement in a social reference group consisting of peers already involved in delinquent behaviors (Moffitt 1993). Deviant peer networks are major training grounds for antisocial and delinquent behaviors (Coie & Kupersmidt 1983, Dishion & Tipsord 2011, Dodge 1983, Hirschi 1969, Tubman et al. 1996).

Winnicott (1984) has suggested that deprivation is the root cause of antisocial tendency and delinquency. Even a minor deprivation may have lasting and severe effects if it occurs at a critical time. Having a group of peers is normative in adolescence, but membership of an antisocial group is suggested to compensate a deprived adolescent's deficiencies. Pathological groups are typically characterized by one strong leader acting on behalf of the whole group. (Winnicott 1984) Social control theory suggests that deviant peers have less influence over securely attached adolescents (Hirschi 1969) due to parental disapproval or active regulation to avoid undesirable (Warr 1993). Distant relations with parents or parental rejection may lead to abandoning commitment to conventional values according to social control theory (Hirschi 1969). Consequently, these adolescents are likely to associate with peers who also have discarded conventional norms, because research suggests that

adolescents select peers phenotypically similar to themselves (McPherson et al. 2001, TenEyck & Barnes 2015). Exposure to delinquent peers is thus one of the strongest predictors of adolescent delinquency (Brook et al. 1986, Connolly et al. 2015, Elliott et al. 1985, Hawkins et al. 1992).

Despite the remarkable strength of peer relationships as an explanatory correlate of delinquency, family and parental factors are of unique importance in adolescent delinquency throughout adolescence (Laursen & Collins 2009). Secure attachment style is connected to more adolescent self-disclosure (Keelan et al. 1998), which contributes to greater parental knowledge (Kerr & Stattin 2000). Insecure attachment may lead to less self-disclosure and parental monitoring (Branstetter et al. 2009). Moreover, insecure attachment may cause hostility toward parents, thus leading to rejection of conventional norms and delinquent behavior (Allen et al. 1998, Hirschi 1969). Low self-esteem can also be seen as a root for delinquency. Ties with society are weakened by low self-esteem (Rosenberg 1965), and alienation from society decreases conformity with social norms, thus exacerbating delinquency (Hirschi 1969). Jo et al. (2014) found parenting to have an indirect effect on adolescent delinquency via self-control, according to self-control theory (Gottfredson & Hirschi 1990).

Higher levels of perceived parental knowledge and parental monitoring are connected to less delinquency in adolescence (Abar et al. 2014, Barnes et al. 2000, Dishion & McMahon 1998, Patterson 1986, Pettit et al. 1999, Stattin & Kerr 2000). However, Rekker et al. (2017) reported that high levels of parental control actually increased rates of delinquency in adolescents with low socioeconomic status. Although many have assumed parental knowledge to be a predictor of adolescent outcomes (Pardini 2008, Pardini et al. 2008), some have assessed bidirectional relations. Williams & Steinberg (2011) found that previously high perceived parental knowledge was associated with subsequent low rates of delinquency, whereas high earlier delinquency was associated with low subsequent knowledge. Abar et al. (2014) in their large longitudinal study found bidirectional short-term associations between parental knowledge and delinquency. They hypothesized that adolescent delinquency may lead to parents seeking to increase their knowledge in response to adolescent risk-taking. Conversely, the association of parental knowledge with adolescent delinquency may represent autonomy-granting parenting implying parents reducing acquisition of knowledge in response to appropriate adolescent behaviors (Abar et al. 2014). Pardini et al. (2008) found poor parenting practices, such as physical punishment, to be predictors of adolescent conduct problems, and also the other way round, severe adolescent conduct problems were predictive of poor parenting.

Walters et al. (2013) found in their medium sized longitudinal study that delinquency in middle adolescence is associated with crime in young adulthood and that this association was mediated by parental involvement in late adolescence and moderated by sex. Hence parental involvement correlates negatively with both delinquency and crime, and the effect of parental involvement is still salient in late adolescence (Walters 2013).

Overall, moderating or mediating factors between family processes, such as parental knowledge and attachment style and delinquent behavior are suggested to be deviant peers, self-control, parent-adolescent relationship quality, and parental monitoring (Abar et al. 2014, De Vries et al. 2016, Jo & Zhang 2014, Patterson 1997). Poor parent-adolescent relationship quality may lead to adolescent's withdrawal from parents, which may partly encourage the shift towards deviant peer networks (Dishion & Patterson 2006, Dishion et al. 2004, Dodge et al. 2006).

2.3.6 Sexual behavior and externalizing disorders

Similarly to internalizing disorders, externalizing disorders are more common among early maturing girls and either early or late maturing boys according to large cross-sectional studies (Graber et al. 1997, 2004; Kaltiala-Heino et al. 2003a, Michaud et al. 2006). Early puberty and early sexual activity are associated with conduct disorder, delinquency, and substance use (Copeland et al. 2010, Graber 2013, Kaltiala-Heino et al. 2011, Negriff & Susman 2011, Tapert et al. 2001, Wymbs et al. 2013). Negriff et al. (2011) suggested that the association between early maturation and delinquency may follow from a need to gain a social status comparable to one's physical development. They also found peer delinquency to be a moderator in this association in both sexes. Copeland et al. (2010) conducted a longitudinal study examining associations between early puberty and externalization and found that in young adulthood most of these associations had attenuated. However, reporting multiple sexual partners remained significantly associated with early puberty through adolescence into young adulthood (Copeland et al. 2010).

Research has established connections between delinquency/antisocial behavior/conduct disorder and early or risk-taking sexual behavior in adolescence (Bingham & Crockett 1996, Capaldi et al. 1996, Donenberg et al. 2011, Farrell et al. 1992, Harakeh et al. 2012, Kaltiala-Heino et al. 2015, Kotchick et al. 2001, Ramrakha et al. 2000, Tubman et al. 1996). Only a few studies (e.g. Scaramella et al. (1998), Devine et al. (1993)) explore the connection between delinquency and sexual

behaviors among late adolescents and the majority has focused on either early or middle adolescence. Nevertheless, since delinquency and risk-taking sexual behavior are both driven by pronounced impulsivity and sensation-seeking (Kotchick et al. 2001) the association is likely to persist in late adolescence and even in early adulthood.

Early age of sexual initiation precedes subsequent risk-taking sexual behaviors (Sandfort et al. 2008, Wellings et al. 2001). Conduct disorder, aggressive behavior, and delinquent behavior have been shown to be predictors of both early sexual activity and subsequent risk-taking sexual behavior (Anderson et al. 2017, Boislard P & Poulin 2011, Epstein et al. 2014, Ramrakha et al. 2007, Samek et al. 2014, Schofield et al. 2008). Also, alcohol and marijuana use are suggested to be independent predictors of risk-taking sexual behaviors in spite of conduct disorder across adolescence (Brooks Holliday et al. 2017). Low levels of self-regulation in childhood predict both early and risk-taking sexual behavior in middle adolescence (Crockett et al. 2006). Together, it has been suggested that the association between early sexual activity and later risk-taking sexual behavior is not causal but exists due to common genetic and environmental factors and general tendency to externalizing behaviors and impulsivity (Boislard P & Poulin 2011, Cooper et al. 2003, Donahue et al. 2013, Donohew et al. 2000, Huibregtse et al. 2011, Kahn et al. 2002, Samek et al. 2014).

Mediating factors between conduct disorder and early or risk-taking sexual activity are suggested to be school maladjustment, antisocial activity, substance abuse, and deviant peers, in keeping with problem behavior theory (Anderson et al. 2017, Jessor 1991, Moffitt 1993, Schofield et al. 2008, Tubman et al. 1996). High levels of externalizing behaviors in childhood predict school maladjustment in the elementary years (Moffitt 1993), whereas academic engagement, connection with peers and teachers, and extracurricular activities reduce the risk for early sexual activity (Kotchick et al. 2001).

Different manifestations of aggression as a symptom of conduct disorder have been suggested to exist between sexes. Crick & Zahn-Waxler (2003) hypothesized, that the key concern of childhood and adolescence is physical dominance for boys and formation of close relationships for girls. Thus boys suffering from conduct disorders engage in physical aggression, whereas girls engage in relational aggression, for instance attempts to damage interpersonal relationships. The latter is suggested to manifest as more risk-taking sexual behaviors in girls than boys (Berkout et al. 2011, Crick & Zahn-Waxler 2003). Accordingly, Brooks Holliday et al. (2017) found multiple sex partners and sex without condom to have a stronger association with

conduct disorder in adolescent girls than in boys. On the other hand, the association between conduct disorder and alcohol and other substance abuse before sex was stronger in adolescent boys in this same medium sized cross-sectional study (Brooks Holliday et al. 2017). Also, dispositional and behavioral traits other than delinquent behavior, such as negative emotionality, may lie behind the progression of risk-taking sexual behaviors in girls (Samek et al. 2014).

2.4 Summary of the literature

Sexuality and sexual maturation are an essential part of adolescent development. Sexual behavior is gradually advancing towards more intimate sexual experiences. It is statistically normative to engage in sexual behavior during late adolescence. On the other hand, in early and middle adolescence sexual activity may rather be problematic. Having experienced sexual intercourse is associated with mental disorders, difficulties at school, and hardships inside the family and other social relationships.

Sexual behavior in adolescence, especially risk-taking sexual behavior, is related to both internalizing and externalizing symptoms and disorders (Hallfors et al. 2004, 2005; Kotchick et al. 2001). Majority of studies indicate, that mental disorders precede subsequent risk-taking sexual behaviors (Anderson et al. 2017, Boislard P & Poulin 2011, Epstein et al. 2014, Ramrakha et al. 2007, Samek et al. 2014, Schofield et al. 2008, Vasilenko & Lanza 2014, Wickrama & Wickrama 2010). Adolescents suffering from mental disorders may lack the skills or motivation to protect themselves, or they seek intimacy or closeness as a way to alleviate emotional distress. In turn, early sexual activity or sexually transmitted infections may trigger mental disorders as a consequence (Hallfors et al. 2005, Shrier et al. 2002), when emotional capability is insufficient to handle these experiences. However, despite the known comorbidity between depression and delinquency (Angold & Costello 1993, Capaldi 1991, Chen & Simons-Morton 2009, Connell & Dishion 2006, Loeber et al. 1994, Wolff & Ollendick 2006) these factors have rarely been scrutinized simultaneously to ascertain if one of them proves to be more significant than the other in adolescent sexual behavior.

Ineffective parenting, such as inter-parental conflicts, poor parental knowledge, and less warmth expressed is connected to both depression and delinquency, but also early and risk-taking sexual behavior in adolescence (de Kemp et al. 2006, DiClemente et al. 2001b, Hui Yap et al. 2014, Markham et al. 2010, McCauley et al.

2016, Meschke et al. 2002, Moffitt et al. 2002, Wight et al. 2006). This kind of parenting is likely to represent either authoritarian or indulgent parenting style rather than authoritative parenting. Additionally, these parenting practices potentially indicate insecure attachment style between adolescent and parent. Yet it remains unclear whether family factors associated with both adolescent mental and sexual health are still significant predictors and related factors when these are assessed simultaneously.

In conclusion, there are some studies accounting for adolescent sexual behavior, mental disorders, and parenting/family background, but mostly separately. Inconsistent study populations have been used and mostly clinical or relatively small study samples. As rapid development and changes occur in adolescence, it is essential to study different phases of adolescence concurrently and using the same statistical methods. Large population-based studies are needed to determine clear outlines and to find the strongest correlates of adolescent sexual behavior. This thesis is based on the Finnish School Health Promotion Study, nationally representative data, and is thus able to address these needs and study all these factors simultaneously.

3 AIMS OF THE STUDY

The objective of this study is to elucidate the mental health and family factors associated with both adolescent sexual behavior and risk-taking sexual behavior. The manifestation of internalizing disorders used is self-reported depression and for externalizing disorders delinquency. Since many of the family factors are connected to adolescent mental health, they are worth studying both separately and concurrently to identify possible differences and modifying associations in relation to adolescent (risk-taking) sexual behavior. This study seeks answers to the following questions:

1. What are the mental health and family factors associated with experience of sexual intercourse in adolescence? Factors studied are self-reported depression (Papers I, II, III, IV), parental involvement (Papers II, IV), delinquency (Papers III, IV), parental education (Paper IV) and family structure (Paper IV).

2. What are the mental health and family factors associated with having five or more partners for sexual intercourse in adolescence? Factors studied are self-reported depression (Papers II, III, IV), parental involvement (Paper II, IV), delinquency (Paper III, IV), parental education (Paper IV) and family structure (Paper IV).

3. What are the key differences between adolescents of different ages? (Papers I-IV)

4. What are the key differences between adolescent girls and boys? (Papers I-IV)

4 MATERIAL AND METHODS

Data from a large cross-sectional School Health Promotion Study from Finland was utilized in the present study.

4.1 The School Health Promotion Study

The School Health Promotion Study is a Finnish nationwide classroom survey conducted yearly since 1995. Adolescents fill in anonymously the self-report questionnaires. Originally, only 14-16-year-old secondary school students responded, but since 2008 responders have also comprised 16-20-year-old upper secondary and vocational school students. Until 2011 the survey was carried out in alternate years in western and eastern parts of Finland and the results of two consecutive years were combined to represent the whole country.

4.1.1 Procedure and subjects

This study utilized the School Health Promotion Study from 2010-2011. All the age groups, 14-20-year-olds were included. The vast majority, ca 99%, of 14-16-year-old adolescents attends secondary school in Finland. Attendance at upper secondary education, where students are normally 16-18 years old, is about 93% because it is no more compulsory education. Students aged 19-20 are not so well represented in the study because they have usually graduated from the schools in which the study is conducted. Students attending school on the study day responded to the survey. Students absent on the survey day (10-15%) were not contacted. Each municipality decides upon participating in the survey, and the majority does. However, there was a slight loss of eligible respondents because not every school participated in the School Health Promotion Study. The final coverage of the 2010-11 SHPS was 80% of all 14-16-year-old secondary school students, 73% of 16-18-year-old upper secondary school students, and 43% of 16-18-year-old vocational school students in the whole of Finland. The total number of respondents was 186,632 of whom 94,154

(50.4%) were girls and 92,478 (49.6%) were boys. Age distributions of the study population are illustrated in Figure 1.

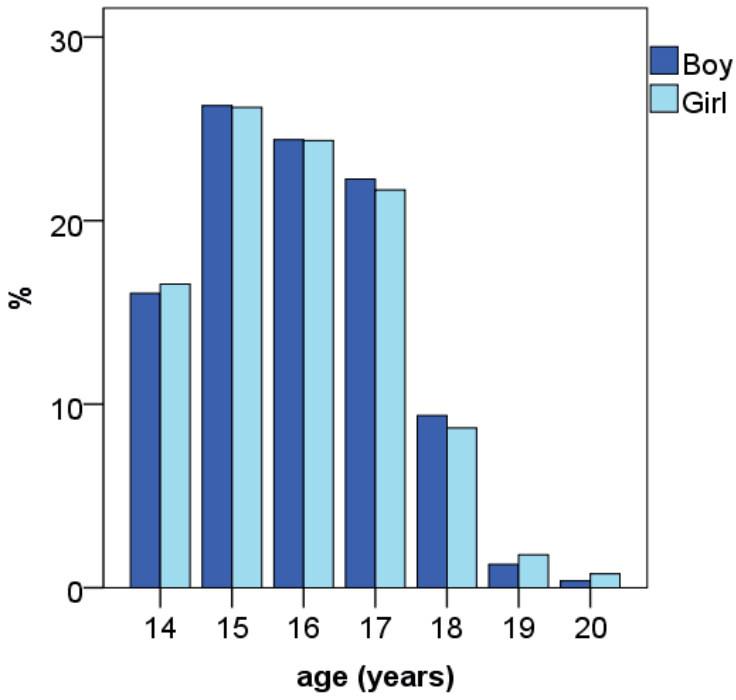

Figure 1. Percentages of different age groups in the study population.

4.1.2 Measures

Self-reported questionnaires were used to evaluate sexual behavior, risk-taking sexual behavior, depression, delinquency, parental involvement, family structure, and parental education reported by adolescents.

4.1.2.1 Sexual behavior (I, II, III, IV)

Sexual behavior is a wide concept including different steps such as dating, kissing, petting, masturbation, or engaging in sexual intercourse. In the research field, sexual activity during adolescence is often plainly defined by whether an adolescent has experienced first intercourse. Intercourse is clinically significant because it enables

pregnancies and sexually transmitted infections. Thus we utilize this measure in our study. Sexual activity was elicited by asking "Have you ever had sexual intercourse?", the response alternatives being either "yes" or "no". In the whole sample (n=186,632) 36.9% of the girls and 32.7% of the boys reported having experienced sexual intercourse.

Only a few studies have tested the reliability or validity of sexual research questions. Reliability of self-reported measures has been examined by repeating an interview at a couple month's interval (Rohan et al. 1994) or comparing a self-report questionnaire and an interview (Davoli et al. 1992). Both ways showed high correlations of young women's reports of age at first sexual intercourse and number of sexual partners (Davoli et al. 1992, Rohan et al. 1994). Finnish adolescents' sexual behaviors have previously been monitored with three different surveys repeated at intervals of a few years and consistency between studies was high. In the absence of unpredictable or illogical variation over time responses can be considered reliable (Kosunen et al. 2000).

4.1.2.2 Risk-taking sexual behavior (I, II, III, IV)

Risk-taking sexual behavior is behavior with negative consequences, such as unintended pregnancies or sexually transmitted diseases. This study utilized number of sexual partners as a measure of risk-taking sexual behavior. According to earlier research, five or more sexual partners can be regarded as risk-taking sexual behavior in adolescence (Kaltiala-Heino et al. 2015). The number of sexual partners was elicited by asking "How many sexual partners have you had sexual intercourse with?", the response alternatives being "one", "two", "three or four", and "five or more". This measure of risk-taking sexual behavior was analyzed as a dichotomized variable, the cutpoint being five or more sexual partners. Among sexually active adolescents (n=65,063), 15.2% of the girls and 16.9% of the boys reported having had intercourse with five or more sexual partners.

4.1.2.3 Self-reported depression (I, II, III, IV)

Self-reported depression was measured with the Finnish version of the 13-item Beck Depression Inventory (R-BDI) (Kaltiala-Heino et al. 1999, Raitasalo 2007). The 13-item BDI has been validated in detecting depression (Beck et al. 1974, Bennett et al. 1997), and the psychometric properties have been shown to be good in the School

Health Promotion Study. The Finnish version has been modified from the original by adding an introductory question and one positive response alternative to each item. The scoring corresponds to the original 13-item inventory (Kaltiala-Heino et al. 1999). Each item is scored 0-3. Thus the maximum score is 39. Adolescents scoring 0-4 were categorized as not depressed, 5-7 as mildly depressed, 8-15 as moderately depressed, and 16+ as severely depressed. As self-reported depression in this study was considered those scoring 8 or more, thus indicating moderate or severe depression. This was the case for 16.9% of the girls, and 7.7% of the boys.

4.1.2.4 Delinquency (III, IV)

Six questions were used to assess delinquency: "During the past 12 months have you 1) drawn tags or graffiti on walls or elsewhere, 2) deliberately damaged or destroyed school property or the school building, 3) deliberately damaged or destroyed other property, 4) stolen from a shop or a stall, 5) been involved in a fight, 6) beaten someone up?" The response alternatives for each question were "no" (=0), "once" (=1), "2-4 times" (=2), and "more than 4 times" (=3). The maximum sum score was 18. A score of 4 or more represented the 90th percentile and was thus used to indicate delinquency. The questions were adopted from the Finnish Self-Report Delinquency Study questionnaire. This is a modified version of the International Self-Report Delinquency Study (ISRD) instrument (Junger-Tas 1994), which has been shown to possess adequate reliability in test–retest studies (Zhang et al. 2000). Of the girls, 6.2%, and of the boys, 12.2% scored above the 90th percentile ($p<0.001$).

The amount of delinquent behaviors differs depending on whether it is reported by adolescent or parent, but in non-clinical samples adolescents tend to report slightly more problem behavior than do parents (Asscher et al. 2014). Hence level of delinquency is best assessed by adolescent self-report in general population samples, whereas reports by parents give more reliable results in juvenile offender samples (Asscher et al. 2014).

4.1.2.5 Parental involvement (II, IV)

Parental involvement in an adolescent's life was elicited with three questions based on which a sum score was formed. The first question was "Do your parents know most of your friends?" with response alternatives "they both know" (coded for the

analyses (=2), "only father knows" (=1), "only mother knows" (=1) and "neither of them knows" (=0)). The second question was "Do your parents know about your whereabouts on Friday and Saturday nights?" with response alternatives "always" (=2), "sometimes" (=1) and "mostly not" (=0). The third question was "Are you able to talk with your parents about matters important to you?" with response alternatives "often" (=3), "fairly often" (=2), "now and then" (=1) and "hardly ever" (=0). Thus, a maximum sum score was 7. Scores 0-3 were categorized as low parental involvement, scores 4-5 as average parental involvement and scores 6-7 as high parental involvement. Of the girls (boys), 17.7% (18.4%) reported low, 44.7% (44.3%) average and 37.6% (37.2%) high parental involvement. As far as we know, no validated method to measure parental involvement has been presented.

4.1.2.6 Family structure (IV)

Family structure was controlled for as a sociodemographic variable in Papers I, II and III. In Paper IV it was used as an independent variable. Family structure was a dichotomized variable: living with mother and father vs. any other family constellation. Of the girls 76.1% and of the boys 77.2% were living with both mother and father.

4.1.2.7 Parental education (IV)

Parental education was controlled for as a sociodemographic variable in Papers I, II and III. In Paper IV it was used as an independent variable. Parental educational level was measured with a question about mother's and father's educational qualifications. The response alternatives were comprehensive school only/ upper secondary or vocational school/ upper secondary or vocational school and further vocational studies/ university or university of applied sciences. Parents' highest educational attainment being comprehensive school was considered low parental education, which was reported by 6.8% of the girls and 5.8% of the boys.

4.1.3 Attrition

Approximately 10-15% of adolescents are absent on any given school day. Thus, no information was available on them. Of the participants, 4,929 (2.6%) did not respond

on experience of intercourse, 31 (0.0%) on the depression scale, 1,230 (0.7%) on parental involvement items, 1,526 (0.8%) on the delinquency scale. Of those who had experienced intercourse, 449 (0.7%) did not report the number of sexual partners. Non-response was more common among boys on experience of intercourse (0.9% vs. 0.4%, $p<0.001$), on parental involvement (3.1% vs. 2.1%, $p<0.001$) and on number of partners (1.0% vs. 0.4%, $p<0.001$) and was also associated with being younger (mean (SD) 16.2 (1.2) vs. 16.3 (1.3), $p<0.001$). Not responding was statistically significantly associated with younger age (in years, mean (sd)): non-response on experience of intercourse 16.2 (1.2) vs. 16.3 (1.3), non-response on depression scale 16.2 (1.3) vs. 16.3 (1.3), non-response on parental involvement 16.1 (1.2) vs. 16.3 (1.3), non-response on number of partners 16.3 (1.3) vs. 16.9 (1.2), all $p<0.001$. Nevertheless, the small amount of missing information is negligible in terms of the subject studied.

4.2 Statistical analyses

Prevalences for experience of sexual intercourse, number of sexual partners, self-reported depression, delinquency, parental involvement, family structure, and parental education were calculated for both girls and boys. Bivariate associations between these measures were examined by cross-tabulations and significance was tested with χ^2 test/ Fisher's exact test where appropriate.

Logistic regression analysis was used for studying multivariate associations, and 95% confidence intervals (CI) were applied to Odds Ratios. For Paper I, Odds Ratios for having experienced sexual intercourse according to self-reported depression, controlling for exact age (as continuous variable), were calculated separately for both boys and girls within each age group. Finally, sociodemographic variables were controlled for.

For Paper II, having experienced sexual intercourse was first entered as dependent variable. Each in turn self-reported depression and parental involvement (high/average/low, using high as reference category) were entered alone as independent variables, and Crude Odds Ratios with 95% confidence intervals (CI) were calculated. Adjusted Odds Ratios (95% CI) were yielded entering those simultaneously. Among those sexually active similar analyses were conducted using number of sexual partners (5 or more / less than 5) as the dependent variable. Finally, sociodemographic variables were controlled for.

For Paper III, Crude Odds Ratios (95% CI) for having experienced sexual intercourse according to delinquency were calculated first. Delinquency was then entered simultaneously with self-reported depression, yielding adjusted Odds Ratios. Among the sexually active similar analyses were conducted using number of sexual partners (5 or more / less than 5) as the dependent variable. Finally, sociodemographic variables were controlled for.

For Paper IV, having experienced sexual intercourse was set first as a dependent variable. In Model 1 delinquency, self-reported depression, and continuous age were entered as independent variables. In Model 2, parental involvement, family structure, parental education, and continuous age were entered as independent variables. In Model 3, both mental health and family variables were entered simultaneously. Secondly, among the sexually active number of sexual partners (5 or more / less than 5) was entered as dependent variable, and the analyses were run. Additionally, for Paper I, a model with gender and its interaction with self-reported depression was developed to measure the differences between boys and girls. In Papers I-III, family structure and parental education were controlled for as sociodemographic variables.

All available data was utilized in all the analyses. Some participants may have occasionally skipped a question, thus there may be slight variation in response numbers in different analyses. All the analyses were run separately for girls and boys. For Papers I, II and III adolescents were classified into yearly age categories (14-20) according to their age calculated from the dates of birth supplied. For instance, 14.00 to 14.99-year-old adolescents were in age group 14. In Papers II and III age groups 19 and 20 were combined due to their smaller size. For Paper IV two age groups were formed according to the average age of reportedly experiencing first sexual intercourse in Finland. On average, girls experience their first sexual intercourse at age 16.5, and boys at age 17.5 (Family Federation of Finland 2017). Thus adolescents aged 14.00–16.99 were in the age group 14-16 (early-to-middle adolescence), and adolescents aged 17.00-20.99 were in the age group 17-20 (middle-to-late adolescence). For Paper I, statistical significance was set at $p<0.05$. For Papers II, III, and IV the limit for statistical significance was set at $p<0.01$ due to the vast data size and to avoid bias due to multiple testing.

4.3 Ethical considerations

The SHPS was granted approval by the ethics committees of Pirkanmaa Hospital District and the National Institute of Health and Welfare. The respondents cannot

be identified from the data. In Finland there has been public debate about children's right to respond to surveys like the SHPS without parental permission. The Finnish ombudsman for children, Maria Kaisa Aula, issued a statement protecting children's rights in 2012. She stated that always requiring active parental permission for each questionnaire-based surveillance is not in keeping with Article 12 of the United Nations Convention on the Rights of the Child and Section 6 of the Finnish Constitution Law. Aula considered most important children's equal opportunities to be able to respond to surveys like the SHPS without parental permission, and thus influence decisions about themselves. (Aula 2012)

4.4 Personal involvement

The author of this thesis discussed the core ideas of the studies presented in the four papers with the research team. The analyses were planned together with a statistician. The author of this thesis interpreted all the results of the statistical analyses and had the main responsibility for writing the manuscripts. She was the corresponding author and had the main responsibility for revising the manuscripts for the journals. She planned and wrote the summary part of the dissertation.

5 RESULTS

In sexual behavior and risk-taking sexual behavior potential associations with self-reported depression, parental involvement, delinquency, family structure, and parental education were examined. Additionally, differences between girls and boys, and between ages, were studied in detail.

5.1 Descriptive statistics

In the whole study population, 36.9% of the girls and 32.7% of the boys had experienced sexual intercourse, and the proportion of those who had experienced intercourse increased linearly from 14 to 20-year-olds among both girls and boys. Moderate or severe self-reported depression was present in 16.9% of the girls and 7.7% of the boys. Experience of sexual intercourse was reported by 44.5% of depressed adolescents, but only by 34.6% of those non-depressed ($p \leq 0.001$). Experience of sexual intercourse was reported by 60.4% of delinquent adolescents, but only by 33.3% of the non-delinquent ($p \leq 0.001$). Among those who had experienced sexual intercourse five or more sexual partners were reported by 25.1% of depressed adolescents, whereas among non-depressed only by 14.4% ($p \leq 0.001$). Among those who had experienced sexual intercourse five or more sexual partners were reported by 29.6% of delinquent adolescents, whereas among the non-delinquent only by 13.5% ($p \leq 0.001$).

5.2 Mental health and family factors associated with experience of sexual intercourse

There was a statistically significant positive association between self-reported depression and having experienced sexual intercourse among girls aged 14-17 and boys aged 14-16. In older girls, no statistically significant associations were seen between self-reported depression and experience of intercourse. Among boys aged

19 there was an inverse association between self-reported depression and having experienced intercourse.

Logistic regression analysis showed the strongest relation in the youngest boys suggesting that those who were depressed were almost five times more likely to have experienced sexual intercourse than were the non-depressed. Adding socio-demographic variables to the analyses hardly changed the associations detected between self-reported depression and having experienced sexual intercourse, but the association of self-reported depression with experience of intercourse did not remain significant in 17-year-old girls (Paper I Table 3).

The proportion of those who had experienced sexual intercourse was the lowest among 14 to 18-year-old adolescents reporting high parental involvement. Experience of sexual intercourse was more common among those reporting average parental involvement, and most common among adolescents reporting low parental involvement (Paper II Table 1). Among 14 to 16-year-old girls Odds Ratios for having experienced sexual intercourse were increased among depressed and in the average and low parental involvement groups. This finding persisted when self-reported depression and parental involvement were studied separately, simultaneously, and after adjusting for socio-demographics. In multivariate analyses average and low parental involvement were also associated with experience of sexual intercourse among 17-year-old girls. Among 14 to 16-year-old boys Odds Ratios for having experienced sexual intercourse were increased among depressed and in the average and low parental involvement groups. This finding persisted when self-reported depression and parental involvement were studied separately, simultaneously, and after adjusting for socio-demographics. Average and low parental involvement were also associated with experience of sexual intercourse in multivariate analyses among 17 and 18-year-old boys (Paper II Table 3).

The proportion of those having experienced sexual intercourse was higher among delinquent adolescents than among the non-delinquent. This finding was statistically significant among both girls and boys, and across all age groups except 19 to 20-year-old girls (Paper III Table 1). Among 14 to 18-year-old girls Odds Ratios for having experienced sexual intercourse according to delinquency were statistically significant both when delinquency was studied alone, simultaneously with self-reported depression, and further after adjusting for socio-demographics. In multivariate analyses the positive association between self-reported depression and having experienced intercourse also persisted among 14 to 16-year-old girls when delinquency was entered in the same models. Among 14 to 20-year-old boys Odds Ratios for having experienced sexual intercourse according to delinquency were

significantly increased, and the Odds Ratios were only slightly reduced when self-reported depression was controlled for. In multivariate analyses the positive association between self-reported depression and having experienced sexual intercourse also persisted in 14 to 15-year-old boys. Among 17-year-old and 19 to 20-year-old boys this association was reversed, and even highly significant in the age group 19-20 (Paper III Table 3).

In Paper IV, there were only two age groups instead of each year comprising one age group as in Papers I-III. Different age categorization yielded parallel results. Self-reported depression was positively associated with experience of sexual intercourse among both girls and boys in the younger (14-16 years) age groups, and inversely associated among older (17-20 years) age group boys (Paper IV Table 2). In both age groups and in both girls and boys the Odds Ratios for having experienced sexual intercourse were statistically significantly increased according to delinquency. In the younger age group, the Odds Ratios for having experienced sexual intercourse were in both girls and boys decreased according to high parental involvement and living with both parents and increased according to low parental education. These associations were similar in the older age group, except that low parental education was leveled out from being a correlate of experience of sexual intercourse. Studying mental health and parenting/family characteristics simultaneously in the same model changed the estimates very little, and all the associations detected persisted as statistically significant (Paper IV Table 2.

To conclude, both mental health and family variables had significant associations with experience of sexual intercourse in the final models. Firstly, self-reported depression had a significant association with experience of sexual intercourse in early and middle adolescents, and also an inverse association in late adolescent boys (Papers I, III, IV). Secondly, average and low parental involvement had significant associations with experience of sexual intercourse in early and middle adolescents, and also in late adolescent boys (Paper II). Also, it emerged that both girls and boys across all age groups had an inverse association between high parental involvement and experience of sexual intercourse (Paper IV). Third, delinquency had a significant association with experience of sexual intercourse in early, middle, and late adolescent girls and boys (Papers III, IV). Fourth, low parental education had a significant association with experience of sexual intercourse in early and middle adolescents (Paper IV). Fifth, family structure, namely living with both parents, had a significant inverse association with experience of sexual intercourse across all the age groups (Paper IV).

5.3 Mental health and family factors associated with having five or more partners for sexual intercourse

The association between self-reported depression and having had five or more partners for sexual intercourse was briefly studied in Paper II. This association was statistically significant across all age groups and among both girls and boys, except for 17-year-old girls (Paper II Table 4).

Across all age groups, the proportion of sexually active adolescents reporting five or more partners for intercourse was most common in the low parental involvement group. When parental involvement and self-reported depression were studied simultaneously, the Odds Ratios for having had five or more partners for intercourse were increased among the depressed and among those reporting low parental involvement in 15 to 20-year-old sexually active girls and 14 to 18-year-old sexually active boys. In 14-year-old girls, only self-reported depression was statistically significantly associated with reporting five or more partners for intercourse. Adjusting for socio-demographics showed that among the oldest girls (19-20) only self-reported depression was associated with reporting five or more partners, and among 16-17-year-old boys only self-reported depression was associated and among 18-20-year-olds only low parental involvement was associated with reporting five or more partners (Paper II Table 4).

The proportion of sexually active adolescents reporting five or more partners for intercourse was higher among delinquent adolescents than among the non-delinquent (Paper III Table 2). Among sexually active adolescents Odds Ratios for having five or more partners for intercourse according to delinquency were highly significant in all age groups. This finding persisted when delinquency was studied alone and simultaneously with self-reported depression, and after adjusting for socio-demographics. Reporting five or more partners for intercourse was also associated with self-reported depression in girls across all the age groups and in all the boys except 18-year-olds (Paper III Table 3).

Among younger girls and boys (14-16) having five or more partners for sexual intercourse was associated with low parental education, whereas high parental involvement and living with both parents were inversely associated. Among older girls (17-20) having five or more partners for sexual intercourse was associated with low parental education and high parental involvement was inversely associated, whereas in older boys no such associations were detected. Among older girls and boys (17-20) living with both parents had a significant inverse association with reporting five or more partners for sexual intercourse. Studying mental health and

parenting/family characteristics simultaneously in the same model changed the estimates only slightly. Parental involvement was leveled out in younger boys and parental education in older girls, whereas all the other associations detected persisted as statistically significant.

To conclude, both mental health and family variables had significant associations with having five or more partners for sexual intercourse in the final models. Firstly, self-reported depression had a significant association with having five or more partners practically across all age groups in both girls and boys (Papers II-IV). Secondly, low parental involvement had a significant association with having five or more partners in early adolescent boys, and with middle and late adolescent girls and boys (Paper II). Also, it emerged that for girls there was an inverse association between high parental involvement and having five or more partners, whereas no such association was found for boys (Paper IV). Third, delinquency had a significant association with having five or more partners in girls and boys across all age groups (Papers III, IV). Fourth, low parental education had a significant association with having five or more partners in early and middle adolescent girls and boys (Paper IV). Fifth, family structure, namely living with both parents, had a significant inverse association with having five or more partners in girls and boys across all age groups (Paper IV). Prevalences of sexual behaviors, depression, and delinquency in SHPS 2010-2011 data are presented in Figure 2.

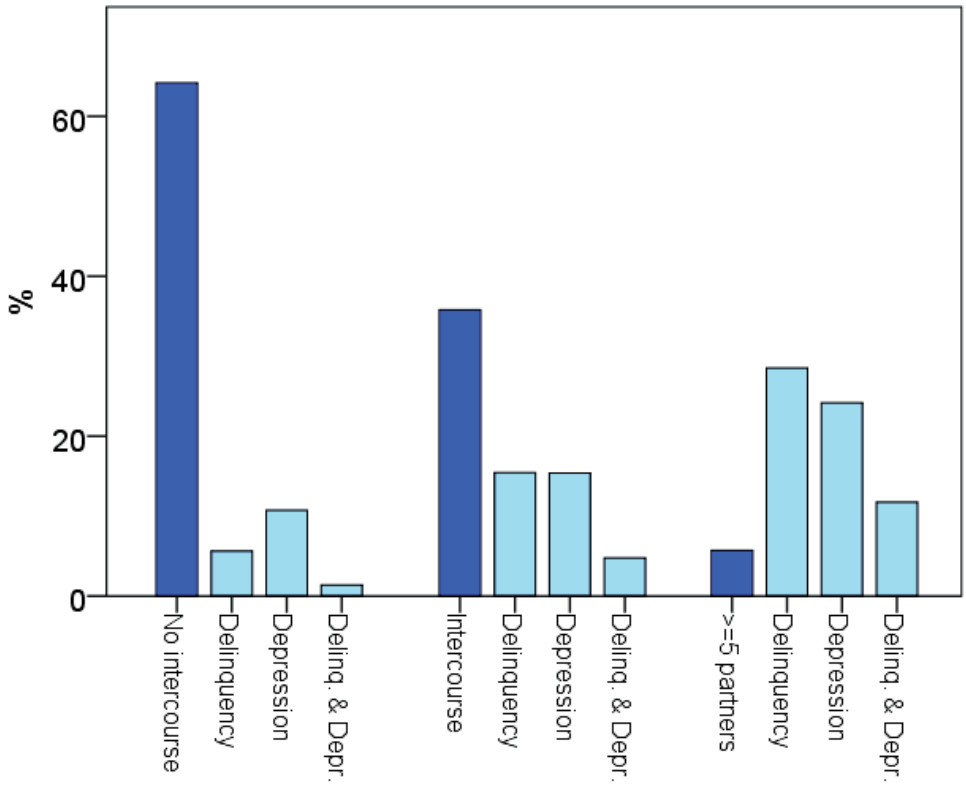

Figure 2. Shares of those not having experienced sexual intercourse, those having experienced sexual intercourse and those reporting five or more partners in percentages of the whole study population are shown in dark columns. Light columns present those reporting delinquency, depression, or both, in percentages of the preceding dark column.

5.4 Key differences between adolescents of different ages

Predictably, the proportion of those who had experienced sexual intercourse increased linearly from 14 to 20-year-olds among both girls and boys (Paper I Table 1). Also, within all age groups experience of sexual intercourse was more likely as age increased. The association between self-reported depression and experience of intercourse was strongest among the youngest age groups (Paper I Table 2).

One of the key differences between adolescents of different ages was that self-reported depression had a significant association with experience of sexual intercourse in early and middle adolescent girls and boys, whereas in late adolescence

no such positive association was detected (Papers I, III, IV). Having had five or more partners for sexual intercourse was associated with self-reported depression in all phases of adolescence (Papers III, IV). Delinquency was throughout adolescence associated with experience of intercourse and having had five or more partners for intercourse (Papers III, IV). Parental involvement and living with both parents seem to be important family factors associated with having experienced sexual intercourse or having experienced sexual intercourse with five or more partners throughout adolescence, whereas low parental education was associated with adolescent sexual behavior only in early and middle adolescents (Papers II, IV).

5.5 Key differences between adolescent girls and boys

One of the key differences between adolescent girls and boys was detected in the association between self-reported depression and experience of sexual intercourse. Among early and middle adolescents, self-reported depression was associated with having had sexual intercourse, whereas among late adolescent boys a statistically significant inverse association was found (Papers I-IV).

Some differences between girls' and boys' risk-taking sexual behavior were detected in relation to family factors. Among sexually active girls, having had five or more partners for intercourse was associated with both low and average parental involvement, whereas among boys only with low parental involvement (Paper II). In late adolescent girls, low parental education was positively and high parental involvement inversely associated with reporting five or more partners for intercourse, but among boys no such associations were detected (Paper IV).

6 DISCUSSION

The main finding of this study was the independent and unique associations of all the outcome variables with adolescent sexual behavior. Despite many of the family and mental health variables' reciprocal correlations *per se*, their independent associations with adolescent (risk-taking) sexual behavior are established by this work.

6.1 Sexual behavior and family factors

Parental involvement

In early and middle adolescent girls and boys, less parental involvement was associated with adolescents having more often experienced sexual intercourse. Compared to peers reporting high parental involvement, experience of sexual intercourse was more common in adolescents reporting average parental involvement and most common in those reporting low parental involvement. These associations weakened gradually from young to older age groups. These findings are in consonant with research suggesting that adolescents postpone sexual debut when they report greater parental knowledge, when the quality of the parent-adolescent relationship is better, or when there is open parent-adolescent communication (Deptula et al. 2010, Dittus et al. 2015, Ethier et al. 2016, Madkour et al. 2010, Markham et al. 2010, Rai et al. 2003, van de Bongardt et al. 2014). Furthermore, self-reported depression did not substantially change these associations, although low parental involvement may be associated with more depressive symptoms (Burnett-Zeigler et al. 2012, Fröjd et al. 2007, Hamza & Willoughby 2011, Schwartz et al. 2012, Yu et al. 2006), as attachment theory also suggests (Bowlby 1969, 1973). Our results establish that low parental involvement has independent associations with adolescent sexual behavior. Possibly, insecurely attached adolescents do not idealize their parents as much as the securely attached do, thus leading to abandoning parental rules and engaging in risky behaviors (Aalberg 2016, Bowlby 1969). Since parenting problems and family conflicts often evolve in the long term, it seems likely

that low parental involvement predisposed adolescents to engage in sexual activity inappropriately early. Nonetheless, it is also possible that initiating sex life early distances adolescents from parents and causes a decrease in disclosure to parents.

In late adolescent girls' and boys' average or low parental involvement was not associated with having experienced sexual intercourse. Sexual activity is fairly normative in late adolescence (Cromer 2011, Madkour et al. 2010), and likely indicates no psychosocial problems. Accepting oneself, making one's own decisions and taking responsibility for them as well as seeking greater emotional and behavioral autonomy are essential skills to develop in adolescence (Steinberg & Morris 2001). Hence it is developmentally appropriate that parental involvement loses its role as a significant correlate of sexual behavior in late adolescents.

High parental involvement remained inversely associated with having experienced sexual intercourse also when delinquency was controlled for. As social learning theory proposes, inept parenting practices are connected to delinquency and deviant peer networks (Bandura 1971), and both predispose to early and risk-taking sexual behaviors (Anderson et al. 2017, Boislard P & Poulin 2011, Epstein et al. 2014, Ramrakha et al. 2007, Samek et al. 2014, Schofield et al. 2008). Thus, at least part of the protective effect of high parental involvement on early or risk-taking sexual behavior may come from neutralizing the effect of deviant peers. Similarly, social control theory suggests that high attachment security reduces the effect of deviant peers (Hirschi 1969).

Among the sexually active, low parental involvement was throughout adolescence associated with reporting five or more partners for sexual intercourse. This finding concurs with existing research demonstrating connections between low parental monitoring and risk-taking sexual behaviors (DiClemente et al. 2001b, Kalina et al. 2013, Markham et al. 2010, Meschke et al. 2002, Wight et al. 2006). Also, high quality of parent-adolescent relationship has been inversely associated with risk-taking sexual behaviors (Deptula et al. 2010, Kahn et al. 2015, Markham et al. 2010, Rink et al. 2007), whereas lower quality of this relationship was associated with more risk-taking sexual behaviors in those with low self-control (Kahn et al. 2015), in keeping with the self-control theory (Gottfredson & Hirschi 1990). Significantly, our study establishes low parental involvement as being positively associated and high parental involvement as inversely associated with risk-taking sexual behavior even in the presence of mental health and other family variables.

Even for late adolescent girls high parental involvement was inversely associated with having five or more partners for intercourse, whereas among boys no such association was found. Hence, girls may benefit more than boys from high parental

involvement. One explanation for this finding may lie in girls' greater tendency to disclose to parents (Stattin & Kerr 2000).

Adolescents' sense of control over outcomes resulting from their own behaviors is greatly affected by parents, peers, and individual characteristics. Adolescents with an internal locus of control feel responsible for the consequences of their own behavior, whereas those with external locus of control explain the effects of their own behavior as chance or circumstances beyond their control (Ahlin & Lobo Antunes 2015). Family management strategies and parental supervision are the most prominent predictors of internal locus of control, which is further associated with normative and positive adolescent behavior (Ahlin & Lobo Antunes 2015). Thus high parental involvement is probably protective against risk-taking sexual behaviors. This is also in keeping with problem behavior theory and other theoretical frameworks (Bandura 1971, Bowlby 1969, 1973; Gottfredson & Hirschi 1990, Hirschi 1969, Jessor & Jessor 1977).

Parental education

Low level of parental education, parents' highest educational qualification being comprehensive school, was associated with experience of sexual intercourse and reporting five or more partners for intercourse among early and middle adolescents. These findings concur with those of earlier research (Bailey et al. 2008, Cavazos-Rehg et al. 2010, de Looze et al. 2012, Valle et al. 2009). However, in our study the association between parental education and adolescent sexual behaviors was weaker than other family variables, especially family structure. Yet this association persisted in the presence of other family and mental health variables. The association between low level of parental education and late adolescent sexual behavior was not significant. Research has shown that low level of parental education is also associated with adolescent mental disorders, which in turn are connected to low level of adolescent educational attainment (Paananen et al. 2013).

The route from parental education to adolescent early or risk-taking sexual behaviors requires further study. Parental educational level is an important predictor of children's educational level (Dubow et al. 2009). One alternative is that low level of parental education is associated with poor adolescent adjustment to school, and in turn with early or risk-taking sexual behaviors (Schofield et al. 2008). Another possible explanation is that low level of parental education leads to peers with low academic engagement, and these deviant peers lead to risk-taking behaviors

(Schofield et al. 2008, Tubman et al. 1996), in keeping with social learning theory. Alternatively, low level of parental education leads to poor academic engagement in the adolescent, which is further connected to early sexual activity (Klein 2005, Kotchick et al. 2001, Upchurch & McCarthy 1990).

Family structure

A significant finding of the study was that family structure, living with both parents, had a significant inverse association with adolescents' experience of sexual intercourse in both girls and boys and throughout adolescence. Another important finding was that family structure was inversely associated with having five or more sexual partners throughout adolescence and in both girls and boys. These findings concur with those of earlier research showing adolescents from one-parent families to be prone to early sexual debut and risk-taking sexual behaviors compared to peers from two-parent households (Kotchick et al. 2001, Oman et al. 2005, Santelli et al. 2000, White & Warner 2015, Young et al. 1991). These associations remained significant when studied simultaneously with mental health and other family variables. Family structure proved to be the strongest family variable compared to parental involvement and parental education associated with experience of sexual intercourse. One possible mediating or moderating factor between family structure and adolescent sexual behavior may be adolescent mental disorders (Hallfors et al. 2004, 2005; Tebeka et al. 2016). Furthermore, two parents in a family presumably increases parental involvement in an adolescent's life, thus deterring risk behaviors. From this standpoint it seems beneficial for both girls and boys to live with both mother and father in the family.

Divorce rates have increased significantly in recent decades (Schor 2003, US Census Bureau 2012). Parental divorce seems to have a more prominent effect at least on adolescent mental health than does parental death, which is also related to subsequent mental disorders (Paananen et al. 2013, Tebeka et al. 2016). Internalizing and externalizing symptoms and disorders, for their part, are associated with early and risk-taking sexual behaviors (Hallfors et al. 2004, 2005; Kotchick et al. 2001). Moreover, a specific association with substance abuse disorders and a history of parental divorce have been found in various studies (Arkes 2013, D'Onofrio et al. 2007, Tebeka et al. 2016), suggesting an association between parental divorce and other externalizing behaviors, such as delinquency. However, in our study the

association between family structure and sexual behaviors remained quite intact when delinquency was accounted for.

Parental divorce may temporarily trigger more family conflicts and family difficulties are also more common preceding parental divorce than parental death (Smetana et al. 2006, Tebeka et al. 2016). Family conflicts and quarrels are connected to greater likelihood of risk-taking sexual behaviors (Lyerly & Brunner Huber 2013). Although parental separation is associated with early sexual intercourse (Miller et al. 2001, Zimmer-Gembeck & Helfand 2008), joint physical custody has been suggested to afford greater protection against early sexual debut than single parenthood (Carlsund et al. 2013). Self-control theory posits that parental rearing behavior mediates the possible effect of single parenthood on delinquency, and thus risk-taking sexual behaviors (Gottfredson & Hirschi 1990).

The literature suggests that parental divorce and other than two-parent family constellation precedes adolescent early and risk-taking sexual behaviors. Of course, conclusions about causalities cannot be drawn from our study. On the other hand, it cannot be excluded that adolescent problem behaviors could also have an impact on the relationship between parents, for example by causing conflict.

6.2 Sexual behavior and self-reported depression

In early and even in middle adolescence having experienced sexual intercourse was associated with self-reported depression, then this association gradually disappeared and turned to the reverse in late adolescent boys. The relation between self-reported depression and experience of sexual intercourse was the stronger the younger the adolescent was, as also reported in earlier research (Vasilenko 2017). According to earlier studies, depression is connected to sexual activity in early adolescence and some studies haven even suggested this association to continue into middle adolescence (Hallfors et al. 2004, 2005; Heidmets et al. 2010, Jamieson & Wade 2011, Kaltiala-Heino et al. 2003a, Kosunen et al. 2003, Oshri et al. 2011, Vasilenko 2017). Intimate sexual contact is likely to require a certain emotional maturity not yet developed in the majority of early and middle adolescents (Ge et al. 2003). Being associated with depression, sexual activity in early and middle adolescence probably demonstrates developmental difficulties rather than rapid and successful adolescent passage (Kaltiala-Heino et al. 2003a). It is possible that depressed adolescents engage in sexual activity in an attempt to seek support and closeness. On the other hand, early sexual activity without sufficient capacity to deal with the emotions related to

the experience may predispose adolescents to depression, and this is especially true if the sexual experience has taken place under external pressures (Kaltiala-Heino et al. 2003a, Kosunen et al. 2003). Social pressure from own peer group or from discourses in the media and society at large may cause an adolescent to engage in early or risk-taking sexual behavior (Templeton et al. 2017).

In late adolescence the vast majority has reached emotional maturity. As noted, sexual activity is no longer associated with depression. Actually, in 19-year-old boys it was not being sexually active that was associated with self-reported depression. Sexual inexperience when the majority of peers have engaged in sexual activity may trigger feelings of loneliness, sadness or social isolation predisposing to depression. Among late adolescents, not having a dating relationship has been connected to emotional distress (La Greca & Harrison 2005). On the other hand, being depressed may result in such hardships in social relationships that cause delays in sexual development. Towards adulthood more serious relationships and marriage become normative, thus causing pressures for intimate relationships, and emerging adults have been found to experience a decrease in psychological distress after first intercourse (Vasilenko 2011). These findings concur with the theory of adolescent development suggesting that physical and cognitive maturity are reached before emotional (Steinberg 2016).

Practically, self-reported depression was statistically significantly associated with having five or more partners across adolescence in both girls and boys. The only exception was the 17-year-old girls. Throughout adolescence self-reported depression maintained its independent association with having five or more partners when studied simultaneously with all the mental health and family variables. This finding concurs with earlier research (Hallfors et al. 2004, 2005; Lehrer et al. 2006, Mazzaferro et al. 2006, Ramrakha et al. 2000, Rubin et al. 2009, Vasilenko & Lanza 2014). The causality may go either way. Depressed adolescents may have less motivation or ability to protect themselves or they may seek intimacy (with multiple partners) to alleviate distress, and thereby depression may be followed by risk-taking sexual behaviors (Wickrama & Wickrama 2010). On the other hand, depression may be a consequence of risk-taking sexual behaviors later regretted (Kaltiala-Heino et al. 2015).

6.3 Sexual behavior and delinquency

The association between delinquency and experience of sexual intercourse was clear not only among the youngest but continued into late adolescence. This finding was true for both girls and boys. Extending earlier research describing an association between early sexual activity and delinquency (Kaltiala-Heino et al. 2015, Kotchick et al. 2001, Tubman et al. 1996), we demonstrated this association to hold in all phases of adolescence. Moreover, the association persisted when studied simultaneously with self-reported depression and family variables. Thus their associations with sexual behavior in adolescence are individual in spite of comorbidity between depression and delinquency (Kessler et al. 1994, Mun et al. 2008), and they share common correlates (Copeland et al. 2010, Hui Yap & Jorm 2015, Kaltiala-Heino et al. 2003b,a; Moffitt et al. 2001, Murray & Farrington 2010).

Although boys usually exhibit more delinquent behaviors (Zheng & Cleveland 2013), as was also the case in our study, few differences between girls and boys emerged regarding adolescent sexual behavior. Throughout adolescence delinquent girls and boys are more likely to be sexually active than are their non-delinquent peers.

Throughout adolescence those exhibiting delinquency were more likely to report five or more partners for sexual intercourse than their non-delinquent peers. This finding is in keeping with earlier research (Kaltiala-Heino et al. 2015, Ramrakha et al. 2000, Tubman et al. 1996). No family variable or self-reported depression significantly changed the associations detected, indicating a unique and individual association between delinquency and adolescent sexual behavior. To some extent both delinquency and risk-taking sexual behaviors are known to be driven by pronounced impulsivity and sensation seeking (Kotchick et al. 2001). Childhood impulsivity is associated with impulsivity in late adolescence (Elam et al. 2016), and reward-related impulsivity may still be a salient predictor of risk-taking behaviors in late adolescence (Gullo et al. 2017). This may then be one explanation for the continuous association between delinquency and risk-taking sexual behavior even in late adolescence. Multiple problem behaviors are likely to be prevalent in the same adolescents according to problem behavior theory (Jessor & Jessor 1977), which, however, gives a parsimonious account of the co-occurrence of multiple problem behaviors (Bromberg & O'Donohue 2013). The root of problem behaviors is likely to derive from parents and family factors and it has been suggested that external locus of control is associated with risk-taking behaviors (Ahlin 2014).

Adolescents with low self-efficacy for affect regulation are more likely to engage in delinquency or other risk-taking behaviors as their inability to regulate their own behavior undermines their ability to resist negative peer pressure (Bandura 1971, 1997; Siegler et al. 2010). Deviant peer groups being a major training ground for delinquent acts, they may also predispose to risk-taking sexual behaviors and other adverse health outcomes (Tubman et al. 1996), in accordance with social learning theory (Bandura 1971). Also, given the correlation between delinquency and academic failure (Mun et al. 2008, Patterson et al. 1989), delinquent adolescents engaging in risk-taking sexual behaviors may also be the ones lacking sexual health knowledge and skills to protect themselves and their partners in sexual contact. On the other hand, delinquency may also be acting out behavior of distress related to risk-taking sexual behavior later regretted. On the whole, family processes are linked to delinquency via deviant peers, self-control, parental monitoring, and parent-adolescent relationship quality (Abar et al. 2014, De Vries et al. 2016, Jo & Zhang 2014, Patterson 1997), in keeping with self-control and social control theories. Further, delinquency is linked to early and risk-taking sexual behaviors via school maladjustment, antisocial activity, substance abuse, and deviant peers (Anderson et al. 2017, Jessor 1991, Moffitt 1993, Schofield et al. 2008, Tubman et al. 1996), in keeping with problem behavior theory.

6.4 Age and sex differences in adolescent sexual behavior

In spite of the age categorization differences between studies, no noteworthy differences were detected. Many of the associations differed slightly by strength between different ages and a tendency to lose significance was noted towards older age groups. For instance, the strongest associations between self-reported depression and early or risk-taking sexual behavior were in the youngest age groups. These associations tended gradually to lose strength until they lost significance overall. A remarkable exception was the inverse association between experience of sexual intercourse and self-reported depression in late adolescent boys. The stronger associations among the youngest are in keeping with earlier research (Hallfors et al. 2004, 2005; Heidmets et al. 2010, Jamieson & Wade 2011, Kaltiala-Heino et al. 2003a, Kosunen et al. 2003, Oshri et al. 2011, Vasilenko 2017).

Despite the normative adolescent developmental task concerning romantic relationships, dating and romantic involvement are also associated with subsequent depression (Anderson et al. 2015, Exner-Cortens et al. 2013, Joyner & Udry 2000).

Anderson et al. (2015) found that dating in middle adolescence was still associated with depressive symptoms in late adolescence, although our results suggested that not having experienced sexual intercourse was associated with self-reported depression in late adolescent boys. Sexual activity earlier than peers may be associated with depressive symptoms, whereas sexual activity in late adolescence may have more positive consequences due to more tolerant environments (Arnett 2000, Lefkowitz 2005, Meier 2007, Vasilenko 2017). In support of this, engaging in first sexual intercourse late in comparison to peers is associated with sexual problems in adulthood (Sandfort et al. 2008), and abstinence in young adulthood is connected to body image issues, shyness, and issues with social relationships (Boislard et al. 2016, Donnelly et al. 2001). What is more, a double standard attaching different meanings to girls' and boys' sexual behavior (Crawford & Popp 2003) may increase the depression rates associated with sexual experience in girls, but may also cause contemptuous behavior towards late adolescent boys not yet sexually experienced.

A remarkable finding was that early adolescent boys had a stronger association between self-reported depression and experience of intercourse than did girls. Statistics demonstrate a lifetime peak for onset of internalizing disorders, including depression, in adolescence (Häfner et al. 1989, Kessler et al. 2005). What is more, depression prevalence among adolescent girls is almost twice that among boys (Patton et al. 2014). In spite of that, compared to boys of the same age, early adolescent girls had a weaker, although highly significant, association between experience of intercourse and self-reported depression. Nevertheless, the explanation probably lies in the different developmental stages between girls and boys. Because girls mature earlier than boys (Fechner 2002, Klimstra et al. 2009), early adolescent boys are on average the most immature adolescent group. Thus early sexual activity seems to have the most detrimental effect on the mental health of early and even middle adolescent boys, or, conversely, emotional immaturity exacerbated by depression may precede early sexual experiences. On the one hand, it is also possible that depressed early adolescent boys have been early in their pubertal development and in some ways resemble girls more, for example, being more emotional, thus engaging in early sexual intercourse and greater emotionality then serves as a prerequisite for depression when adolescents are still not capable of dealing with the experience.

Both girls and boys reported higher rates of self-reported depression in association with reporting multiple sexual partners throughout adolescence. Findings are similar in earlier research (Hallfors et al. 2004, 2005; Lehrer et al. 2006, Mazzaferro et al. 2006, Ramrakha et al. 2000, Rubin et al. 2009, Vasilenko & Lanza

2014). Nevertheless, Vasilenko et al. (2014) found that the association between depression and multiple partners ceased to be significant only in the late 20s in females, but as early as in late adolescence in males. The effect of early maturation and negative effects related to early maturation, such as early and risk-taking sexual behaviors (Copeland et al. 2010, Michaud et al. 2006, Phinney et al. 1990), are presumably time limited and negative effects are attenuated towards adulthood (Copeland et al. 2010). However, Copeland et al. (2010) found that the negative consequences related to risk-taking sexual behaviors, especially multiple sexual partners, continued into adulthood. Attenuation of effects has been found to occur due to recovery of early maturers and catch-up by on-time and late maturers (Copeland et al. 2010).

6.5 Potential underlying factors

This study addressed comprehensively family factors and common mental disorders of adolescence related to early and risk-taking sexual behavior. However, there are potential underlying factors which could not be examined in this work due to the nature of data utilized.

Early pubertal timing may contribute to both mental disorders and early or risk-taking sexual behaviors (Copeland et al. 2010; Kaltiala-Heino et al. 2003a, 2011; Michaud et al. 2006, Phinney et al. 1990). Early maturing adolescents have been suggested to be most vulnerable to risk-taking behaviors due to the maturational gap between physical and emotional development (Ge et al. 2003, Moffitt 1993, Steinberg 2005). Interestingly, parenting practices have been proposed to determine the timing of pubertal maturation via infant attachment security (Belsky et al. 2010). Neglectful, inconsistent, and harsh parenting styles imply difficulties and uncertainty for children in their future environments, thus putting them on accelerated developmental trajectories (Belsky et al. 2010). Conversely, nurturing and responsive parenting delays physical maturation and engaging in sexual activity (Belsky et al. 2010). Hence, the timing of puberty may have implications for all family, mental health, and sexual behaviors.

Theories on adolescent development suggest that peers are of crucial importance, especially in early adolescence, which is about either belonging to some affiliation or abandonment (Kroger 2006). Attachment style, largely developed due to parenting (Bowlby 1973), is connected to the peer groups adolescents engage with (Benson et al. 2006, Warr 1993). Low attachment security predisposes to deviant peers, which

are further a main source in developing delinquent behavior (Brook et al. 1986, Connolly et al. 2015, Elliott et al. 1985, Hawkins et al. 1992). Thus, as theoretical frameworks also suggest, peer relationships are possible mediators between parenting and development of delinquency, which may further predispose to early and risk-taking sexual behaviors (McPherson et al. 2001, Schofield et al. 2008, TenEyck & Barnes 2015, Tubman et al. 1996). By contrast, antisocial behavior and related risk-taking behaviors may also be result of parenting practices only, and thus lead to rejection by the normal peer group in which these risk-taking behaviors are discouraged (Bandura 1971, Hirschi 1969).

Moreover, school-related factors may also serve as mediators on the path to sexual behaviors. School maladjustment is suggested to mediate externalizing behaviors and early or risk-taking sexual behaviors (Moffitt 1993, Schofield et al. 2008), whereas high academic engagement and positive relations with peers and teachers reduce the risk of early sexual activity (Kotchick et al. 2001). Also, alcohol and marijuana use have been found to be independent predictors of risk-taking sexual behaviors in the presence of conduct disorder throughout adolescence (Brooks Holliday et al. 2017). On the other hand, substance abuse could also be subsequent to risk-taking sexual behaviors when these behaviors are regretted and substances are used as a form of self-medication.

Siblings may also contribute to mental health. Buist et al. (2013) conducted a meta-analysis and found that those with less sibling conflict, more sibling warmth, and less differential treatment experienced fewer internalizing and externalizing problems. Since siblings may also have an effect on adolescent dating behavior, such social factors may account for some variation. Other social and relational factors having an effect on adolescent sexual behaviors may include peer pressure, identity issues, impulsiveness and reward sensitivity.

Parental divorce has significant effects on adolescent lives (Bachar et al. 1997, Kelly 2000, Robbers et al. 2012, Tebeka et al. 2016). Behind parental separation may lie some conflicts related entirely to parents, for example, parental alcoholism or infidelity (Waldron et al. 2015). However, Waldron et al. (2015) found the association between parental separation and adolescent early sexual intercourse to persist when parental alcoholism was controlled for.

Although known correlates of adolescent sexual behavior, history of sexual abuse or being a member of a sexual minority were ruled out of the scope of this study. History of abuse is associated with mental disorders and risk-taking sexual behaviors in adolescence and sexual abuse is the one most strongly associated forms of maltreatment (Agyapong et al. 2017, Maniglio 2014, Thibodeau et al. 2017).

Moreover, it should be noted that sexual experiences in early adolescence may also be regarded as abusive and thus may be connected to mental disorders. Meta-analyses have reported that sexual minority youth experience higher rates of depressive symptoms and depressive disorders when compared to heterosexual youth (Lucassen et al. 2017), and sexual minority adults also suffer more from mental disorders (Semlyen et al. 2016). Risk-taking sexual behaviors, such as unprotected sex, are relatively common among gay populations (Hess et al. 2017).

6.6 Methodological considerations

A remarkable strength of this study lies in the vast and comprehensive data sample, whereas the cross-sectional nature and self-reported measures need to be counted as limitations. The strengths and limitations are discussed in detail below.

6.6.1 Strengths

A clear strength of this study was the large population-based data set representing Finnish comprehensive school students well. Being a classroom survey, the School Health Promotion Study reaches a remarkably high response rate. Nonetheless, a small fraction, 10-15%, of students are absent on any given day, as well as the survey day. These adolescents may also be the ones suffering more not only from physical illnesses, but also from mental disorders compared to the study population as a whole. Therefore, prevalences for mental health and risk-taking sexual behavior variables, for instance, may be underestimates. However, in health surveys even high levels of non-response are unlikely to have an effect on the associations studied (Van Loon et al. 2003). Among the respondents, non-response to the variables relevant to the study was statistically significantly more common in younger subjects and in boys, although these differences were minimal and were not likely to bias the findings.

Comprising ages 14 to 20, the whole spectrum of adolescence, our study was able to explore the associations between self-reported depression, delinquency, family variables, and sexual behaviors in different phases of adolescence, from early (14-year-olds) to middle (15-17), and to late adolescents (18-20).

6.6.2 Limitations

There may be other potential confounders not addressed in this study warranting further research. Other biopsychosocial factors associated with both mental health and sexual behavior in adolescence could also play a mediating or moderating role between the associations studied (Jamieson & Wade 2011). For example, no information about alcohol consumption was available in our data, although this may increase impulsiveness and risk behaviors. Other associated factors might include self-esteem, social support, peer relationships, academic factors, pubertal timing, parental mental health problems, or other factors relevant to adolescent development (Boislard P & Poulin 2011, Davila et al. 2009, Hallfors et al. 2005, Jamieson & Wade 2011, Kaltiala-Heino et al. 2003a).

The data concerning older adolescents, those in upper secondary school or vocational school, was combined in our study. However, it is possible that psychosocial problems and substance abuse are more prevalent among vocational school students. Nevertheless, the response rate of vocational school students was lower than that of upper secondary school students, thus probably attenuating potential differences. This is a topic for a further study to find out if there is a difference between these groups in this data.

6.6.2.1 Study design

It is noteworthy that, due to the cross-sectional nature of the data, conclusions about causality cannot be drawn. Models for the analysis were formed by examining the main theories on adolescence and a robust evidence base. In spite of the high correlations detected, to explore causality remains a topic for future research. However, all the affirmed associations were found in the presence of all the study variables. This finding establishes that there are independent and unique associations between early and risk-taking sexual behavior and internalizing problems, externalizing problems, not living with both parents, experiencing low parental involvement, and low parental educational attainment.

The sample size in the SHPS diminished towards the older age groups. Respondents selected for this study were 14–20 years old and the majority of the study sample comprised 14 to 18-year-olds. The considerably lower percentage, ca. 2% of the whole study sample, of 19-20-year-olds was due to the fact that they have usually already left the schools in which the SHPS is conducted. Also, it is possible that these oldest adolescents still attending the study schools are experiencing social,

psychological or other problems delaying graduation. Hence depression, delinquency, and problems related to family or sexuality may be more common among them than among their peers. This oldest age group may not necessarily be as representative as the younger subjects. However, the sample size was still considerable, about 4,000 subjects, and enabled analyses to be conducted in these age groups as well.

6.6.2.2 Measures

One limitation of our study was the use of self-reports. Diagnostic structured interviews to detect mental disorders would have been more reliable, but with such a large study sample this was not feasible. Also, self-reported depression was assessed with R-BDI, a validated state measure giving no information on the duration of the symptoms. On that account, the cut-point for scoring as depressed was set at 8 points (moderate/severe depression) and adolescents scoring only mild depression (5–7) were not considered to be depressed in this study, thus avoiding overestimates of depression. On the other hand, students absent on the study day may be the ones experiencing more emotional problems, thus causing a possible underestimated rate of self-reported depression in our study. Depressive symptoms are likely to be valid predictors for and correlate well with clinical depression (Charman 1994, Hofstra et al. 2001, Lewinsohn et al. 1994). Bennett et al. (1997) found that the significance, positive and negative predictive values, and specificity of the 13-item and 21-item Beck Depression Inventories were virtually identical. In addition, they found that the BDI correlated well with depressive disorders in a clinical sample (Bennett et al. 1997).-Hence moderate or severe self-reported depression is likely to require clinical attention (Charman 1994). Moreover, most of the depression morbidity comes from the large number of people suffering from depressive symptoms rather than from a small number of cases with diagnosable depressive disorders (Harrington & Clark 1998).

In the research field many of the concepts regarding adolescent-parent interaction and quality of the relationship are likely to overlap, and the terms may be used interchangeably. Our measure of parental involvement was assessed by adolescents and included parental awareness of adolescents' whereabouts and friends and the adolescents' ability to disclose to parents. To the best of our knowledge, no validated method to measure parental involvement has been presented. Scott et al. (2013)

measured parental involvement by assessing the frequency of parental engagement in conversations and activities with their child, and the items were scored on a 3-point scale. King et al. (2014) divided the concept of parental involvement into monitoring, behavioral involvement, and relationship quality. Stattin & Kerr (2000) argued that in earlier research parental monitoring has often meant parental knowledge rather than active checking or control by parents, because many of the studies measured what adolescents themselves have disclosed to parents. Our measure of parental involvement simply assesses the adolescents' perspectives on parental knowledge and connectedness, and does not confuse the aspects emanating from parents and adolescents. The reliability of our measure would have gained more strength if it has been feasible to elicit responses to the same questions from the parents. It is known that there is some discrepancy between parents' and children's reports and that parents' reports tend to be more favorable than children's report of parenting behaviors (Korelitz & Garber 2016). Thus the portion reporting high parental involvement might have been greater if the parental perspective had been taken into account. Nevertheless, due to the study design it was impossible to gather information from parents; what matters the most for adolescent's behavior is likely to be their own perceptions of these issues.

Delinquency was measured with self-reported questions based on an international and reliable instrument (Junger-Tas 1994, Zhang et al. 2000). The same measure has been used in Finnish adolescent public health and mental health research (Ritakallio et al. 2005, 2006). Anonymity of the survey was likely to reduce social desirability bias in the responses. Self-report of delinquency reveals more incidents than ever end up in official crime statistics. The amount of delinquent behavior differs depending on whether it is reported by adolescent or parent, but in non-clinical samples adolescents tend to report slightly more problem behavior than do parents (Asscher et al. 2014). Hence, level of delinquency is best assessed by adolescent self-report in general population samples, whereas reports by parents give more reliable results in juvenile offender samples (Asscher et al. 2014).

Despite the known gradual progress in adolescent sexual development from holding hands to intimate relationships, sexual debut ("Have you experienced sexual intercourse?") is often the factor measured in the research field. Experience of intercourse is likely to include clinical significance because it is connected to pregnancies and other outcomes.

In this study we used reporting five or more partners for sexual intercourse as an indicator of risk-taking sexual behaviors. Other indicators of risk-taking sexual behaviors are, for instance, neglecting contraception and having sex under the

influence of alcohol. All these variables were also correlated in the SHPS data (data not shown). Hence our measure of risk-taking sexual behavior can be considered reliable. The cut-point for number of sexual partners indicating risk-taking sexual behavior was set as high as five. Yet, at least among the younger, a smaller number is also likely to indicate risk-taking sexual behavior. To confirm this, we ran the analysis with three or more partners as an indicator of risk-taking sexual behavior and achieved results similar to those with five or more partners as an indicator. Different cultures and countries may attach different meanings to adolescent sexual behavior. Therefore validation of our findings in different cultural settings is warranted.

7 SUMMARY AND CONCLUSIONS

The mental health dimensions of internalizing psychopathology (self-reported depression) and externalizing psychopathology (delinquency) demonstrated independent associations with both early and risk-taking sexual behaviors in adolescence. Living with both parents was inversely and low level of parental education and low parental involvement positively associated with early and risk-taking sexual behaviors. These associations were only slightly modified by each other, even if these domains are intercorrelated *per se* (de Kemp et al. 2006, Hui Yap et al. 2014). No major sex differences were detected. On the whole, sexual activity in early and even in middle adolescence is associated with mental disorders. In late adolescence these associations are mostly attenuated, whereas risk-taking sexual behavior persists correlated with mental disorders and family factors. Our results bear out the theories on adolescent passage and risk-taking sexual behavior, but this study cannot confirm causal associations. To better reflect these findings against theoretical frameworks, longitudinal research is needed.

The main findings of this study were:

I Self-reported depression was positively associated with experience of sexual intercourse in early and middle adolescents and this association gradually weakened towards late adolescence. In late adolescence boys a reverse association was found. Reporting five or more partners for intercourse was significantly associated with self-reported depression throughout adolescence.

II Delinquency was significantly associated with experience of sexual intercourse and reporting five or more partners throughout adolescence.

III High parental involvement was inversely associated with having experienced sexual intercourse and reporting five or more partners for intercourse in adolescence. Experience of sexual intercourse and reporting five or more partners was most common in those reporting low parental involvement and these associations gradually weakened towards older age groups.

IV Low level of parental education was associated with experience of sexual intercourse and reporting five or more partners for intercourse in early and middle adolescents.

V Living with two parents, compared to any other family constellation, was inversely associated with experience of sexual intercourse and reporting five or more partners across adolescence.

The main conclusion of this study is that both self-reported depression and delinquency are associated with experience of sexual intercourse in early and middle adolescence, and with risk-taking sexual behavior throughout adolescence. Thus early sexual activity and risk-taking sexual behavior signal challenges in adolescent development and cannot be assumed to be favorable development or benefits of possible early maturation.

7.1 Scientific implications

Our findings corroborate theories of adolescent development and risk-taking sexual behaviors and confirm the associations suggested by earlier research and update scientific knowledge in the field of adolescent sexual behavior to this day. Finnish adolescents come from widely different socioeconomic backgrounds and living conditions. For this reason, our discoveries are likely to be highly generalizable to and representative of Western adolescent populations. Future research aiming at duplicating these findings in different adolescent populations with other ethnic and/or school attendance characteristics is needed.

Establishing causal relations between mental health and family variables and adolescent sexual behavior remains an important topic for further research. Because early sexual activity and risk-taking sexual behaviors cause unintended pregnancies and sexually transmitted infections (Edgardh 2000, 2002; Kotchick et al. 2001), it is possible that these consequences are actually the triggers for depression (Hallfors et al. 2005, Shrier et al. 2002). On the other hand, research examining the association of mental disorders and internalizing and externalizing symptoms with subsequent risk-taking sexual behaviors is more abundant (Anderson et al. 2017, Boislard P & Poulin 2011, Epstein et al. 2014, Ramrakha et al. 2007, Samek et al. 2014, Schofield et al. 2008, Vasilenko & Lanza 2014, Wickrama & Wickrama 2010), and it may be that depressed adolescents are negligent about protecting themselves against these consequences.

Due to comorbidity between depression and delinquency (Angold & Costello 1993, Capaldi 1991, Chen & Simons-Morton 2009, Connell & Dishion 2006, Loeber et al. 1994, Wolff & Ollendick 2006), one can serve as a mediating or moderating factor to the other in trajectories to early or risk-taking sexual behavior. No

conclusion on the causal direction between depression and delinquency has been presented and both directions seem to be possible (Kovacs et al. 1988, Patterson et al. 1992, Rohde et al. 1991). Fergusson et al. (1996) have argued that a significant part of the comorbidity between depression and delinquency can be explained by delinquent peers, parental attachment, and other common risk factors. However, Beyers et al. (2003) demonstrated causal relations in both directions even after controlling for such risk factors. A modern-day challenge is posed by the easy access to the digital world. For example, adolescents may encounter internet pornography or games with violence, possibly affecting their mental health and behavior. Moreover, sex offenders have ever easier access to children and adolescents via unprotected social media profiles. In addition to adult exploitation, peers can obtain or share sexual or intimate photos with or without the individual's consent. The effect of digital technology on mental health is obscure. Excessive use may be detrimental, whereas moderate use may be beneficial. Digital technology facilitates communication, thus potentially enhancing adolescents' social relationships and overall health. Future research is warranted in order to explore the effects of the digital world on adolescent mental and sexual health and behavior more thoroughly. (The Lancet Child & Adolescent Health 2018)

Longitudinal study designs and various analytical techniques to allow testing for different causal pathways are warranted. Moderating and mediating factors need to be accounted for more specifically. Associations with peers and pubertal timing are especially important factors for further examination. Trajectories between different externalizing behaviors and the associations with adolescent sexual behaviors are likewise interesting topics for future research.

Our study addressed different associations separately with experience of sexual intercourse and multiple sexual partners. Earlier research has found associations between early sexual initiation and risk-taking sexual behaviors (Sandfort et al. 2008, Wellings et al. 2001). Nonetheless, many have argued that this association is not causal but exists due to common genetic and environmental factors and general tendency to externalizing behaviors and impulsivity (Boislard P & Poulin 2011, Cooper et al. 2003, Donahue et al. 2013, Donohew et al. 2000, Huibregtse et al. 2011, Kahn et al. 2002, Samek et al. 2014). Since delinquency and risk-taking sexual behavior are both driven by pronounced impulsivity and sensation-seeking (Kotchick et al. 2001), these trajectories regarding sexual behaviors and externalizing psychopathology demand more precise scrutiny.

The measurement of parental involvement in our study needs further testing of reliability and validity. Being a comprehensive measure of different facets of parenting, it is likely to be useful in future studies.

7.2 Clinical implications

Experience of sexual intercourse in early or middle adolescence and risk-taking sexual behaviors in all phases of adolescence warrant special attention. Clinicians working with adolescents presenting with delinquent behavior or depression need to address their sexual health needs. School healthcare practitioners and health educators especially play a key role at population level in detecting problems and preventing them. Both girls and boys are likely to profit equally from sexual health services since no major sex differences were detected in the current study. Sexuality and sexual health are an important part of the overall health of an adolescent. Thus, sexual behavior, and especially risk-taking sexual behavior, needs to be specifically addressed by a health care professional. General education in the form of lectures is important, but not enough in order to reach adolescents at risk.

Depression prevalence is relatively high among adolescents and depressive symptoms even more common, especially among girls (Mason et al. 2017, Patton et al. 2014). Hence more efficient treatment of depression, for instance in the form of internet therapies or other mini-interventions, would be beneficial. However, since our study established both family factors and mental disorders to be independently associated with adolescent sexual behaviors, multifaceted services would be most useful. Also, investing in the social relationships, such as peer relations, is likely to have a preventive effect on an adolescent. As problem behavior theory suggests multiple problems to exist concurrently, targeting groups of behaviors is preferable to implementing more narrowly targeted interventions. In Finland, school social workers usually bear the main responsibility for intervening in disruptive behavior and conduct problems. However, it could be beneficial first to arrange a doctor's appointment to evaluate mental and sexual health, risk behaviors, and family circumstances comprehensively. Thereafter an adolescent could be referred to the professional(s) whose expertise is most needed.

To prevent future adversities, mental disorders are most effectively treated in their early phases. Thus early and middle adolescents need to be especially targeted in mental and sexual health work because mental disorders may not yet be developed to their full extent and these are also the ones mostly exacerbated by sexual activity.

School health care plays a key role in this preventive work, in problem detection and in primary interventions. Adolescents with mental health problems are less likely to participate in school and community activities (Burnett-Zeigler et al. 2012). Thus, routine clinical examinations and appointments with school nurses and doctors in order to reach all adolescents are likely to be useful.

Adolescents experiencing family conflicts or inept parenting practices or those suffering from mental disorders need to be taken into account to prevent early and risk-taking sexual behaviors. Enhancing parental involvement in adolescent lives is likely to be beneficial and parenting interventions may prove helpful. What is more, parents of general population adolescents are likely to benefit from interventions making them more aware of delinquent behaviors occurring outside their supervision since these adolescents tend to estimate their delinquent behaviors to be at higher levels than their parents do (Asscher et al. 2014).

Because parenting and family factors showed independent associations with adolescent sexual behavior, it is also worthwhile to intervene in these factors. Different conditions affecting parental involvement or family structure, for instance family conflicts, need to be addressed in adult social work but these issues are probably best managed in direct collaboration between adult and adolescent social work and health services.

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REFERENCES

Aalberg V. 2016. Nuoruusiän psyykkinen kehitys. In *Lastenpsykiatria ja nuorisopsykiatria*, eds. K Kumpulainen, E Aronen, H Ebeling, E Laukkanen, M Marttunen, et al., pp. 35–42. Kustannus Oy Duodecim. 1st ed.

Abar CC, Jackson KM, Wood M. 2014. Reciprocal relations between perceived parental knowledge and adolescent substance use and delinquency: The moderating role of parent – teen relationship quality. *Dev. Psychol.* 50(9):2176–87

Abram KM, Teplin LA, McClelland GM, Dulcan MK. 2003. Comorbid psychiatric disorders in youth in juvenile detention. *Arch Gen Psychiatry*. 60:1097–1108

Abramson LY, Metalsky GI, Alloy LB. 1989. Hopelessness depression: A theory-based subtype of depression. *Psychol. Rev.* 96(2):358–72

Adams R, Laursen B. 2001. The organization and dynamics of adolescent conflict with parents and friends. *J. Marriage Fam.* 63:97–110

Agyapong VIO, Juhás M, Ritchie A, Ogunsina O, Ambrosano L, Corbett S. 2017. Prevalence rate and demographic and clinical correlates of child sexual abuse among new psychiatric outpatients in a city in Northern Alberta. *J. Child Sex. Abus.* 26(4):442–52

Ahlin EM. 2014. Locus of control redux: Adolescents' choice to refrain from violence. *J. Interpers. Violence*. 29(14):2695–2717

Ahlin EM, Lobo Antunes MJ. 2015. Locus of control orientation: Parents, peers, and place. *J. Youth Adolesc.* 44(9):1803–18

Ainsworth M, Blehar M, Waters E, Wall S. 1978. *Patterns of Attachment: A Psychological Study of the Strange Situation*. New York: Lawrence Erlbaum Associates. 1st ed.

Akers R, Sellers C. 2004. *Criminological Theories: Introduction, Evaluation, and Application*. Los Angeles, CA: Roxbury Publishing. 4th ed.

Allen JP, Kuperminc G, Bell K. 1998. Attachment and adolescent psychosocial functioning. *Child Dev.* 69(5):1406–19

Anderson SF, Salk RH, Hyde JS. 2015. Stress in romantic relationships and adolescent depressive symptoms: Influence of parental support. *J. Fam. Psychol.* 29(3):339–48

Anderson SL, Zheng Y, McMahon RJ. 2017. Predicting risky sexual behavior: the unique and interactive roles of childhood conduct disorder symptoms and callous-unemotional traits. *J. Abnorm. Child Psychol.* 45(6):1147–56

Angold A, Costello EJ. 1993. Depressive comorbidity in children and adolescents: Empirical, theoretical, and methodological issues. *Am. J. Psychiatry*. 150:1779–91

Angold A, Costello EJ, Worthman CM. 1998. Puberty and depression: The roles of age, pubertal status and pubertal timing. *Psychol. Med.* 28(1):51–61

Arkes J. 2013. The temporal effects of parental divorce on youth substance use. *Subst. Use Misuse*. 48(3):290–97

Arnett JJ. 2000. Emerging adulthood: A theory of development from the late teens through the twenties. *Am. Psychol.* 55(5):469–80

Asscher J, Wissink I, Deković M, Prinzie P, Stams G. 2014. Delinquent behavior, poor relationship quality with parents, and involvement with deviant peers in delinquent

and nondelinquent adolescents: Different processes, informant bias, or both? *Int. J. Offender Ther. Comp. Criminol.* 58(9):1001–19

Aula MK. 2012. *Lapsen oikeuksien näkökulma lasten ja nuorten osallistumisesta kyselytutkimuksiin*. Retrieved from. http://lapsiasia.fi/tata-mielta/aloitteet/aloitteet-2012/lapsen-oikeuksien-nakokulma-lasten-ja-nuorten-osallistumisesta-kyselytutkimuksiin. Date accessed 28.2.2019.

Baams L, Dubas JS, Overbeek G, Van Aken MAG. 2015. Transitions in body and behavior: A meta-analytic study on the relationship between pubertal development and adolescent sexual behavior. *J. Adolesc. Health.* 56(6):586–98

Bachar E, Canetti L, Bonne O, Denour AK, Shalev AY. 1997. Psychological well-being and ratings of psychiatric symptoms in bereaved israeli adolescents: Differential effect of war- versus accident-related bereavement. *J. Nerv. Ment. Dis.* 185(6):402–6

Bailey JA, Fleming CB, Henson JN, Catalano RF, Haggerty KP. 2008. Sexual risk behavior 6 months post-high school: Associations with college attendance, living with a parent, and prior risk behavior. *J. Adolesc. Health.* 42(6):573–79

Bandura A. 1971. *Social Learning Theory*. New York, NY: General Learning Press. 1st ed.

Bandura A. 1994. Self-efficacy. In *Encyclopedia of Human Behavior*, ed. VS Ramachaudran, pp. 71–81. New York: Academic Press. 4th ed.

Bandura A. 1997. *Self-Efficacy: The Exercise of Control*. New York, NY: Worth Publishers. 1st ed.

Bandura A. 2001. Social cognitive theory: An agentic perspective. *Annu. Rev. Psychol.* 52:1–26

Barnes GM, Reifman AS, Farrell MP, Dintcheff BA. 2000. The effects of parenting on the development of adolescent alcohol misuse: A six-wave latent growth model. *J. Marriage Fam.* 62:175–86

Barriga AQ, Landau JR, Stinson BL, Liau AK, Gibbs JC. 2000. Cognitive distortion and problem behaviors in adolescents. *Crim. Justice Behav.* 27:36–56

Beardslee WR, Keller MB, Seifer R, Lavori PW, Staley J, et al. 1996. Prediction of adolescent affective disorder: Effects of prior parental affective disorders and child psychopathology. *J. Am. Acad. Child Adolesc. Psychiatry*. 35(3):279–88

Bechara A, Damasio H, Damasio A. 2000. Emotion, decision making and the orbitofrontal cortex. *Cereb. Cortex*. 10(3):295–307

Bechara A, Damasio H, Damasio A, Lee GP. 1999. Different contributions of the human amygdala and ventromedial prefrontal cortex to decision-making. *J. Neurosci.* 19(13):5473–81

Beck A. 1987. Cognitive models of depression. *J. Cogn. Psychoter. An Int. Q.* 1:5–37

Beck A, Rial W, Rickels K. 1974. Short form of depression inventory: cross-validation. *Psychol. Rep.* 34:1184–86

Belsky J, Houts RM, Fearon RMP. 2010. Infant attachment security and the timing of puberty: Testing an evolutionary hypothesis. *Psychol. Sci.* 21(9):1195–1201

Bennett DS, Ambrosini PJ, Bianchi M, Barnett D, Metz C, Rabinovich H. 1997. Relationship of Beck Depression Inventory factors to depression among adolescents. *J. Affect. Disord.* 45:127–34

Benson P, Scales P, Hamilton S, Sesma A. 2006. Positive youth development: Theory, research and application. In *Handbook of Child Psychology*, ed. R Lerner, pp. 894–914. Hoboken, New Jersey: John Wiley & Sons. 6th ed.

Berkout O V., Young JN, Gross AM. 2011. Mean girls and bad boys: Recent research on gender differences in conduct disorder. *Aggress. Violent Behav.* 16(6):503–11

Bersamin M, Todd M, Fisher DA, Hill DL, Grube JW, Walker S. 2008. Parenting practices and adolescent sexual behavior: A longitudinal study. *J. Marriage Fam.* 70(1):97–112
Beyers JM, Loeber R. 2003. Untangling developmental relations between depressed mood and delinquency in male adolescents. *J. Abnorm. Child Psychol.* 31(3):247–66
Bingham CR, Crockett LJ. 1996. Longitudinal adjustment patterns of boys and girls experiencing early, middle, and late sexual intercourse. *Dev. Psychol.* 32(4):647–58
Blakemore S. 2012. Development of the social brain in adolescence. *J. R. Soc. Med.* 105(3):111–16
Blakemore SJ, Choudhury S. 2006. Development of the adolescent brain: Implications for executive function and social cognition. *J. Child Psychol. Psychiatry Allied Discip.* 47(3–4):296–312
Blatt SJ, Homann E. 1992. Parent-child interaction in the etiology of dependent and self-critical depression. *Clin. Psychol. Rev.* 12:47–91
Blos P. 1962. *On Adolescence: A Psychoanalytic Interpretation*. New York: Free Press. 1st ed.
Blos P. 1967. The Second Individuation Process of Adolescence. *Psychoanal. Study Child.* 22(1):162–86
Blos P. 1974. *The Young Adolescent: Clinical Studies*. New York: Free Press. 1st ed.
Blum RW, Beuhring T, Shew ML, Bearinger LH, Resnick MD. 2000. The effects of race/ethnicity, income, and family structure on adolescent risk behaviors. *Am. J. Public Health.* 90(12):1879–84
Boelen PA, Spuij M. 2013. Symptoms of post-traumatic stress disorder in bereaved children and adolescents: Factor structure and correlates. *J. Abnorm. Child Psychol.* 41(7):1097–1108
Bohlin G, Hagekull B. 2009. Socio-emotional development: From infancy to young adulthood. *Scand. J. Psychol.* 50:592–601
Boislard M-A, van de Bongardt D, Blais M. 2016. Sexuality (and lack thereof) in adolescence and early adulthood: A review of the literature. *Behav. Sci. (Basel).* 6(1):8
Boislard P M-A, Poulin F. 2011. Individual, familial, friends-related and contextual predictors of early sexual intercourse. *J. Adolesc.* 34(2):289–300
Bordini GS, Sperb TM. 2013. Sexual double standard: A review of the literature between 2001 and 2010. *Sex. Cult.* 17(4):686–704
Bowlby J. 1969. *Attachment and Loss: Vol. 1. Attachment*. New York: Basic Books. 1st ed.
Bowlby J. 1973. *Attachment and Loss: Vol. 2. Separation Anxiety and Anger*. New York: Basic Books. 1st ed.
Brakefield T, Wilson H, Donenberg G. 2012. Maternal models of risk: Links between substance use and risky sexual behavior in African American female caregivers and daughters. *J. Adolesc.* 35(4):959–68
Branstetter S, Furman W, Cottrell L. 2009. The influence of representations of attachment, maternal- adolescent relationship quality, and maternal monitoring on adolescent substance use: A two-year longitudinal examination. *Child Dev.* 80(5):1448–62
Brix N, Ernst A, Lauridsen LLB, Parner E, Støvring H, et al. 2019. Timing of puberty in boys and girls: A population-based study. *Paediatr. Perinat. Epidemiol.* 33(1):70–78
Bromberg D, O'Donohue W. 2013. *Handbook of Child and Adolescent Sexuality*. United States: Academic Press. 1st ed.
Brook JS, Whiteman M, Gordon AS, Cohen P. 1986. Dynamics of childhood and adolescent personality traits and adolescent drug use. *Dev. Psychol.* 22(3):403–14

Brooks Holliday S, Ewing B, Storholm E, Parast L, D'Amico E. 2017. Gender differences in the association between conduct disorder and risky sexual behavior. *J. Adolesc.* 56:75–83

Buist KL, Deković M, Prinzie P. 2013. Sibling relationship quality and psychopathology of children and adolescents: A meta-analysis. *Clin. Psychol. Rev.* 33(1):97–106

Burnett-Zeigler I, Walton M, Ilgen M, Barry K, Chermack S, et al. 2012. Prevalence and correlates of mental health problems and treatment among adolescents seen in primary care. *J. Adolesc. Health.* 50(6):559–64

Cameron JL. 2004. Interrelationships between hormones, behavior, and affect during adolescence: Understanding hormonal, physical, and brain changes occurring in association with pubertal activation of the reproductive axis - Introduction to part III. *Ann. N. Y. Acad. Sci.* 1021:110–23

Capaldi D. 1991. Co-occurrence of conduct problems and depressive symptoms in early adolescent boys: I. Familial factors and general adjustment at Grade 6. *Dev. Psychopathol.* 3(3):277–300

Capaldi D, Crosby L, Stoolmiller M. 1996. Predicting the timing of first sexual intercourse for at-risk adolescent males. *Child Dev.* 67(2):344–59

Capaldi D, Stoolmiller M, Clark S, Owen L. 2002. Heterosexual risk behaviors in at-risk young men from early adolescence to young adulthood: Prevalence, prediction, and association with STD contraction. *Dev. Psychol.* 38(3):394–406

Carlsund A, Eriksson U, Lofstedt P, Sellstrom E. 2013. Risk behaviour in Swedish adolescents: Is shared physical custody after divorce a risk or a protective factor? *Eur. J. Public Health.* 23(1):3–8

Carroll A, Houghton S, Wood R, Unsworth K, Hattie J, et al. 2009. Self-efficacy and academic achievement in Australian high school students: The mediating effects of academic aspirations and delinquency. *J. Adolesc.* 32(4):797–817

Cassidy J, Kirsh SJ, Scolton KL, Parke RD. 1996. Attachment and representations of peer relationships. *Dev. Psychol.* 32(5):892–904

Cavazos-Rehg P, Spitznagel E, Bucholz K, Nurnberger J, Edenberg H, et al. 2010. Predictors of sexual debut at age 16 or younger. *Arch. Sex. Behav.* 39(3):664–73

Centers for Disease Control and Prevention. 2012. Youth risk behavior surveillance—United States 2011. *Morb. Mortal. Wkly. Rep.* 61:

Chapman E, Werner-Wilson R. 2008. Does positive youth development predict adolescent attitudes about sexuality? *Adolescence.* 43(171):505–23

Charman T. 1994. The stability of depressed mood in young adolescents: A school-based survey. *J. Affect. Disord.* 30:109–16

Chayer C, Freedman M. 2001. Frontal lobe functions. *Curr. Neurol. Neurosci. Rep.* 1(6):547–52

Chen R, Simons-Morton B. 2009. Concurrent changes in conduct problems and depressive symptoms in early adolescents: A developmental person-centered approach. *Dev. Psychopathol.* 21(1):285–307

Chumlea WC, Schubert C, Roche A, Kulin H, Lee P, et al. 2003. Age at menarche and racial comparisons in US girls. *Pediatrics.* 111(1):110–13

Cohen DA, Farley TA, Taylor SN, Martin DH, Schuster MA. 2002. When and where do youths have sex? The potential role of adult supervision. *Pediatrics.* 110(6):1–6

Cohen S, Wills T. 1985. Stress, social support, and the buffering hypothesis. *Psychol. Bull.* 98(2):310–57

Coie J, Kupersmidt J. 1983. A behavioral analysis of emerging social status in boys' groups. *Child Dev.* 54(6):1400–1416

Coley R, Votruba-Drzal E, Schindler H. 2009. Fathers' and mothers' parenting predicting and responding to adolescent sexual risk behaviors. *Child Dev.* 80(3):808–27

Connell AM, Dishion TJ. 2006. The contribution of peers to monthly variation in adolescent depressed mood: A short-term longitudinal study with time-varying predictors. *Dev. Psychopathol.* 18:139–54

Connelly B, Johnston D. 1993. The prevalence of depression in a high school population. *Adolescence.* 28(109):149

Connolly E, Schwartz J, Nedelec J, Beaver K, Barnes JC. 2015. Different slopes for different folks: Genetic influences on growth in delinquent peer association and delinquency during adolescence. *J. Youth Adolesc.* 44(7):1413–27

Cooper ML, Wood P, Orcutt H, Albino A. 2003. Personality and the predisposition to engage in risky or problem behaviors during adolescence. *J. Pers. Soc. Psychol.* 84(2):390–410

Copeland W, Shanahan L, Miller S, Costello EJ, Angold A, Maughan B. 2010. Outcomes of early pubertal timing in young women: A prospective population-based study. *Am. J. Psychiatry.* 167(10):1218–25

Costello JE, Erkanli A, Angold A. 2006. Is there an epidemic of child or adolescent depression? *J. Child Psychol. Psychiatry.* 47(12):1263–71

Crawford M, Popp D. 2003. Sexual double standards: A review and methodological critique of two decades of research. *J. Sex Res.* 40(1):13–26

Crick NR, Zahn-Waxler C. 2003. The development of psychopathology in females and males: Current progress and future challenges. *Dev. Psychopathol.* 15(3):719–42

Crockett LJ, Raffaelli M, Shen YL. 2006. Linking self-regulation and risk proneness to risky sexual behavior: Pathways through peer pressure and early substance use. *J. Res. Adolesc.* 16:503–25

Cromer B. 2011. Adolescent development. In *Nelson Textbook of Pediatrics*, eds. R Kliegman, R Behrman, H Jenson, B Stanton, pp. 649–60. Philadelphia: Saunders Elsevier. 19th ed.

D'Onofrio BM, Turkheimer E, Emery RE, Maes HH, Silberg J, Eaves LJ. 2007. A children of twins study of parental divorce and offspring psychopathology. *J. Child Psychol. Psychiatry Allied Discip.* 48(7):667–75

Davila J, Steinberg SJ, Kachadourian L, Cobb R, Fincham F. 2004. Romantic involvement and depressive symptoms in early and late adolescence: The role of a preoccupied relational style. *Pers. Relatsh.* 11(2):161–78

Davila J, Stroud CB, Starr LR, Miller MR, Yoneda A, Hershenberg R. 2009. Romantic and sexual activities, parent-adolescent stress, and depressive symptoms among early adolescent girls. *J. Adolesc.* 32(4):909–24

Davoli M, Perucci C, Sangalli M, Brancato G, Dell'Uomo G. 1992. Reliability of sexual behaviour data among high school students in Rome. *Epidemiology.* 3:531–35

de Kemp R, Scholte R, Overbeek G, Engels R. 2006. Early adolescent delinquency. *Crim. Justice Behav.* 33(4):488–510

de Looze M, Harakeh Z, van Dorsselaer S, Raaijmakers Q, Vollebergh W, ter Bogt T. 2012. Explaining educational differences in adolescent substance use and early sexual debut: The role of parents and peers. *J. Adolesc.* 35(4):1035–44

De Vries S, Hoeve M, Stams G, Asscher J. 2016. Adolescent-parent attachment and externalizing behavior: The mediating role of individual and social factors. *J Abnorm Child Psychol.* 44:283–94

Deptula DP, Henry DB, Schoeny ME. 2010. How can parents make a difference? Longitudinal associations with adolescent sexual behavior. *J. Fam. Psychol.* 24(6):731–39

Devine D, Long P, Forehand R. 1993. A prospective study of adolescent sexual activity. Description, correlates, and predictors. *Adv. Behav. Res. Ther.* 15:185–209

Diagnostic and statistical manual of mental disorders (5th ed.). 2013. Washington DC

DiClemente R, Wingood G, Crosby R, Cobb B, Harrington K, Davies S. 2001a. Parent-adolescent communication and sexual risk behaviors among African American adolescent females. *J. Pediatr.* 139(3):407–12

DiClemente R, Wingood G, Crosby R, Sionean C, Cobb B, et al. 2001b. Parental monitoring: association with adolescents' risk behaviors. *Pediatrics*. 107(6):1363–68

Dishion TJ, McMahon RJ. 1998. Parental monitoring and the prevention of child and adolescent problem behavior: A conceptual and empirical formulation. *Clin. Child Fam. Psychol. Rev.* 1(1):61–75

Dishion TJ, Nelson SE, Bullock BM. 2004. Premature adolescent autonomy: parent disengagement and deviant peer process in the amplification of problem behaviour. *J. Adolesc.* 27(5):515–30

Dishion TJ, Patterson GR. 2006. The development and ecology of antisocial behavior in children and adolescents. In *Risk, Disorder, and Adaptation*, pp. 503–41. John Wiley & Sons. 3rd ed.

Dishion TJ, Tipsord JM. 2011. Peer contagion in child and adolescent social and emotional development. *Annu. Rev. Psychol.* 62(1):189–214

Dittus P, Michael S, Becasen J, Gloppen K, McCarthy K, Guilamo-Ramos V. 2015. Parental monitoring and its associations with adolescent sexual risk behavior: A meta-analysis. *Pediatrics*. 136(6):1587–99

Dittus PJ, Jaccard J. 2000. Adolescents' perceptions of maternal disapproval of sex: Relationship to sexual outcomes. *J. Adolesc. Health.* 26(4):268–78

Dodge K. 1983. Behavioral antecedents of peer social status. *Child Dev.* 54(6):1386–99

Dodge K, Coie J, Lynam D. 2006. Aggression and antisocial behavior in youth. In *Handbook of Child Psychology: Social, Emotional, and Personality Development*, eds. N Eisenberg, W Damon, R Lerner, pp. 719–88. Hoboken, New Jersey: John Wiley & Sons

Dodge KA. 1993. Social-cognitive mechanisms in the development of conduct disorder and depression. *Annu. Rev. Psychol.* 44:559–84

Dogan SJ, Conger RD, Kim KJ, Masyn KE. 2007. Cognitive and parenting pathways in the transmission of antisocial behavior from parents to adolescents. *Child Dev.* 78(1):335–49

Donahue K, Lichtenstein P, Lundström S, Anckarsäter H, Gumpert C, et al. 2013. Childhood behavior problems and adolescent sexual risk behavior: Familial confounding in the Child and adolescent twin study in Sweden (CATSS). *J. Adolesc. Health.* 52(5):606–12

Donenberg GR, Emerson E, Mackesy-Amiti ME. 2011. Sexual risk among African American girls: psychopathology and mother-daughter relationships. *J. Consult. Clin. Psychol.* 79(2):153–58

Donnelly D, Burgess E, Anderson S, Davis R, Dillard J. 2001. Involuntary celibacy: A life course analysis. *J. Sex Res.* 38(2):159–69

Donohew L, Zimmerman R, Cupp PS, Novak S, Colon S, Abell R. 2000. Sensation seeking, impulsive decision-making, and risky sex: Implications for risk-taking and design of interventions. *Pers. Individ. Dif.* 28:1079–91

Donovan J, Jessor R. 1985. Structure of problem behavior in adolescence and young adulthood. *J. Consult. Clin. Psychol.* 53(6):890–904

Dubow EF, Boxer P, Huesmann LR. 2009. Long-term effects of parents' education on children's educational and occupational success: Mediation by family interactions, child aggression, and teenage aspirations. *Merrill Palmer Q. (Wayne State Univ. Press.* 55(3):224–49

Dykas M, Cassidy J. 2011. Attachment and the processing of social information across the life span: Theory and evidence. *Psychol. Bull.* 137(1):19–46

Edelbrock C, Rende R, Plomin R, Thompson LA. 1995. A twin study of competence and problem behavior in childhood and early adolescence. *J. Child Psychol. Psychiatry*. 36:775–85

Edgardh K. 1993. *Tonåringar - Sex Och Samlevnad*. Gothenburg, Sweden: Förlagshuset Gothia

Edgardh K. 2000. Sexual behaviour and early coitarche in a national sample of 17 year old Swedish girls. *Sex. Transm. Infect.* 76(2):98–102

Edgardh K. 2002. Sexual behaviour and early coitarche in a national sample of 17-year-old Swedish boys. *Acta Paediatr.* 91(9):985–91

Egger HL, Angold A. 2006. Common emotional and behavioral disorders in preschool children: presentation, nosology, and epidemiology. *J. Child Psychol. Psychiatry*. 47(3–4):313–37

Ehrenberg MF, Cox DN, Koopman RF. 1990. The prevalence of depression in high school students. *Adolescence*. 25:905–912

Eisenberg N, Morris A. 2004. Moral cognitions and prosocial responding in adolescence. In *Handbook of Adolescent Psychology*, eds. R Lerner, L Steinberg, pp. 155–88. Hoboken, New Jersey: John Wiley & Sons. 2nd ed.

Elam KK, Wang FL, Bountress K, Chassin L, Pandika D, Lemery-Chalfant K. 2016. Predicting substance use in emerging adulthood: A genetically informed study of developmental transactions between impulsivity and family conflict. *Dev. Psychopathol.* 28(3):673–88

Eley TC, Lichtenstein P, Moffitt TE. 2003. A longitudinal behavioral genetic analysis of the etiology of aggressive and nonaggressive antisocial behavior. *Dev. Psychopathol.* 15:383–402

Elliot D, Morse B. 1987. Drug use, delinquency, and sexual activity. In *Drug Abuse and Adolescent Sexual Activity, Pregnancy, and Parenthood*, eds. C Jones, E McAnarney, pp. 32–60. Washington, DC: US Government Printing Office

Elliott D, Huizinga D, Ageton S. 1985. *Explaining Delinquency and Drug Use*. Beverly Hills, CA: Sage Publications. 1st ed.

Elliott G, Feldman S. 1990. Capturing the adolescent experience. In *At the Threshold: The Developing Adolescent*, pp. 1–13. Cambridge: Harvard University Press. 1st ed.

Epstein M, Bailey JA, Manhart LE, Hill KG, Hawkins JD. 2014. Sexual risk behavior in young adulthood: broadening the scope beyond early sexual initiation. *J. Sex Res.* 51(7):721–30

Erikson E. 1968. *Identity, Youth, and Crisis*. New York: W. W. Norton. 1st ed.

Ethier K, Harper C, Hoo E, Dittus P. 2016. The longitudinal impact of perceptions of parental monitoring on adolescent initiation of sexual activity. *J. Adolesc. Health.* 59(5):570–76

Evans L, Kouros C, Frankel S, McCauley E, Diamond G, et al. 2015. Longitudinal relations between stress and depressive symptoms in youth: Coping as a mediator. *J. Abnorm. Child Psychol.* 43(2):355–68

Exner-Cortens D, Eckenrode J, Rothman E. 2013. Longitudinal associations between teen dating violence victimization and adverse health outcomes. *Pediatrics*. 131(1):71–78

Falah-Hassani K, Kosunen E, Rimpelä A. 2006. The use of oral contraceptives among Finnish teenagers from 1981 to 2003. *J. Adolesc. Health*. 39:649–55

Family Federation of Finland. 2017. *FINSEX seksielämän aloittaminen*. Retrieved from. http://www.vaestoliitto.fi/tieto_ja_tutkimus/vaestontutkimuslaitos/seksologinen_tutkimus/suomalaisten-seksuaalisuus-finse/finsex-seksielaman-aloittaminen/. Date accessed 28.2.2019.

Family Federation of Finland. 2019. *FINSEX Ehkäisy*. Retrieved from. http://www.vaestoliitto.fi/tieto_ja_tutkimus/vaestontutkimuslaitos/seksologinen_tutkimus/suomalaisten-seksuaalisuus-finse/finsex-ehkaisy/. Date accessed 17.2.2019.

Farrell A, Danish S, Howard C. 1992. Relationship between drug use and other problem behaviors in urban adolescents. *J. Consult. Clin. Psychol.* 60(5):705–12

Fazel S, Doll H, Långström N. 2008. Mental disorders among adolescents in juvenile detention and correctional facilities: A systematic review and metaregression analysis of 25 surveys. *J. Am. Acad. Child Adolesc. Psychiatry*. 47(9):1010–19

Fechner PY. 2002. Gender differences in puberty. *J. Adolesc. Health*. 30S:44–48

Fergus S, Zimmerman MA, Caldwell CH. 2007. Growth trajectories of sexual risk behavior in adolescence and young adulthood. *Am. J. Public Health*. 97(6):1096–1101

Fergusson DM, Horwood LJ, Ridder EM. 2005. Show me the child at seven: The consequences of conduct problems in childhood for psychosocial functioning in adulthood. *J. Child Psychol. Psychiatry*. 46(8):837–49

Fergusson DM, Lynskey MT, Horwood LJ. 1996. Origins of comorbidity between conduct and affective disorders. *J. Am. Acad. Child Adolesc. Psychiatry*. 35(4):451–60

Fletcher A. 2004. Parental influences on adolescent problem behavior: Revisiting Stattin and Kerr. *Child Dev.* 75(3):781–96

Fonagy P, Target M. 1997. Attachment and reflective function: Their role in self-organization. *Dev. Psychopathol.* 9:679–700

Forbes EE, Dahl RE. 2010. Pubertal development and behavior: Hormonal activation of social and motivational tendencies. *Brain Cogn.* 72(1):66–72

Francis DD, Diorio J, Plotsky PM, Meaney MJ. 2002. Environmental enrichment reverses the effects of maternal separation on stress reactivity. *J. Neurosci.* 22(18):7840–43

Freud S. 1976. The ego and the id. In *The Standard Edition of the Complete Psychological Works of Sigmund Freud*, ed. J Strachey. London: W. W. Norton. 1st ed.

Fröjd S, Kaltiala-Heino R, Rimpelä M. 2007. The association of parental monitoring and family structure with diverse maladjustment outcomes in middle adolescent boys and girls. *Nord. J. Psychiatry*. 61(4):296–303

Gardner M, Steinberg L. 2005. Peer influence on risk taking, risk preference, and risky decision making in adolescence and adulthood: An experimental study. *Dev. Psychol.* 41(4):625–35

Ge X, Kim IJ, Brody GH, Conger RD, Simons RL, et al. 2003. It's about timing and change: pubertal transition effects on symptoms of major depression among African American youths. *Dev. Psychol.* 39(3):430–39

Gilbert KE. 2012. The neglected role of positive emotion in adolescent psychopathology. *Clin. Psychol. Rev.* 32(6):467–81

Goldstein S, Malanchuk O, Davis-Kean P, Eccles J. 2007. Risk factors of sexual harassment by peers: A longitudinal investigation of African American and European American adolescents. *J. Res. Adolesc.* 17(2):285–300

Goodson P, Evans A, Edmundson E. 1997. Female adolescents and onset of sexual intercourse: a theory-based review of research from 1984 to 1994. *J Adolesc Health.* 21(3):147–56

Gottfredson MR, Hirschi T. 1990. *A General Theory of Crime*. Palo Alto, CA: Stanford University Press. 1st ed.

Graber J. 2013. Pubertal timing and the development of psychopathology in adolescence and beyond. *Horm. Behav.* 64:262–69

Graber JA, Lewinsohn PM, Seeley JR, Brooks-Gunn J. 1997. Is psychopathology associated with the timing of pubertal development? *J. Am. Acad. Child Adolesc. Psychiatry*. 36(12):1768–76

Graber JA, Seeley JR, Brooks-Gunn J, Lewinsohn PM. 2004. Is pubertal timing associated with psychopathology in young adulthood? *J. Am. Acad. Child Adolesc. Psychiatry*. 43(6):718–26

Grusec J. 2011. Socialization processes in the family: Social and emotional development. *Annu. Rev. Psychol.* 62(1):243–69

Gullo M, Loxton N, Price T, Voisey J, Young R, Connor J. 2017. A laboratory model of impulsivity and alcohol use in late adolescence. *Behav. Res. Ther.* 97:52–63

Häfner H, Riecher A, Maurer K, Löffler W, Munk-Jørgensen P, Strömgren E. 1989. How does gender influence age at first hospitalization for schizophrenia? *Psychol. Med.* 19(4):903–18

Hall G. 1904. *Adolescence: Its Psychology and Its Relations to Physiology, Anthropology, Sociology, Sex, Crime, Religion and Education*. New York: Appleton & Company. 1st ed.

Hall J, Guyton A. 2011. *Guyton and Hall Textbook of Medical Physiology*. Philadelphia, PA: Saunders Elsevier. 12th ed.

Hallfors DD, Waller MW, Bauer D, Ford CA, Halpern CT. 2005. Which comes first in adolescence - Sex and drugs or depression? *Am. J. Prev. Med.* 29(3):163–70

Hallfors DD, Waller MW, Ford C a, Halpern CT, Brodish PH, Iritani B. 2004. Adolescent depression and suicide risk: association with sex and drug behavior. *Am. J. Prev. Med.* 27(3):224–31

Hamza C a, Willoughby T. 2011. Perceived parental monitoring, adolescent disclosure, and adolescent depressive symptoms: a longitudinal examination. *J. Youth Adolesc.* 40(7):902–15

Harakeh Z, De Looze M, Schrijvers C, van Dorsselaer S, Vollebergh W. 2012. Individual and environmental predictors of health risk behaviours among Dutch adolescents: The HBSC study. *Public Health.* 126(7):566–73

Harrington R, Clark A. 1998. Prevention and early intervention for depression in adolescence and early adult life. *Eur Arch Psychiatry Clin Neurosci.* 248:32–45

Havighurst RJ. 1948. *Developmental Tasks and Education*. Chicago: University of Chicago Press. 1st ed.

Hawkins JD, Catalano RF, Miller JY. 1992. Risk and protective factors for alcohol and other drug problems in adolescence and early adulthood: Implications for substance abuse prevention. *Psychol. Bull.* 112(1):64–105

Healey A, Knapp M, Farrington DP. 2004. Adult labour market implications of antisocial behaviour in childhood and adolescence: Findings from a UK longitudinal study. *Appl. Econ.* 36:93–105

Heidmets L, Samm A, Sisask M, Kõlves K, Aasvee K, Värnik A. 2010. Sexual behavior, depressive feelings, and suicidality among Estonian school children aged 13 to 15 years. *Cris. J. Cris. Interv. Suicide*. 31(3):128–36

Herres J, Kobak R. 2015. The role of parent, teacher, and peer events in maintaining depressive symptoms during early adolescence. *J. Abnorm. Child Psychol.* 43:325–37

Hershenberg R, Davila J. 2010. Depressive symptoms and sexual experiences among early adolescent girls: interpersonal avoidance as moderator. *J. Youth Adolesc.* 39(8):967–76

Hess KL, Crepaz N, Rose C, Purcell D, Paz-Bailey G. 2017. Trends in sexual behavior among men who have sex with men (MSM) in high-income countries, 1990–2013: A systematic review. *AIDS Behav.* 21(10):2811–34

Hirschi T. 1969. *Causes of Delinquency*. Berkeley, CA: University of California Press. 1st ed.

Hofstra M, Van Der Ende J, Verhulst F. 2001. Adolescents' self-reported problems as predictors of psychopathology in adulthood: 10-year follow-up study. *Br. J. Psychiatry*. 179:203–9

Hui Yap M, Jorm A. 2015. Parental factors associated with childhood anxiety, depression, and internalizing problems: A systematic review and meta-analysis. *J. Affect. Disord.* 175:424–40

Hui Yap M, Pilkington P, Ryan S, Jorm A. 2014. Parental factors associated with depression and anxiety in young people: A systematic review and meta-analysis. *J. Affect. Disord.* 156:8–23

Huibregtse B, Bornovalova M, Hicks B, McGue M, Iacono W. 2011. Testing the role of adolescent sexual initiation in later-life sexual risk behavior: A longitudinal twin design. *Psychol. Sci.* 22(7):924–33

Impett EA, Sorsoli L, Schooler D, Henson JM, Tolman DL. 2008. Girls' relationship authenticity and self-esteem across adolescence. *Dev. Psychol.* 44(3):722–33

Jackson C, Hanson R, Amstadter A, Saunders B, Kilpatrick D. 2013. The longitudinal relation between peer violent victimization and delinquency: Results from a national representative sample of U.S. adolescents. *J. Interpers. Violence*. 28(8):1596–1616

Jamieson LK, Wade TJ. 2011. Early age of first sexual intercourse and depressive symptomatology among adolescents. *J. Sex Res.* 48(5):450–60

Jessor R. 1991. Risk behavior in adolescence: A psychosocial framework for understanding and action. *J. Adolesc. Health*. 12(8):597–605

Jessor R, Jessor S. 1977. *Problem Behavior and Psychosocial Development: A Longitudinal Study of Youth*. New York: Academic Press. 1st ed.

Jo Y, Zhang Y. 2014. Parenting, self-control, and delinquency: Examining the applicability of Gottfredson and Hirschi's General theory of crime to South Korean youth. *Int. J. Offender Ther. Comp. Criminol.* 58(11):1340–63

Joyner K, Udry JR. 2000. You don't bring me anything but down: Adolescent romance and depression. *J. Health Soc. Behav.* 41(4):369–91

Junger-Tas J. 1994. Delinquent behavior among young people in the Western world: First results of the international self-report delinquency study. In *Studies on Crime and Justice: A Series from the Dutch Research and Documentation Centre*, eds. J Junger-Tas, G-J Terlouw, M Klein. Amsterdam: Kugler Publications

Kahn J, Kaplowitz R, Goodman E, Emans SJ. 2002. The association between impulsiveness and sexual risk behaviors in adolescent and young adult women. *J. Adolesc. Health*. 30:229–32

Kahn R, Holmes C, Farley J, Kim-Spoon J. 2015. Delay discounting mediates parent-adolescent relationship quality and risky sexual behavior for low self-control adolescents. *J. Youth Adolesc.* 44(9):1674–87

Kalina O, Geckova AM, Klein D, Jarcuska P, Orosova O, et al. 2013. Mother's and father's monitoring is more important than parental social support regarding sexual risk behaviour among 15-year-old adolescents. *Eur. J. Contracept. Reprod. Health. Care.* 18(2):95–103

Kaltiala-Heino R, Fröjd S, Marttunen M. 2015. Depression, conduct disorder, smoking and alcohol use as predictors of sexual activity in middle adolescence: a longitudinal study. *Health. Psychol. Behav. Med.* 3(1):25–39

Kaltiala-Heino R, Koivisto A, Marttunen M, Fröjd S. 2011. Pubertal timing and substance use in middle adolescence: a 2-year follow-up study. *J. Youth Adolesc.* 40:288–1301

Kaltiala-Heino R, Kosunen E, Rimpelä M. 2003a. Pubertal timing, sexual behaviour and self-reported depression in middle adolescence. *J. Adolesc.* 26(5):531–45

Kaltiala-Heino R, Marttunen M, Rantanen P, Rimpelä M. 2003b. Early puberty is associated with mental health problems in middle adolescence. *Soc. Sci. Med.* 57(6):1055–64

Kaltiala-Heino R, Rimpela M, Rantanen P, Laippala P. 1999. Finnish modification of the 13-item Beck Depression Inventory in screening an adolescent population for depressiveness and positive mood. *Nord. J. Psychiatry*. 53(6):451–57

Kaltiala-Heino R, Rimpelä M, Rissanen A, Rantanen P. 2001. Early puberty and early sexual activity are associated with bulimic-type eating pathology in middle adolescence. *J. Adolesc. Health.* 28(4):346–52

Keating D. 2004. Cognitive and brain development. In *Handbook of Adolescent Psychology*, eds. R Lerner, L Steinberg, pp. 45–84. Hoboken, New Jersey: John Wiley & Sons. 2nd ed.

Keelan JPR, Dion KK, Dion KL. 1998. Attachment style and relationship satisfaction: Test of a self-disclosure explanation. *Can. J. Behav. Sci.* 30:24–35

Kelly JB. 2000. Children's adjustment in conflicted marriage and divorce: A decade review of research. *J. Am. Acad. Child Adolesc. Psychiatry*. 39:963–73

Kerr M, Stattin H. 2000. What parents know, how they know it, and several forms of adolescent adjustment: further support for a reinterpretation of monitoring. *Dev. Psychol.* 36:366–80

Kessler R, Chiu W, Demler O, Walters E. 2005. Prevalence, severity, and comorbidity of twelve-month DSM-IV disorders in the national comorbidity survey replication (NCS-R). *Arch. Gen. Psychiatry*. 62(6):617–27

Kessler R, Mcgonagle K, Zhao S, Nelson C, Hughes M, et al. 1994. Lifetime and 12-month prevalence of DSM-III-R psychiatric disorders in the United States: Results from the national comorbidity survey. *Arch Gen Psychiatry*. 51(1):8–19

King P, Berg C, Butner J, Butler J, Wiebe D. 2014. Longitudinal trajectories of parental involvement in type 1 diabetes and adolescents' adherence. *Health. Psychol.* 33(5):424–32

King R. 2002. Adolescence. In *Child and Adolescent Psychiatry*, ed. Lewis, pp. 332–42. Philadelphia: Lippincott Williams & Williams. 3rd ed.

Klein JD. 2005. Adolescent pregnancy: current trends and issues. *Pediatrics*. 116(1):281–86

Klimstra T, Hale III W, Raaijmakers Q, Branje S, Meeus W. 2009. Maturation of personality in adolescence. *J. Pers. Soc. Psychol.* 96(4):898–912

Korelitz K, Garber J. 2016. Congruence of parents' and children's perceptions of parenting: A meta-analysis. *J. Youth Adolesc.* 45(10):1973–95

Korteniemi-Poikela E, Cacciatore R. 2015. *Seksuaalisuuden Portaat*. Väestöliitto. Opetushallitus

Kosunen E, Kaltiala-Heino R, Rimpelä M, Laippala P. 2003. Risk-taking sexual behaviour and self-reported depression in middle adolescence – a school-based survey. *Child. Care. Health Dev.* 29(5):337–44

Kosunen E, Rimpela M, Liinamo A. 1998. Nuorten seksuaalikäyttäytyminen Suomessa 1996–1997. *Suom. Lääkäril.* 53:3353–60

Kosunen E, Rimpelä M, Liinamo A, Jokela J. 2000. Suomalaisten nuorten seksuaalikäyttäytymisen muutokset 1990-luvun lopulla. *Sos. Laaketiet. Aikak.* 37(4):273–282

Kotchick B, Shaffer A, Forehand R, Miller KS. 2001. Adolescent sexual risk behavior: a multi-system perspective. *Clin. Psychol. Rev.* 21(4):493–519

Kotchick BA, Forehand R. 2002. Putting parenting in perspective: A discussion of the contextual factors that shape parenting practices. *J. Child Fam. Stud.* 11(3):255–69

Kovacs M, Beck AT. 1978. Maladaptive cognitive structures in depression. *Am. J. Psychiatry*. 135:525–33

Kovacs M, Paulauskas S, Gatsonis C, Richards C. 1988. Depressive disorders in childhood III. A longitudinal study of comorbidity with and risk for conduct disorders. *J. Affect. Disord.* 15(3):205–17

Kreager DA, Staff J. 2009. The sexual double standard and adolescent peer acceptance. *Soc. Psychol. Q.* 72(2):143–64

Kroger J. 2006. *Identity Development: Adolescence Through Adulthood*. Sage Publications. 2nd ed.

La Greca AM, Harrison HM. 2005. Adolescent peer relations, friendships, and romantic relationships: Do they predict social anxiety and depression? *J. Clin. Child Adolesc. Psychol.* 34(1):49–61

Laird R, Pettit G, Bates J, Dodge K. 2003. Parents' monitoring-relevant knowledge and adolescents' delinquent behavior: Evidence of correlated developmental changes and reciprocal influences. *Child Dev.* 74(3):752–68

Larson R, Moneta G, Richards M, Wilson S. 2002. Continuity, stability, and change in daily emotional experience across adolescence. *Child Dev.* 73(4):1151–65

Larson R, Raffaelli M, Ham M, Jewell L. 1990. Ecology of depression in late childhood and early adolescence: A profile of daily states and activities. *J. Abnorm. Psychol.* 99(I):92–102

Larson RW, Moneta G, Richards MH, Holmbeck G, Duckett E. 1996. Changes in adolescents' daily interactions with their families from ages 10 to 18: Disengagement and transformation. *Dev. Psychol.* 32:744–54

Laursen B, Collins WA. 2009. Parent-child relationships during adolescence. In *Handbook of Adolescent Psychology*, eds. R Lerner, L Steinberg, pp. 3–42. Hoboken, New Jersey: John Wiley & Sons. 3rd ed.

Leadbeater BJ, Kuperminc GP, Blatt SJ, Hertzog C. 1999. A multivariate model of gender differences in adolescents' internalizing and externalizing problems. *Dev. Psychol.* 35(5):1268–82

Lefkowitz E, Wesche R, Leavitt C. 2018. Never been kissed: Correlates of lifetime kissing status in U.S. university students. *Arch. Sex. Behav.* 47(4):1283–93

Lefkowitz ES. 2005. "Things have gotten better": Developmental changes among emerging adults after the transition to university. *J. Adolesc. Res.* 20(1):40–63

Lehrer J, Shrier L, Gortmaker S, Buka S. 2006. Depressive symptoms as a longitudinal predictor of sexual risk behaviors among US middle and high school students. *Pediatrics*. 118(1):189–200

Leon A, Klerman G, Wickramaratne P. 1993. Continuing female predominance in depressive illness. *Am. J. Public Health*. 83:754–57

Lerner R, Steinberg L. 2004. *Handbook of Adolescent Psychology*. Hoboken, New Jersey: John Wiley & Sons. 2nd ed.

Lewinsohn P, Clarke G, Seeley J, Rohde P. 1994. Major depression in community adolescents: Age at onset, episode duration, and time to recurrence. *J. Am. Acad. Child Adolesc. Psychiatry*. 33(6):809–18

Loeber R, Dishion T. 1983. Early predictors of male delinquency: A review. *Psychol. Bull.* 94(1):68–99

Loeber R, Russo MF, Stouthamer-Loeber M, Lahey BB. 1994. Internalizing problems and their relation to the development of disruptive behaviors in adolescence. *J. Res. Adolesc.* 4(4):615–37

Lohman BJ, Billings A. 2008. Protective and risk factors associated with adolescent boys' early sexual debut and risky sexual behaviors. *J. Youth Adolesc.* 37(6):723–35

Lucassen MF, Stasiak K, Samra R, Frampton CM, Merry SN. 2017. Sexual minority youth and depressive symptoms or depressive disorder: A systematic review and meta-analysis of population-based studies. *Aust. New Zeal. J. Psychiatry*. 51(8):774–87

Lyerly JE, Brunner Huber LR. 2013. The role of family conflict on risky sexual behavior in adolescents aged 15 to 21. *Ann. Epidemiol.* 23(4):233–35

Mack KY. 2001. Childhood family disruptions and adult well-being: The differential effects of divorce and parental death. *Death Stud.* 25:419–43

Madden G, Bickel W. 2010. *Impulsivity: The Behavioral and Neurological Science of Discounting*. Washington, DC: American Psychological Association. 1st ed.

Madkour A, Farhat T, Halpern C, Godeau E, Gabhainn S. 2010. Early adolescent sexual initiation as a problem behavior: A comparative study of five nations. *J. Adolesc. Health.* 47(4):389–98

Mahalik J, Coley RL, McPherran Lombardi C, Lynch AD, Markowitz A, Jaffee S. 2013. Changes in health risk behaviors for males and females from early adolescence through early adulthood. *Health. Psychol.* 32(6):685–94

Maniglio R. 2014. Prevalence of sexual abuse among children with conduct disorder: A systematic review. *Clin. Child Fam. Psychol. Rev.* 17(3):268–82

Marcia JE, Waterman AS, Matteson DR, Archer SL, Orlofsky JL. 1993. *Ego Identity: A Handbook for Psychosocial Research*. New York: Springer. 1st ed.

Markham C, Tortolero S, Escobar-Chaves SL, Parcel G, Harrist R, Addy R. 2003. Family connectedness and sexual risk-taking among urban youth attending alternative high schools. *Perspect. Sex. Reprod. Health.* 35(4):174–79

Markham CM, Lormand D, Gloppen KM, Peskin MF, Flores B, et al. 2010. Connectedness as a predictor of sexual and reproductive health outcomes for youth. *J. Adolesc. Health.* 46(3):S23-41

Marshall WA, Tanner JM. 1969. Variations in pattern of pubertal changes in girls. *Arch. Dis. Child.* 44:291–303

Marshall WA, Tanner JM. 1970. Variations in the pattern of pubertal changes in boys. *Arch. Dis. Child.* 45:13–23

Martinez G, Copen C, Abma J. 2011. Teenagers in the United States: Sexual activity, contraceptive use, and childbearing, 2006-2010. National Survey of Family Growth. National Center for Health Statistics.
Mason A, January S-A, Chmelka A, Parra G, Savolainen J, et al. 2016. Cumulative contextual risk at birth in relation to adolescent substance use, conduct problems, and risky sex: General and specific predictive associations in a Finnish birth cohort. *Addict Behav.* 58:161–66
Mason WA, Chmelka MB, Trudeau L, Spoth RL. 2017. Gender moderation of the intergenerational transmission and stability of depressive symptoms from early adolescence to early adulthood. *J. Youth Adolesc.* 46(1):248–60
Mazzaferro K, Murray P, Ness R, Bass D, Tyus N, Cook R. 2006. Depression, stress, and social support as predictors of high-risk sexual behaviors and STIs in young women. *J. Adolesc. Health.* 39(4):601–3
McCauley KL, Shadur JM, Hoffman EM, MacPherson L, Lejuez CW. 2016. Adolescent callous-unemotional traits and parental knowledge as predictors of unprotected sex among youth. *Behav. Modif.* 40(1–2):70–96
McCord W, McCord J, Howard A. 1961. Familial correlates of aggression in nondelinquent male children. *J. Abnorm. Soc. Psychol.* 62(1):79–93
McGee L, Newcomb MD. 1992. General deviance syndrome: Expanded hierarchical evaluations at four ages from early adolescence to adulthood. *J. Consult. Clin. Psychol.* 60(5):766–76
McHale S, Bissell J, Kim J-Y. 2009. Sibling relationship, family, and genetic factors in sibling similarity in sexual risk. *J. Fam. Psychol.* 23(4):562–72
McLaughlin KA, Garrad M, Somerville L. 2015. What develops during emotional development? A component process approach to identifying sources of psychopathology risk in adolescence. *Dialogues Clin. Neurosci.* 17(4):403–10
McNeely C, Shew M, Beuhring T, Sieving R, Miller B, Blum R. 2002. Mothers' influence on the timing of first sex among 14- and 15-year-olds. *J. Adolesc. Health.* 31(3):256–65
McPherson M, Smith-Lovin L, Cook J. 2001. Birds of a feather: Homophily in social networks. *Annu. Rev. Sociol.* 27:415–44
Meier A. 2007. Adolescent first sex and subsequent mental health. *Am. J. Sociol.* 112(6):1811–47
Mendle J, Ferrero J. 2012. Detrimental psychological outcomes associated with pubertal timing in adolescent boys. *Dev. Rev.* 321:49–66
Mendle J, Turkheimer E, Emery RE. 2007. Detrimental psychological outcomes associated with early pubertal timing in adolescent girls. *Dev. Rev.* 27(2):151–71
Merikangas K, Nakamura E, Kessler R. 2009. Epidemiology of mental disorders in children and adolescents. *Dialogues Clin. Neurosci.* 11:7–20
Merikangas KR, Risch NJ, Merikangas JR, Weissman MM, Kidd KK. 1988. Migraine and depression: association and familial transmission. *J. Psychiatr. Res.* 22(2):119–29
Meschke LL, Bartholomae S, Zentall SR. 2002. Adolescent sexuality and parent-adolescent processes: promoting healthy teen choices. *J. Adolesc. Health.* 31(6):264–79
Michaud P-A, Suris J-C, Deppen A. 2006. Gender-related psychological and behavioural correlates of pubertal timing in a national sample of Swiss adolescents. *Mol. Cell. Endocrinol.* 254–255:172–78
Miller B, Benson B, Galbraith K. 2001. Family relationships and adolescent pregnancy risk: A research synthesis. *Dev. Rev.* 21(1):1–38

Miller BC. 2002. Family influences on adolescent sexual and contraceptive behavior. *J. Sex Res.* 39(1):22–26

Moffitt T. 1993. Adolescence-limited and life-course-persistent antisocial behavior: A developmental taxonomy. *Psychol. Rev.* 100(4):674–701

Moffitt T, Arseneault L, Jaffee S, Kim-Cohen J, Koenen K, et al. 2008. Research Review: DSM-V conduct disorder: research needs for an evidence base. *J. Child Psychol. Psychiatry.* 49(1):3–33

Moffitt T, Caspi A, Harrington H, Milne B. 2002. Males on the life-course-persistent and adolescence-limited antisocial pathways: Follow-up at age 26 years. *Dev. Psychopathol.* 14:179–207

Moffitt TE, Caspi A, Rutter M, Silva P. 2001. *Sex Differences in Antisocial Behaviour: Conduct Disorder, Delinquency, and Violence in the Dunedin Longitudinal Study*. New York: Cambridge University Press. 1st ed.

Monroe S, Rohde P, Seeley J, Lewinsohn P. 1999. Life events and depression in adolescence: Relationship loss as a prospective risk factor for first onset of major depressive disorder. *J. Abnorm. Psychol.* 108(4):606–14

Moore S, Rosenthal D. 1993. *Sexuality in Adolescence*. London: Psychology Press. 1st ed.

Moshman D. 2011. *Adolescent Rationality and Development: Cognition, Morality, and Identity*. New York: Psychology Press. 3rd ed.

Mun EY, Windle M, Schainker LM. 2008. A model-based cluster analysis approach to adolescent problem behaviors and young adult outcomes. *Dev. Psychopathol.* 20(1):291–318

Murray J, Farrington D. 2010. Risk factors for conduct disorder and delinquency: Key findings from longitudinal studies. *Can. J. Psychiatry*. 55(10):633–42

National Institute for Health and Welfare. 2015. *School Health Promotion Study*. Unpublished observation. https://thl.fi/fi/tutkimus-ja-kehittaminen/tutkimukset-ja-hankkeet/kouluterveyskysely

National Institute for Health and Welfare. 2017a. *School Health Promotion Study*. Unpublished observation. https://thl.fi/fi/tutkimus-ja-kehittaminen/tutkimukset-ja-hankkeet/kouluterveyskysely

National Institute for Health and Welfare. 2017b. *Kouluterveyskyselyn tulokset nuorilla*. Retrieved from. https://sampo.thl.fi/pivot/prod/fi/ktk/ktk1/. Date accessed 28.2.2019.

Neemann J, Hubbard J, Masten AS. 1995. The changing importance of romantic relationship involvement to competence from late childhood to late adolescence. *Dev. Psychopathol.* 7(4):727–50

Negriff S, Susman EJ. 2011. Pubertal timing, depression, and externalizing problems: A framework, review, and examination of gender differences. *J. Res. Adolesc.* 21(3):717–46

Negriff S, Susman E, Trickett P. 2011. The developmental pathway from pubertal timing to delinquency and sexual activity from early to late adolescence. *J. Youth Adolesc.* 40:1343–56

Neinstein L. 2008. *Handbook of Adolescent Healthcare*. Philadelphia, PA: Lippincott Williams & Wilkins. 1st ed.

Nicolai K, Laney T, Mezulis A. 2013. Different stressors, different strategies, different outcomes: How domain-specific stress responses differentially predict depressive symptoms among adolescents. *J. Youth Adolesc.* 42(8):1183–93

Nogueira Avelar e Silva R, van de Bongardt D, van de Looij-Jansen P, Wijtzes A, Raat H. 2016. Mother- and father-adolescent relationships and early sexual intercourse. *Pediatrics*. 138(6):e20160782

Nottelmann E, Susman E, Inoff-Germain G, Cutler GJ, Loriaux D, Chrousos G. 1987. Developmental processes in early adolescence: Relationships between adolescent adjustment problems and chronologic age, pubertal stage, and puberty-related serum hormone levels. *J. Pediatr.* 110(3):473–80

Oatley K, Bolton W. 1985. A social-cognitive theory of depression in reaction to life events. *Psychol. Rev.* 92(3):372–88

Olsson G, von Knorring A-L. 1997. Beck's Depression Inventory as a screening instrument for adolescent depression in Sweden: Gender differences. *Acta Psychiatr. Scand.* 95:277–82

Oman R, Vesely S, Aspy C. 2005. Youth assets and sexual risk behavior: The importance of assets for youth residing in one-parent households. *Perspect. Sex. Reprod. Health*. 37(1):25–31

Oshri A, Tubman J, Jaccard J. 2011. Psychiatric symptom typology in a sample of youth receiving substance abuse treatment services: Associations with self-reported child maltreatment and sexual risk behaviors. *AIDS Behav.* 15(8):1844–56

Paananen R, Ristikari T, Merikukka M, Gissler M. 2013. Social determinants of mental health: A finnish nationwide follow-up study on mental disorders. *J. Epidemiol. Community Health*. 67(12):1025–31

Pardini DA. 2008. Novel insights into longstanding theories of bidirectional parent-child influences: Introduction to the special section. *J. Abnorm. Child Psychol.* 36(5):627–31

Pardini DA, Fite PJ, Burke JD. 2008. Bidirectional associations between parenting practices and conduct problems in boys from childhood to adolescence: The moderating effect of age and African-American ethnicity. *J. Abnorm. Child Psychol.* 36(5):647–62

Patterson GR. 1986. Performance models for antisocial boys. *Am. Psychol.* 41(4):432–444

Patterson GR. 1997. Performance models for parenting: A social interactional perspective. In *Parenting and Children's Internalization of Values: A Handbook of Contemporary Theory*, eds. J Grusec, L Kuczynski, pp. 193–226. Hoboken, New Jersey: John Wiley & Sons. 1st ed.

Patterson GR, DeBaryshe B, Ramsay E. 1989. A developmental perspective on antisocial behavior. *Am. Psychol.* 44:329–35

Patterson GR, Reid J, Dishion T. 1992. *A Social Learning Approach: Vol. 4. Antisocial Boys*. Eugene, OR: Castalia Press. 1st ed.

Patton G, Coffey C, Romaniuk H, Mackinnon A, Carlin J, et al. 2014. The prognosis of common mental disorders in adolescents: A 14-year prospective cohort study. *Lancet*. 383:1404–11

Patton G, Hemphill S, Beyers J, Bond L, Toumbourou J, et al. 2007. Pubertal stage and deliberate self-harm in adolescents. *J. Am. Acad. Child Adolesc. Psychiatry*. 46(4):508–14

Paunio T, Lehtonen J. 2016. Aivojen kypsymisen merkitys nuoruudessa. In *Lastenpsykiatria ja nuorisopsykiatria*, eds. K Kumpulainen, E Aronen, H Ebeling, E Laukkanen, M Marttunen, et al., pp. 42–50. Kustannus Oy Duodecim. 1st ed.

Paus T, Zijdenbos A, Worsley K, Collins DL, Blumethal J, et al. 1999. Structural maturation of neural pathways in children and adolescent: In vivo study. *Science*. 283(5409):1908–11

Pearson J, Muller C, Frisco M. 2006. Parental involvement, family structure, and adolescent sexual decision making. *Sociol. Perspect.* 49(1):67–90

Pettit G, Bates J, Dodge K, Meece D. 1999. The impact of after-school peer contact on early adolescent externalizing problems is moderated by parental monitoring, perceived neighborhood safety, and prior adjustment. *Child Dev.* 70(3):768–78

Phinney V, Jensen L, Olsen J, Cundick B. 1990. The relationship between early development and psychosexual behaviors in adolescent females. *Adolescence.* 25(98):321–32

Pietromonaco P, Barrett LF. 2000. The internal working models concept: What do we really know about the self in relation to others? *Rev. Gen. Psychol.* 4(2):155–75

Pilowsky D, Wickramaratne P, Talati A, Tang M, Hughes C, et al. 2008. Children of depressed mothers 1 year after the initiation of maternal treatment: Findings from the STAR*D-child study. *Am. J. Psychiatry.* 165(9):1136–47

Prosser J, McArdle P. 1996. The changing mental health of children and adolescents: Evidence for a deterioration? *Psychol. Med.* 26:715–25

Puura K, Laukkanen E. 2016. Biopsykososiaalinen kehitys. In *Lastenpsykiatria ja nuorisopsykiatria*, eds. K Kumpulainen, E Aronen, H Ebeling, E Laukkanen, M Marttunen, et al., pp. 20–22. Kustannus Oy Duodecim. 1st ed.

Quatman T, Sampson K, Robinson C, Watson C. 2001. Academic, motivational, and emotional correlates of adolescent dating. *Genet. Soc. Gen. Psychol. Monogr.* 127(2):211–34

Rai A, Stanton B, Wu Y, Li X, Galbraith J, et al. 2003. Relative influences of perceived parental monitoring and perceived peer involvement on adolescent risk behaviors: An analysis of six cross-sectional data sets. *J. Adolesc. Health.* 33(2):108–18

Raitasalo R. 2007. Mood questionnaire. Finnish modification of the short form of the beck depression inventory measuring depression symptoms and self-esteem. Studies in social security and health, 86. Helsinki

Ramrakha S, Bell M, Paul C, Dickson N, Moffitt T, Caspi A. 2007. Childhood behavior problems linked to sexual risk taking in young adulthood: A birth cohort study. *J. Am. Acad. Child Adolesc. Psychiatry.* 46(10):1272–79

Ramrakha S, Caspi A, Dickson N, Moffitt T, Paul C. 2000. Psychiatric disorders and risky sexual behaviour in young adulthood: cross sectional study in birth cohort. *Br. Med. J.* 321:263–66

Rekker R, Keijsers L, Branje S, Koot H, Meeus W. 2017. The interplay of parental monitoring and socioeconomic status in predicting minor delinquency between and within adolescents. *J. Adolesc.* 59:155–65

Reniers R, Murphy M, Lin A, Bartolome SP, Wood S. 2016. Risk perception and risk-taking behaviour during adolescence: The influence of personality and gender. *PLoS One.* 11(4):e0153842

Rice F, Lifford K, Thomas H, Thapar A. 2007. Mental health and functional outcomes of maternal and adolescent reports of adolescent depressive symptoms. *J. Am. Acad. Child Adolesc. Psychiatry.* 46(9):1162–70

Richards M, Crowe P, Larson R, Swarr A. 1988. Developmental patterns and gender differences in the experience of peer companionship during adolescence. *Child Dev.* 69(1):154–63

Rink E, Tricker R, Harvey SM. 2007. Onset of sexual intercourse among female adolescents: The influence of perceptions, depression, and ecological factors. *J. Adolesc. Health.* 41(4):398–406

Ritakallio M, Kaltiala-Heino R, Kivivuori J, Luukkaala T, Rimpela M. 2006. Delinquency and the profile of offences among depressed and non-depressed adolescents. *Crim. Behav. Ment. Health.* 16:100–110

Ritakallio M, Kaltiala-Heino R, Kivivuori J, Rimpela M. 2005. Brief report: Delinquent behaviour and depression in middle adolescence: A Finnish community sample. *J. Adolesc.* 28(1):155–59

Robbers S, van Oort F, Huizink A, Verhulst F, van Beijsterveldt C, et al. 2012. Childhood problem behavior and parental divorce: Evidence for gene-environment interaction. *Soc. Psychiatry Psychiatr. Epidemiol.* 47(10):1539–48

Rohan T, McLaughlin J, Harnish D. 1994. Repeatability of interview-derived information on sexual history: A study in women. *Epidemiology.* 5(3):360–63

Rohde P, Lewinsohn P, Seeley J. 1991. Comorbidity of unipolar depression: II . Comorbidity with other mental disorders in adolescents and adults. *J. Abnorm. Psychol.* 100(2):214–22

Rose AJ. 2002. Co-rumination in the friendships of girls and boyss. *Child Dev.* 73(6):1830–43

Rosenberg M. 1965. *Society and the Adolescent Self-Image.* New Jersey: Princeton University Press. 1st ed.

Rubin A, Gold M, Primack B. 2009. Associations between depressive symptoms and sexual risk behavior in a diverse sample of female adolescents. *J. Pediatr. Adolesc. Gynecol.* 22(5):306–12

Rubin C, Rubenstein J, Stechler G, Heeren T, Halton A, et al. 1992. Depressive affect in "normal" adolescents: Relationship to life stress, family, and friends. *Am. J. Orthopsychiatry.* 62(3):430–41

Rubin KH, Chen X, McDougall P, Bowker A, Mckinnon J. 1995. The Waterloo Longitudinal Project: Predicting internalizing and externalizing problems in adolescence. *Dev. Psychopathol.* 7:751–64

Ruuska J, Kaltiala-Heino R, Koivisto A-M, Rantanen P. 2003. Puberty, sexual development and eating disorders in adolescent outpatients. *Eur. Child Adolesc. Psychiatry.* 12(5):214–20

Samek D, Iacono W, Keyes M, Epstein M, Bornovalova M, McGue M. 2014. The developmental progression of age 14 behavioral disinhibition, early age of sexual initiation, and subsequent sexual risk-taking behavior. *J. Child Psychol. Psychiatry Allied Discip.* 55(7):784–92

Sandfort T, Orr M, Hirsch J, Santelli J. 2008. Long-term health correlates of timing of sexual debut: Results from a national US study. *Am. J. Public Health.* 98(1):155–61

Santelli JS, Lowiy R, Brenei ND, Robin L. 2000. Association of sexual behaviors with socioeconomic status, family structure, and race/ethnicity among US adolescents. *Am. J. Public Health.* 90(10):

Santona A, Tagini A, Sarracino D, De Carli P, Pace C, et al. 2015. Maternal depression and attachment: The evaluation of mother-child interactions during feeding practice. *Front. Psychol.* 6:1235

Savolainen J, Mason WA, Hughes L, Ebeling H, Hurtig T, Taanila A. 2015. Pubertal development and sexual intercourse among adolescent girls: An examination of direct, mediated, and spurious pathways. *Youth Soc.* 47(4):520–38

Sawyer S, Azzopardi P, Wickremarathne D, Patton G. 2018. The age of adolescence. *Lancet Child Adolesc. Health.* 2(3):223–28

Scaramella L, Conger R, Simons R, Whitbeck L. 1998. Predicting risk for pregnancy by late adolescence: A social contextual perspective. *Dev. Psychol.* 34(6):1233–45

Schofield H-L, Bierman K, Heinrichs B, Nix R. 2008. Predicting early sexual activity with behavior problems exhibited at school entry and in early adolescence. *J. Abnorm. Child Psychol.* 36(8):1175–88

Schor E. 2003. American Academy of Pediatrics. Family pediatrics: Report of the Task Force on the Family. *Pediatrics*. 111:1541–71

Schwartz IM. 1999. Sexual activity prior to coital initiation: A comparison between males and females. *Arch. Sex. Behav.* 28(1):63–69

Schwartz O, Dudgeon P, Sheeber L, Yap M, Simmons J, Allen N. 2012. Parental behaviors during family interactions predict changes in depression and anxiety symptoms during adolescence. *J. Abnorm. Child Psychol.* 40(1):59–71

Scott L, Whalen D, Zalewski M, Beeney J, Pilkonis P, et al. 2013. Predictors and consequences of developmental changes in adolescent girls' self-reported quality of attachment to their primary caregiver. *J. Adolesc.* 36(5):797–806

Seiffge-Krenke I. 2003. Testing theories of romantic development from adolescence to young adulthood: Evidence of a developmental sequence. *Int. J. Behav. Dev.* 27:519–31

Seiffge-Krenke I, Gelhaar T. 2008. Does successful attainment of developmental tasks lead to happiness and success in later developmental tasks? A test of Havighurst's (1948) theses. *J. Adolesc.* 31(1):33–52

Semlyen J, King M, Varney J, Hagger-Johnson G. 2016. Sexual orientation and symptoms of common mental disorder or low wellbeing: Combined meta-analysis of 12 UK population health surveys. *BMC Psychiatry*. 16(67):1–9

Shrier L, Harris SK, Beardslee W. 2002. Temporal associations between depressive symptoms and self-reported sexually transmitted disease among adolescents. *Arch. Pediatr. Adolesc. Med.* 156(6):599–606

Shumaker DM, Deutsch RM, Brenninkmeyer L. 2009. How do I connect? Attachment issues in adolescence. *J. Child Custody*. 6(1–2):91–112

Siegler R, DeLoache J, Eisenberg N. 2010. *How Children Develop*. New York: Worth Publishers. 3rd ed.

Silvers J, McRae K, Gabrieli J, Gross J, Remy K, Ochsner K. 2012. Age-related differences in emotional reactivity, regulation, and rejection sensitivity in adolescence. *Emotion*. 12(6):1235–47

Silvers JA, Insel C, Powers A, Franz P, Helion C, et al. 2017. The transition from childhood to adolescence is marked by a general decrease in amygdala reactivity and an affect-specific ventral-to-dorsal shift in medial prefrontal recruitment. *Dev. Cogn. Neurosci.* 25:128–37

Simons LG, Sutton TE, Simons RL, Gibbons FX, McBride Murry V. 2016. Mechanisms that link parenting practices to adolescents' risky sexual behavior: A test of six competing theories. *J. Youth Adolesc.* 45(2):255–70

Smetana JG, Campione-Barr N, Metzger A. 2006. Adolescent development in interpersonal and societal contexts. *Annu. Rev. Psychol.* 57(1):255–84

Smiler A, Frankel L, Savin-Williams R. 2011. From kissing to coitus? Sex-of-partner differences in the sexual milestone achievement of young men. *J. Adolesc.* 34:727–35

Sobesky WE. 1983. The effects of situational factors on moral judgments. *Child Dev.* 54(3):575–84

Soller B. 2014. Caught in a bad romance: Adolescent romantic relationships and mental health. *J. Health Soc. Behav.* 55(1):56–72

Sørensen K, Mouritsen A, Aksglaede L, Hagen C., Mogensen S., Juul A. 2012. Recent secular trends in pubertal timing: implications for evaluation and diagnosis of precocious puberty. *Horm. Res. Paediatr.* 77(3):137–45

Spear LP. 2000. The adolescent brain and age-related behavioral manifestations. *Neurosci. Biobehav. Rev.* 24(4):417–63

Stanger C, Achenbach T, Verhulst F. 1997. Accelerated longitudinal comparisons of aggressive versus delinquent syndromes. *Dev. Psychopathol.* 9:43–58

Stanton B, Li X, Galbraith J. 2000. Parental underestimates of adolescent risk behavior: A randomized, controlled trial of a parental monitoring intervention. *J. Adolesc. Health.* 26(1):18–26

Stanton B, Li X, Pack R, Cottrell L. 2002. Longitudinal influence of perceptions of peer and parental factors on African American adolescent risk involvement. *J. Urban Health.* 79(4):536–48

Statistics Finland. 2016. *The rates of marriages and divorces in Finland in 1965-2016*. Changes in marital status. Retrieved from. https://www.stat.fi/til/ssaaty/2016/. Date accessed 17.2.2019.

Stattin H, Kerr M. 2000. Parental monitoring: A reinterpretation. *Child Dev.* 71(4):1072–85

Stattin H, Magnusson D. 1990. *Pubertal Maturation in Female Development*. Hillsdale, NJ: Psychology Press. 1st ed.

Steensma T, Kreukels B, de Vries A, Cohen-Kettenis P. 2013. Gender identity development in adolescence. *Horm. Behav.* 64(2):288–97

Steinberg L. 2001. We know some things: Parent-adolescent relationships in retrospect and prospect. *J. Res. Adolesc.* 11(1):1–19

Steinberg L. 2005. Cognitive and affective development in adolescence. *Trends Cogn. Sci.* 9(2):69–74

Steinberg L. 2016. *Adolescence*. McGraw-Hill Education. 11th ed.

Steinberg L, Morris A. 2001. Adolescent development. *Annu. Rev. Psychol.* 52:83–110

Stocker C, Burwell R, Briggs M. 2002. Sibling conflict in middle childhood predicts children's adjustment in early adolescence. *J. Fam. Psychol.* 16(1):50–57

Tackett J, Krueger R, Iacono W, McGue M. 2005. Symptom-based subfactors of DSM-defined conduct disorder: Evidence for etiologic distinctions. *J. Abnorm. Psychol.* 114(3):483–87

Tanner JM. 1955. *Growth at Adolescence*. Oxford: Blackwell Scientific Publications. 1st ed.

Tapert S, Aarons G, Sedlar G, Brown S. 2001. Adolescent substance use and sexual risk-taking behavior. *J. Adolesc. Health.* 28(3):181–89

Tebeka S, Hoertel N, Dubertret C, Le Strat Y. 2016. Parental divorce or death during childhood and adolescence and its association with mental health. *J. Nerv. Ment. Dis.* 204(9):678–85

Templeton M, Lohan M, Kelly C, Lundy L. 2017. A systematic review and qualitative synthesis of adolescents' views of sexual readiness. *J. Adv. Nurs.* 73(6):1288–1301

TenEyck M, Barnes JC. 2015. Examining the impact of peer group selection on self-reported delinquency: A consideration of active gene–environment correlation. *Crim. Justice Behav.* 42(7):741–62

The ICD-10 classification of mental and behavioural disorders: Clinical descriptions and diagnostic guidelines. 1992. Geneva

The Lancet Child & Adolescent Health. 2018. Growing up in a digital world: Benefits and risks. *Lancet Child Adolesc. Health.* 2(2):79

Thibodeau ME, Lavoie F, Hébert M, Blais M. 2017. Pathways linking childhood maltreatment and adolescent sexual risk behaviors: The role of attachment security. *J. Sex Res.* 54(8):994–1005

Tobin D, Menon M, Menon M, Spatta B, Hodges E, Perry D. 2010. The intrapsychics of gender: A model of self-socialization. *Psychol. Rev.* 117(2):601–22

Tram J, Cole D. 2006. A multimethod examination of the stability of depressive symptoms in childhood and adolescence. *J. Abnorm. Psychol.* 115(4):674–86

Tubman J, Windle M, Windle RC. 1996. Cumulative sexual intercourse patterns among middle adolescents: Problem behavior precursors and concurrent health risk behaviors. *J. Adolesc. Health.* 18:182–91

Tyson P, Tyson R. 1990. Gender development. In *Psychoanalytic Theories of Development: An Integration*, eds. P Tyson, R Tyson, pp. 249–330. New Haven, Connecticut: Yale University press. 1st ed.

Upchurch D, McCarthy J. 1990. The timing of a first birth and high school completion. *Am. Sociol. Rev.* 55(2):224–34

US Census Bureau. 2012. Marriages and divorces in 2012. *Stat. Abstr. United States*. 58(19):63–98

Valle A-K, Roysamb E, Sundby J, Klepp KI. 2009. Parental social position, body image and other psychosocial determinants and first sexual intercourse among 15- and 16-year olds. *Adolescence*. 44(174):479–98

van de Bongardt D, de Graaf H, Reitz E, Deković M. 2014. Parents as moderators of longitudinal associations between sexual peer norms and Dutch adolescents' sexual initiation and intention. *J. Adolesc. Health.* 55(3):388–93

Van Loon AJ, Tijhuis M, Picavet HS, Surtees P, Ormel J. 2003. Survey non-response in the Netherlands: Effects on prevalence estimates and associations. *Ann. Epidemiol.* 13(2):105–10

Vasilenko SA. 2011. *Sexual behavior and mental health in late adolescence. Doctoral dissertation*. Penn State Electronic Theses and Dissertations for Graduate School

Vasilenko SA. 2017. Age-varying associations between nonmarital sexual behavior and depressive symptoms across adolescence and young adulthood. *Dev. Psychol.* 53(2):366–78

Vasilenko SA, Lanza S. 2014. Predictors of multiple sexual partners from adolescence through young adulthood. *J. Adolesc. Health.* 55(4):491–97

Vijayakumar N, Op de Macks Z, Shirtcliff E, Pfeifer J. 2018. Puberty and the human brain: Insights into adolescent development. *Neurosci. Biobehav. Rev.* 92:417–36

Waldron M, Doran K, Bucholz K, Duncan A, Lynskey M, et al. 2015. Parental separation, parental alcoholism, and timing of first sexual intercourse. *J. Adolesc. Health.* 56(5):550–56

Walters G. 2013. Delinquency, parental involvement, early adult criminality, and sex: Evidence of moderated mediation. *J. Adolesc.* 36(4):777–85

Walters G. 2015. Parental attitude toward deviance as a predictor of delinquency: Making the connection via perception and cognition. *J. Adolesc.* 39:27–35

Wang B, Stanton B, Li X, Cottrell L, Deveaux L, Kaljee L. 2013. The influence of parental monitoring and parent-adolescent communication on Bahamian adolescent risk involvement: A three-year longitudinal examination. *Soc. Sci. Med.* 97:161–69

Warr M. 1993. Parents, peers, and delinquency. *Soc. Forces.* 72(1):247–64

Waylen A, Wolke D. 2004. Sex "n" drugs "n" rock "n" roll: The meaning and social consequences of pubertal timing. *Eur. J. Endocrinol.* 151:U151–59

Wellings K, Field B. 1996. Sexual behaviour in young people. *Baillieres. Clin. Obstet. Gynaecol.* 10(1):139–60
Wellings K, Nanchahal K, Macdowall W, McManus S, Erens B, et al. 2001. Sexual behaviour in Britain: Early heterosexual experience. *Lancet.* 358:1843–50
Wheeler L, Killoren S, Whiteman S, Updegraff K, McHale S, Umaña-Taylor A. 2016. Romantic relationship experiences from late adolescence to young adulthood: The role of older siblings in Mexican-origin families. *J. Youth Adolesc.* 45(5):900–915
White C, Warner L. 2015. Influence of family and school-level factors on age of sexual initiation. *J. Adolesc. Health.* 56(2):231–37
Whittle S, Simmons J, Dennison M, Vijayakumar N, Schwartz O, et al. 2014. Positive parenting predicts the development of adolescent brain structure: A longitudinal study. *Dev. Cogn. Neurosci.* 8:7–17
Wichstrøm L, Berg-Nielsen TS, Angold A, Egger HL, Solheim E, Sveen TH. 2012. Prevalence of psychiatric disorders in preschoolers. *J. Child Psychol. Psychiatry Allied Discip.* 53(6):695–705
Wickrama K, Kwon J. 2014. Linking family economic pressure and supportive parenting to adolescent health behaviors: Two developmental pathways leading to health promoting and health risk behaviors. *J. Youth Adolesc.* 43:1176–90
Wickrama T, Wickrama K. 2010. Heterogeneity in adolescent depressive symptom trajectories: Implications for young adults' risky lifestyle. *J. Adolesc. Health.* 47(4):407–13
Wierson M, Long PJ. 1993. Toward a new understanding of early menarche: The role of environmental stress in pubertal timing. *Adolescence.* 28(12):912–24
Wight D, Henderson M, Raab G, Abraham C, Buston K, et al. 2000. Extent of regretted sexual intercourse among young teenagers in Scotland: A cross-sectional survey. *Br. Med. J.* 320:1243–45
Wight D, Williamson L, Henderson M. 2006. Parental influences on young people's sexual behaviour: A longitudinal analysis. *J. Adolesc.* 29(4):473–94
Williams LR, Steinberg L. 2011. Reciprocal relations between parenting and adjustment in a sample of juvenile offenders. *Child Dev.* 82(2):633–45
Winnicott DW. 1984. *Deprivation and Delinquency*. London and New York: Tavistock Publications. 1st ed.
Wolff J, Ollendick T. 2006. The comorbidity of conduct problems and depression in childhood and adolescence. *Clin. Child Fam. Psychol. Rev.* 9(3–4):201–20
World Health Organization. 2006. *Defining sexual health*. Retrieved from. https://www.who.int/reproductivehealth/topics/sexual_health/sh_definitions. Date accessed 28.2.2019.
World Health Organization. 2014. *Mental health: a state of well-being*. Retrieved from. http://www.who.int/features/factfiles/mental_health. Date accessed 28.2.2019.
World Health Organization. 2019. *Adolescent health and development*. Retrieved from. http://www.searo.who.int/entity/child_adolescent/topics/adolescent_health. Date accessed 28.2.2019.
Wymbs B, McCarty C, Baer J, King K, Vander Stoep A, McCauley E. 2013. Callous-unemotional traits and conduct disorder symptoms as prospective risk factors for adolescent sexual activity. *J. Clin. Child Adolesc. Psychol.* 42(5):693–99
Young EW, Jensen LC, Olsen J, Cundick B. 1991. The effects of family structure on the sexual behavior of adolescents. *Adolescence.* 26(104):977–86

Yu S, Clemens R, Yang H, Li X, Stanton B, et al. 2006. Youth and parental perceptions of parental monitoring and parent-adolescent communication, youth depression, and youth risk behaviors. *Soc. Behav. Pers.* 34(10):1297–1310

Zhang S, Benson T, Deng X. 2000. A test-retest reliability assessment of the international self-report delinquency instrument. *J. Crim. Justice.* 28(4):283–95

Zheng Y, Cleveland HH. 2013. Identifying gender-specific developmental trajectories of nonviolent and violent delinquency from adolescence to young adulthood. *J. Adolesc.* 36(2):371–81

Zimmer-Gembeck M, Helfand M. 2008. Ten years of longitudinal research on U.S. adolescent sexual behavior: Developmental correlates of sexual intercourse, and the importance of age, gender and ethnic background. *Dev. Rev.* 28(2):153–224

ORIGINAL PUBLICATIONS

PUBLICATION I

Sexual experience and self-reported depression across adolescent years

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Sexual experience and self-reported depression across the adolescent years

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Purpose: Adolescents engaging in early sexual intercourse are at elevated risk for depression, but it is not clear at what point of adolescent development this connection ceases to be significant. Depression is a highly prevalent mental health problem in adolescence compared to childhood, especially among girls. This study examines the association between self-reported depression and sexual intercourse across age cohorts throughout adolescence and separately in boys and girls. Methods: An analysis was conducted on the Finnish School Health Promotion Study data from the years 2010 and 2011 with 186,632 adolescents. Main outcomes were analyzed by χ^2 test and logistic regression. Results: In the whole sample, 44.5% of depressed adolescents had engaged in sexual intercourse, but only 34.6% of non-depressed adolescents ($p \leq 0.001$). Self-reported depression in adolescents aged 14–16 was associated with having experienced intercourse. The association between self-reported depression and sexual experience was strongest in younger adolescents and diminished gradually toward late adolescence. In boys aged 19, self-reported depression was associated with not having experienced intercourse. Conclusions: Among early and middle adolescents, there is a significant connection between self-reported depression and experience of sexual intercourse. Such connection is not seen, or even the opposite is observed, among late adolescents.

Keywords: adolescence; depression; sexual intercourse; self-reported measures

Introduction

Adolescence is a meaningful time in terms of reaching sexual and mental maturity. The line between normative and risk-taking sexual behavior is blurred in adolescence. In Western countries up to one third of adolescents have had their first sexual intercourse by the age of 15

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(Avery & Lazdane, 2010; Centers for Disease Control and Prevention, 2010; Edgardh, 2000, 2002; Sonenstein, Pleck, & Ku, 2014), and the majority of young adults report having experienced sexual intercourse at some point during adolescence (Madkour, Farhat, Halpern, Godeau, & Gabhainn, 2010). Early sexual activity has, on the one hand, been seen as problem behavior, because those adolescents often face challenges in other areas (Madkour et al., 2010). Problems arise when adolescents engage in sexual behaviors prematurely in relation to their psychological maturity. Early sexual debut is connected to multiple sexual risk behaviors such as inconsistent use of condoms and greater number of sexual partners. This places early initiators at higher risk for sexually transmitted diseases and pregnancy (Edgardh, 2000, 2002; Kotchick, Shaffer, Forehand, & Miller, 2001; O'Donnell, O'Donnell, & Stueve, 2001). Having first intercourse before age 15 is connected, for example, with suicidal ideation (Heidmets et al., 2010), substance use (Madkour et al., 2010; Schofield, Bierman, Heinrichs, & Nix, 2008), and antisocial behavior (Boislard & Poulin, 2011; Schofield et al., 2008). On the other hand, in the late stages of adolescent development, it is deemed normative to have intimate sexual relationships (Cromer, 2011).

Rates of youthful depressive disorders are high worldwide (Costello, Erkanli, & Angold, 2006). Adolescent depression is a global health concern. Its prevalence is less than 3% among children (<13 years) (Costello et al., 2006; Egger & Angold, 2006; Wichstrøm et al., 2012) but up to 12% in adolescents (13–18 years) (Costello et al., 2006; Sabaté, Cesar, & Chavoushi, 2013). What is more, depression is almost twice more likely among adolescent girls than boys. Females have also a greater risk for recurrent depressive episodes in young adulthood (Patton et al., 2014).

Sexuality is a wide concept including physical and emotional aspects such as sexual activity, capacity for sexual feelings, and sexual orientation. Nonetheless, sexual activity during adolescence, which is the aspect we focus on in this paper, is often plainly defined by whether an adolescent has experienced his or her first intercourse. Intercourse is clinically significant because it exposes one to pregnancies and sexually transmitted infections. Research has linked sexual debut (intercourse) in early adolescence to depression (Hallfors et al., 2004; Jamieson & Wade, 2011; Kaltiala-Heino, Kosunen, & Rimpelä, 2003; Oshri, Tubman, & Jaccard, 2011; Valle, Roysamb, Sundby, & Klepp, 2009) and there is also evidence that the association persists until middle adolescence (Hallfors, Waller, Bauer, Ford, & Halpern, 2005). There is currently no consensus as to whether depression predicts early sexual activity or is a consequence of it (Davila et al., 2009; Hallfors et al., 2005; Jamieson & Wade, 2011; Lehrer, Shrier, Gortmaker, & Buka, 2006).

Adolescents with depression may engage in intimate sexual relationships before actually being emotionally ready for it in an attempt to seek closeness and support. On the other hand, sexual activity before the young adolescent has developed the capacity to deal with the emotions related to the experience may expose her/him to depression, particularly if the young person has engaged in sexual activity due to external pressures (Kaltiala-Heino et al., 2003; Kosunen, Kaltiala-Heino, Rimpelä, & Laippala, 2003). However, as adolescence is a period of rapid physical, cognitive, emotional, and social development (Moshman, 2011; Steinberg, 2005), being sexually active in the later stages of adolescence could actually be a sign of successful adolescent passage, and lack of intimate experience when one is physically and mentally ready may even be problematic in terms of mental health. However, comparing between findings presented in the literature is difficult, because studies have usually focused on either early, middle, or late adolescents only, and not explored the associations between sexual activity and depression with similar methods among different age cohorts. To the best of our knowledge, no studies have been presented exploring the relationship between sexual activity and depression in samples comprising subjects from the early to the late phase of adolescent development, exploring whether the associations

between depression and sexual activity differ between younger and older adolescents, and what age might be the turning point before which depression and sexual activity are associated and after which they are not.

Pubertal timing is gradually lowering in the Western world (Sørensen et al., 2012). As puberty is essentially about developing sexual maturity, it could be expected that adolescents nowadays both start coital activity all the earlier, and also are ready for it emotionally. If this was the case, there would not necessarily be an association between sexual activity and depression in adolescence, if not among those youngest, those in early adolescence. On the other hand, early puberty increases the risk of emotional disorders (Kaltiala-Heino, Koivisto, Marttunen, & Fröjd, 2011), and this has been explained by adolescents reaching physical maturity before they are cognitively and emotionally ready for it (Ge et al., 2003). If this was the case, a positive association between sexual activity and depression could be expected not only among early but also among middle adolescents, may be even among those reaching late adolescence.

Traditionally Western cultures have been more rigorous in demanding chastity from females than males. Despite sexual liberation, a double standard attaching a different value to sexual activity in males and females may still prevail (Bordini & Sperb, 2013; Crawford & Popp, 2003), allowing boys social gains by being sexually experienced, while among girls being sexually active may met with disapproval. Greater number of sexual partners is connected to boys' acceptance among peers but the association is the reverse for girls (Kreager & Staff, 2009). Taking into account the possible sex differences in expectations regarding sexual morality and tendencies to depression, different associations among boys and girls between depression and sexual behavior in adolescence may be expected.

The data of the School Health Promotion Study, a classroom survey reaching almost 200,000 adolescents (aged 14–20) carried out in Finland in 2010–2011, is used in this paper. Covering almost entire age groups of 14–17-year-olds and large samples of 18–20-year-olds, the data offer a unique opportunity to examine the association between depression and sexual health in different age cohorts throughout adolescence.

The objective of this study is to elucidate the relation between sexual activity and self-reported depression throughout adolescence. This study addresses the following questions:

(1) Is depression associated with experience of sexual intercourse among adolescents of different ages?
(2) If there is an association between depression and having experienced intercourse, is it similar or different among early, middle, and late adolescents?
(3) Are the possible associations in (1) and (2) similar among boys and girls?

In light of the research presented above, we expected that self-reported depression would be associated with having experienced sexual intercourse among early adolescents and probably also among middle adolescents. We expected that among late adolescents there would be no such relation between an experience of sexual intercourse and self-reported depression, or that there would even be an opposite finding indicating that self-reported depression is connected to not having experienced sexual intercourse. Because girls mature earlier than boys, the connection between self-reported depression and experiencing sexual intercourse may cease to be significant among girls at a younger age than among boys. On the other hand, because sexual activity is differently valued for girls and boys, seen as favorable more likely among boys, the association between depression and sexual activity may persist among older age cohorts among girls. Literature does not clearly allow a hypothesis on gender difference, and we leave this open for exploration.

Methods

Participants

The School Health Promotion Study is an anonymous classroom survey on adolescents' health and health behaviors. The survey has been carried out annually since 1995, from 2008 among both secondary school students (aged 14–16) and upper secondary and vocational school students (16–20 years old). Until 2011 the study was carried out in alternate years in certain parts of Finland. Then the results of two consecutive years were combined to represent the whole country. In this paper, we use the School Health Promotion Study from 2010 and 2011 concerning young people aged 14 to 20. The School Health Promotion Study was granted approval by the ethics committee of the National Institute for Health and Welfare in Finland.

Secondary schools are attended by almost 99% of Finnish adolescents aged 14–16. Thereafter, the vast majority continues to either upper secondary or vocational school. However, compulsory education in Finland ends after secondary school. Thus, the upper secondary and vocational schools only include some 93% of the age cohort.[1] In general, adolescents attending these schools are 16–18 years old. Hence, compared to other age groups, there are fewer pupils aged 19 and 20 in our data because the majority of adolescents have already left the schools at which the School Health Promotion Study is conducted. Pupils attending school on the study day complete the questionnaire. Those who are absent are not contacted. In addition, not all schools participated in the study. The final coverage was 80% for 14–16-year-old secondary school students, 73% for 16–18-year-old upper secondary school students, and 43% for vocational school students of the same age in this study.[2] The total number of respondents was 186,632, of whom 92,478 (49.6%) were boys and 94,154 (50.4%) were girls. Adolescents were classified into seven age categories (14–20) according to their age calculated from the dates of birth supplied. For example, 14.00–14.99-year-old adolescents were in age group 14.

Measures

Sexual intercourse

Sexual activity was elicited by asking "Have you had sexual intercourse?". This was a dichotomized variable: response alternatives were "yes" and "no".

Self-reported depression

The Finnish version of the 13-item Beck Depression Inventory (R-BDI) was used to measure self-reported depression (Kaltiala-Heino, Rimpela, Rantanen, & Laippala, 1999). The 13-item BDI has been shown to be valid in detecting depression (Beck, Rial, & Rickels, 1974; Bennett et al., 1997). The psychometric properties of the R-BDI have been shown to be good in the School Health Promotion Study. The Finnish modification corresponds to the original 13-item version, but an introductory question and one positive response option have been added to each item. The scoring is the same as in the original 13-item inventory (Kaltiala-Heino et al., 1999). Each item is scored 0–3 and the maximum score is 39. Adolescents scoring 0–4 were categorized as non-depressed, 5–7 as mildly depressed, 8–15 as moderately depressed, and 16+ as severely depressed. Scores indicating moderate or severe depression are referred to as self-reported depression and adolescents scoring 8 or more are classified in this study as depressed.

Covariates

Sociodemographic variables were controlled family structure (living with mother and father vs. in any other family constellation) and mother's and father's highest education (comprehensive

school only/upper secondary school or vocational school/upper secondary school or vocational school and further vocational studies/university or university of applied sciences).

Data analysis

Prevalences of self-reported depression and experience of sexual intercourse were calculated for both boys and girls. Bivariate associations between having experienced sexual intercourse and self-reported depression were examined by cross-tabulations and significance was tested by Fisher's exact test. Odds ratios for having experienced sexual intercourse according to self-reported depression with exact age as continuous variable were calculated with logistic regression separately for both boys and girls. An additional model with gender and its interaction with self-reported depression was developed to measure the differences between boys and girls. All the analyses were stratified by age group (age in years: 14/15/16 …). Finally, sociodemographic variables were controlled for.

Results

In the whole sample, 36.9% of the girls and 32.7% of the boys had experienced sexual intercourse. Moderate or severe self-reported depression was found in 16.9% of the girls and 7.7% of the boys. In the whole sample, 44.5% of depressed adolescents had had sexual intercourse, while among non-depressed respondents the figure was only 34.6% ($p \leq 0.001$). The proportion of those who had experienced intercourse increased linearly from 14- to 20-year-olds both among girls and boys (Table 1).

The association between experience of sexual intercourse and self-reported depression can be seen in Table 2. Among both boys and girls, in the youngest age groups depressed adolescents were more likely than their peers to have experienced sexual intercourse. The association was highly significant in the age groups 14 to 16, although it remained significant ($p \leq 0.05$) among 17-year-old girls.

The relation between self-reported depression and experience of sexual intercourse ceased to be significant among girls 18 and over. Among 17-year-old boys, the association did not remain significant, but regained its significance among 19-year-old boys. However, this time the connection was reversed, suggesting that among 19-year-olds, depressed boys were less likely than their non-depressed peers to have experienced sexual intercourse. In the last group, boys aged 20, there was again no significant connection.

Odds ratios of having experienced intercourse according to self-reported depression and controlled for exact age are shown in Table 3. The strongest relation was found among the youngest boys among whom those who were depressed were almost five times more likely to have

Table 1. Proportions (% (*n*/*N*)) of those having experienced sexual intercourse by age.

Age (years)	Girls	Boys
14	12.9 (1965/15,178)	13.3 (1902/14,262)
15	23.8 (5714/24,034)	21.8 (5105/23,436)
16	39.9 (8956/22,429)	35.3 (7734/21,895)
17	54.9 (11,017/20,058)	47.7 (9575/20,058)
18	64.9 (5228/8051)	58.0 (4894/8432)
19	79.7 (1333/1672)	71.2 (819/1151)
20	80.6 (572/710)	73.9 (249/337)

Table 2. Proportions (% (*n*/*N*)) of those having experienced sexual intercourse among depressed and non-depressed adolescents by age.

	Girls			Boys		
	Depressed	Non-depressed	*P*-value	Depressed	Non-depressed	*P*-value
Age (years)						
14	**23.8** (682/2864)	**10.4** (1283/12,311)	≤0.001	**37.8** (384/1017)	**11.4** (1515/13,241)	≤0.001
15	**35.2** (1565/4446)	**21.2** (4149/19,588)	≤0.001	**39.5** (749/1895)	**20.2** (4355/21,540)	≤0.001
16	**47.5** (1727/3633)	**38.5** (7228/18,795)	≤0.001	**45.6** (748/1639)	**34.5** (6985/20,255)	≤0.001
17	**57.7** (1707/2958)	**54.4** (9308/17,097)	0.001	49.9 (719/1441)	47.6 (8855/18,615)	0.090
18	64.9 (800/1232)	64.9 (4428/6819)	1.000	60.2 (435/722)	57.8 (4457/7708)	0.222
19	77.0 (241/313)	80.4 (1092/1359)	0.186	**63.4** (104/164)	**72.4** (715/987)	0.020
20	81.1 (103/127)	80.4 (469/583)	1.000	79.0 (49/62)	72.7 (200/275)	0.341

Note: Fisher exact test was used, statistically significant differences are shown in bold.

experienced intercourse than those who were not depressed (Table 3). Among the boys in the 19-year-old group, those who were depressed were less likely to have experienced intercourse than those who were not depressed, but the association was not seen among the 20-year-olds.

As seen in Table 3, the odds ratios by depression for having experienced sexual intercourse were greater among boys than among girls in the age groups 14 and 15. Interaction analyses were carried out to explore whether there were true differences in the strength of the association

Table 3. Odds ratios (OR, 95% CI) for having experienced sexual intercourse according to depression and exact age (continuous), stratified for age groups (Model 1).

	Model 1. Depression and age		Model 2. Depression and age, controlled for sociodemographic variables	
	Girls	Boys	Girls	Boys
14				
Depression	**2.7** (2.4–3.0)	**4.7** (4.1–5.4)	**2.5** (2.2–2.8)	**4.4** (3.8–5.1)
Age (continuous)	**2.1** (1.6–2.7)	**1.8** (1.4–2.3)	**2.0** (1.5–2.6)	**1.8** (1.3–2.3)
15				
Depression	**2.0** (1.9–2.2)	**2.6** (2.3–2.8)	**1.8** (1.7–2.0)	**2.3** (2.1–2.6)
Age (continuous)	**2.6** (2.4–2.9)	**2.4** (2.1–2.6)	**2.7** (2.4–3.0)	**2.4** (2.1–2.6)
16				
Depression	**1.5** (1.4–1.6)	**1.6** (1.5–1.8)	**1.4** (1.3–1.5)	**1.5** (1.4–1.7)
Age (continuous)	**2.3** (2.1–2.5)	**1.9** (1.8–2.1)	**2.3** (2.1–2.6)	**2.0** (1.8–2.2)
17				
Depression	**1.1** (1.1–1.2)	1.1 (1.0–1.2)	1.1 (1.0–1.2)	1.0 (0.9–1.1)
Age (continuous)	**1.9** (1.7–2.1)	**1.7** (1.6–1.9)	**1.9** (1.7–2.1)	**1.7** (1.6–1.9)
18				
Depression	1.0 (0.9–1.1)	1.1 (0.9–1.3)	0.9 (0.8–1.1)	1.0 (0.9–1.2)
Age (continuous)	**1.9** (1.6–2.4)	**2.0** (1.6–2.4)	**1.6** (1.3–2.0)	**1.9** (1.5–2.3)
19				
Depression	0.8 (0.6–1.1)	**0.7** (0.5–0.9)	0.7 (0.5–1.0)	**0.7** (0.4–1.0)
Age (continuous)	1.4 (0.9–2.1)	0.8 (0.5–1.3)	**1.6** (1.0–2.6)	0.8 (0.5–1.3)
20				
Depression	1.1 (0.6–1.7)	1.4 (0.7–2.7)	1.0 (0.6–1.7)	1.3 (0.6–2.7)
Age (continuous)	1.9 (0.5–7.3)	0.5 (0.1–2.8)	1.7 (0.4–7.3)	0.6 (0.1–4.7)

Note: In Model 2, sociodemographic variables are controlled for. Significant values are shown in bold.

between depression and being sexually experienced by gender. Interaction term gender*depression was statistically significant in the age groups 14 and 15 (among 14-year-olds OR = 1.8, 95% CI 1.5–2.1, $p < 0.001$, and among 15-year-olds OR = 1.3, 95% CI 1.1–1.4, $p < 0.001$), confirming the gender difference in these age groups. In age groups 16–20, there were no significant interactions. In each age group, experience of intercourse was, predictably, more likely as age increased.

Adding to the models family structure, mother's education and father's education did not change the associations detected between depression and having experienced sexual intercourse otherwise, but the association did not remain statistically significant among 17-year-old girls anymore. The odds ratios for having experienced intercourse by depression were slightly modified, but all the other reported statistically significant associations persisted as significant when sociodemographic variables were controlled for. These odds ratios are shown in the Model 2 of Table 3.

Discussion

Our main, novel finding was that sexual activity is associated with self-reported depression in early and middle adolescents, but this association gradually disappears, and is actually reversed in late adolescence. Even if young adolescents are physically developed enough to engage safely in sexual activity, and from middle adolescence even in reproduction, their cognitive, not to mention emotional, maturity develops more slowly than their physical maturity (Moshman, 2011; Steinberg, 2005). Our findings concur with these developmental theories. The ability to engage positively in intimate sexual contact likely requires a certain emotional maturity that is not yet developed in the majority of early and middle adolescents, thus sexual activity across the early and middle adolescent years is associated with self-reported depression and more likely indicates developmental difficulties than rapid and successful adolescent passage. In late adolescence, emotional maturity has most often been reached, and being sexually active is no longer associated with self-reported depression; on the contrary, it was found that in 19-year-old boys it was not being sexually active that was associated with self-reported depression. To the best of our knowledge, there are no previous studies analyzing the association between depression and sexual activity year by year across adolescence, exploring how the associations change as adolescent development progresses.

Our findings corroborate those of existing research establishing a link between early sexual activity and depression (Hallfors et al., 2004; Jamieson & Wade, 2011; Kaltiala-Heino et al., 2003; Oshri et al., 2011; Valle et al., 2009). Our data further demonstrated, along with the developmental theories described above, that the relation between having experienced sexual intercourse and self-reported depression is the stronger the younger the adolescent is. The association between self-reported depression and having experienced sexual intercourse diminished until, among adolescents aged 17, the association ceased to be significant. Among 19-year-old boys, the association became significant again, but in the opposite direction: depressed boys were less likely than their non-depressed peers to have experienced sexual intercourse. Being sexually inexperienced in an age when the vast majority has already engaged in intimate sexual relationships may trigger feelings of loneliness, social isolation, or sadness that may predispose to depression; but it is also possible that being depressed results in such difficulties in social relationships that sexual development is delayed. Among girls, the same observation was not statistically significant, even if the share of those who had experienced intercourse according to self-reported depression turned to the opposite from what was seen in early to middle adolescence. These findings support the theory of adolescent development suggesting that emotional maturity is reached later than physical and cognitive.

According to developmental theory, self-reported depression should of course be negatively associated with experiencing sexual intercourse also among 20-year-olds. However, such was not the case in our data. This is probably due to a quite small sample of 20-year-olds, 0.6% of the whole study population. What is more, it is uncommon for 20-year-old adolescents to be attending schools of the type at which the study was conducted. They are, for example, adolescents who have experienced severe illnesses or come from an immigrant background. Their adolescent development and mental health may deviate from the mainstream. Dating and engaging in sexual behaviors for them may be similarly delayed. On the other hand, the group of 20-year-olds was also likely to include adolescents continuing to another secondary education after completing one. Thus, the group of 20-year-olds is likely more heterogeneous than the other age groups in our data.

Contrary to expectations, given gender differences in the epidemiology of depression (Patton et al., 2014) and the prevailing double standard for sexual behavior (Bordini & Sperb, 2013; Crawford & Popp, 2003; Kreager & Staff, 2009), the findings of this study are parallel for boys and girls. Yet as expected, there are slight differences. Among 14- and 15-year-olds, self-reported depression was a more significant factor to boys for experiencing sexual intercourse compared to girls. Because girls mature earlier than boys, they may also be emotionally more ready for sexual intercourses at a younger age. Consequently, the data show that especially in the most immature cohort in this study, among the youngest boys, it is certainly pathological to engage in sexual activity. Moreover, sexual health services for adolescents tend to be directed primarily toward girls (Avery & Lazdane, 2010). Hence, the sexual health of depressed boys warrants special attention in health education and school health services, which may be the only ways to reach these adolescents.

The very large population-based sample is a strength of this study. Because the School Health Promotion Study is a classroom survey, it reaches the vast majority of adolescents at least in comprehensive school. There is always a small fraction, 10–15%, of pupils absent on any given day, including the survey day. It is possible that these are also the ones suffering more not only from physical illnesses, but also from mental disorders. Therefore, the rates of self-reported depression in our study may be underestimated. In health surveys even high levels of non-response may not necessarily have an effect on the associations studied (Van Loon, Tijhuis, Picavet, Surtees, & Ormel, 2003). Our findings may not be generalizable to all adolescents, but is likely to represent quite well western adolescents, because the Finnish adolescents in this study come from widely different living conditions and socioeconomic backgrounds.

The sample size diminished toward the older age groups in our study. Respondents were 14–20 years old and the most of the study sample were in age groups 14–18. There were considerably fewer adolescents in aged 19–20, accounting together for slightly more than 4% of the whole study population. This is because 19–20-year-old adolescents have usually already left the schools in which the School Health Promotion Study is conducted. They may not be as representative of their age group as are the younger subjects of this study in their respective age groups, but as the size of the 19–20 year age group sample is still considerable, about 4000, the data size sufficed to conduct the analyses in these groups as well.

Adding into the models sociodemographic background did not change the main findings of the present study. However, there may be other potential confounders that deserve further study. Biopsychosocial factors beyond the scope of present study, for example, may modify the relation between an experience of sexual intercourse and depression (Jamieson & Wade, 2011). Such factors may be those related to depression, for example self-esteem and social support, peer relationships and academic factors or other factors relevant for adolescent development. To examine potential confounders more specifically is a subject for further research.

Our study was based on self-reported measures, which can be considered a limitation. Diagnostic interviews to detect depression would have been more reliable, but with such a large sample this was not feasible. Self-reported depression was a state measure and the duration of the symptoms cannot be seen in the data. Therefore, the cut-point for being depressed was set at 8 points on the instrument (moderate/severe depression) and adolescents scoring only mild depression (5–7) were not considered to be depressed in this study. In this way, we avoided overestimating the rates of depression. Moderate-to-severe self-reported depression is likely to require clinical attention, because depressive symptoms are already valid predictors of depression (Lewinsohn, Clarke, Seeley, & Rohde, 1994).

Due to the cross-sectional nature of our study, we cannot draw conclusions about causality – which came first in the studied adolescents, depression, or sexual activity. This remains a topic for future research. Third factors associated both with depression and sexual activity in adolescence, such as substance use, conduct disorder, and psychosocial problems in the family (Boislard & Poulin, 2011; Davila et al., 2009; Hallfors et al., 2005), could also play a role in mediating or moderating the associations between sexual activity and depression in adolescence and they are an important topic for further study.

Conclusions

Becoming sexually active is part of adolescent development. However, embarking on sexual activity very early in adolescent development is associated with self-reported depression. It is only at age 17 that depression loses its role as a correlate of sexual activity. In adolescent health services, attention should be paid to the sexual health of depressed adolescents. They may require more intensive sex education and special support to be able to protect themselves from engaging in sexual activity too early, before being emotionally ready for it. On the other hand, the mental health needs of sexually active adolescents require attention. However, toward early adulthood, lack of sexual experience may indicate special needs in adolescent development and mental health.

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Notes

1. Statistics Finland, http://www.stat.fi/tup/julkaisut/tiedostot/julkaisuluettelo/ykou_opla_201200_2013_10094_net.pdf.
2. *Wellbeing of adolescents in Finland 2000–2013*. National Institute for Health and Welfare (THL). Report 25/2014. http://www.julkari.fi/handle/10024/116692.

References

Avery, L., & Lazdane, G. (2010). What do we know about sexual and reproductive health of adolescents in Europe? *The European Journal of Contraception & Reproductive Health Care*, *15*(S2), S54–S66. doi:10.3109/13625187.2010.533007

Beck, A., Rial, W., & Rickels, K. (1974). Short form of depression inventory: Cross-validation. *Psychological Reports*, *34*, 1184–1186.
Bennett, D. S., Ambrosini, P. J., Bianchi, M., Barnett, D., Metz, C., & Rabinovich, H. (1997). Relationship of Beck Depression Inventory factors to depression among adolescents. *Journal of Affective Disorders*, *45*, 127–134.
Boislard, P. M.-A., & Poulin, F. (2011). Individual, familial, friends-related and contextual predictors of early sexual intercourse. *Journal of Adolescence*, *34*(2), 289–300. doi:10.1016/j.adolescence.2010.05.002
Bordini, G. S., & Sperb, T. M. (2013). Sexual double standard: A review of the literature between 2001 and 2010. *Sexuality & Culture*, *17*(4), 686–704. doi:10.1007/s12119-012-9163-0
Centers for Disease Control and Prevention. (2010). Youth risk behavior surveillance. Surveillance Summaries, 2009. *MMWR*, *59*(No. SS–5).
Costello, J. E., Erkanli, A., & Angold, A. (2006). Is there an epidemic of child or adolescent depression? *Journal of Child Psychology and Psychiatry*, *47*(12), 1263–71. doi:10.1111/j.1469-7610.2006.01682.x
Crawford, M., & Popp, D. (2003). Sexual double standards: A review and methodological critique of two decades of research. *Journal of Sex Research*, *40*(1), 13–26.
Cromer, B. (2011). Adolescent development. In R. Kliegman, R. Behrman, H. Jenson, & B. Stanton (Eds.), *Nelson Textbook of Pediatrics* (pp. 649–660, 19th ed.). Philadelphia: Saunders Elsevier.
Davila, J., Stroud, C. B., Starr, L. R., Miller, M. R., Yoneda, A., & Hershenberg, R. (2009). Romantic and sexual activities, parent-adolescent stress, and depressive symptoms among early adolescent girls. *Journal of Adolescence*, *32*(4), 909–24. doi:10.1016/j.adolescence.2008.10.004
Edgardh, K. (2000). Sexual behaviour and early coitarche in a national sample of 17 year old Swedish girls. *Sexually Transmitted Infections*, *76*(2), 98–102.
Edgardh, K. (2002). Sexual behaviour and early coitarche in a national sample of 17-year-old Swedish boys. *Acta Paediatrica*, *91*(9), 985–991.
Egger, H. L., & Angold, A. (2006). Common emotional and behavioral disorders in preschool children: Presentation, nosology, and epidemiology. *Journal of Child Psychology and Psychiatry*, *47*(3–4), 313–337. doi:10.1111/j.1469-7610.2006.01618.x
Ge, X., Kim, I. J., Brody, G. H., Conger, R. D., Simons, R. L., Gibbons, F. X., & Cutrona, C. E. (2003). It's about timing and change: Pubertal transition effects on symptoms of major depression among African American youths. *Developmental Psychology*, *39*(3), 430–439.
Hallfors, D. D., Waller, M. W., Bauer, D., Ford, C. a., & Halpern, C. T. (2005). Which comes first in adolescence – sex and drugs or depression? *American Journal of Preventive Medicine*, *29*(3), 163–70. doi:10.1016/j.amepre.2005.06.002
Hallfors, D. D., Waller, M. W., Ford, C. a., Halpern, C. T., Brodish, P. H., & Iritani, B. (2004). Adolescent depression and suicide risk: Association with sex and drug behavior. *American Journal of Preventive Medicine*, *27*(3), 224–31. doi:10.1016/j.amepre.2004.06.001
Heidmets, L., Samm, A., Sisask, M., Kõlves, K., Aasvee, K., & Värnik, A. (2010). Sexual behavior, depressive feelings, and suicidality among Estonian school children aged 13 to 15 years. *Crisis: Journal of Crisis Intervention & Suicide*, *31*(3), 128–36. doi:10.1027/0227-5910/a000011
Jamieson, L. K., & Wade, T. J. (2011). Early age of first sexual intercourse and depressive symptomatology among adolescents. *Journal of Sex Research*, *48*(5), 450–60. doi:10.1080/00224499.2010.509892
Kaltiala-Heino, R., Koivisto, A.-M., Marttunen, M., & Fröjd, S. (2011). Pubertal timing and substance use in middle adolescence: A 2-year follow-up study. *Journal of Youth and Adolescence*, *40*(10), 1288–301. doi:10.1007/s10964-011-9667-1
Kaltiala-Heino, R., Kosunen, E., & Rimpelä, M. (2003). Pubertal timing, sexual behaviour and self-reported depression in middle adolescence. *Journal of Adolescence*, *26*(5), 531–545. doi:10.1016/S0140-1971(03)00053-8
Kaltiala-Heino, R., Rimpela, M., Rantanen, P., & Laippala, P. (1999). Finnish modification of the 13-item Beck Depression Inventory in screening an adolescent population for depressiveness and positive mood. *Nordic Journal of Psychiatry*, *53*(6), 451–457.
Kosunen, E., Kaltiala-Heino, R., Rimpelä, M., & Laippala, P. (2003). Risk-taking sexual behaviour and self-reported depression in middle adolescence – a school-based survey. *Child Care Health and Development*, *29*(5), 337–344.
Kotchick, B. a., Shaffer, A., Forehand, R., & Miller, K. S. (2001). Adolescent sexual risk behavior: A multi-system perspective. *Clinical Psychology Review*, *21*(4), 493–519.
Kreager, D. A., & Staff, J. (2009). The sexual double standard and adolescent peer acceptance. *Social Psychology Quarterly*, *72*(2), 143–164. doi:10.1177/019027250907200205

Lehrer, J. a, Shrier, L. a, Gortmaker, S., & Buka, S. (2006). Depressive symptoms as a longitudinal predictor of sexual risk behaviors among US middle and high school students. *Pediatrics*, *118*(1), 189–200. doi:10.1542/peds.2005-1320

Lewinsohn, P., Clarke, G., Seeley, J., & Rohde, P. (1994). Major depression in community adolescents: Age at onset, episode duration, and time to recurrence. *Journal of American Academy of Child & Adolescent Psychiatry*, *33*(6), 809–818.

Madkour, A. S., Farhat, T., Halpern, C. T., Godeau, E., & Gabhainn, S. N. (2010). Early adolescent sexual initiation as a problem behavior: A comparative study of five nations. *Journal of Adolescent Health*, *47* (4), 389–98. doi:10.1016/j.jadohealth.2010.02.008

Moshman, D. (2011). *Adolescent rationality and development: Cognition, morality, and identity* (3rd ed.). New York, NY: Psychology Press.

O'Donnell, L., O'Donnell, C. R., & Stueve, A. (2001). Early sexual initiation and subsequent sex-related risks among urban minority youth: The reach for health study. *Family Planning Perspectives*, *33*(6), 268–275.

Oshri, A., Tubman, J. G., & Jaccard, J. (2011). Psychiatric symptom typology in a sample of youth receiving substance abuse treatment services: Associations with self-reported child maltreatment and sexual risk behaviors. *AIDS and Behavior*, *15*(8), 1844–56. doi:10.1007/s10461-011-9890-5

Patton, G. C., Coffey, C., Romaniuk, H., Mackinnon, A., Carlin, J. B., Degenhardt, L., Olsson, C., & Moran, P. (2014). The prognosis of common mental disorders in adolescents: A 14-year prospective cohort study. *Lancet*, *383*, 1404–11. doi:10.1016/S0140-6736(13)62116-9

Sabaté, E., Cesar, J., & Chavoushi, F. (2013). Depression. In: *Priority Medicines for Europe and the World: "A Public Health Approach to Innovation"*. Background paper retrieved from http://www.who.int/medicines/areas/priority_medicines/BP6_15Depression.pdf.

Schofield, H.-L. T., Bierman, K. L., Heinrichs, B., & Nix, R. L. (2008). Predicting early sexual activity with behavior problems exhibited at school entry and in early adolescence. *Journal of Abnormal Child Psychology*, *36*(8), 1175–88. doi:10.1007/s10802-008-9252-6

Sonenstein, F. L., Pleck, J. H., & Ku, L. C. (2014). Levels of sexual activity among adolescent males in the United States. *Family Planning Perspectives*, *23*(4), 162–167.

Sørensen, K., Mouritsen, A., Aksglaede, L., Hagen, C., Mogensen, S., & Juul, A. (2012). Recent secular trends in pubertal timing: Implications for evaluation and diagnosis of precocious puberty. *Hormone Research in Paediatrics*, *77*(3), 137–145. doi:10.1159/000336325

Steinberg, L. (2005). Cognitive and affective development in adolescence. *Trends in Cognitive Sciences*, *9* (2), 69–74. doi:10.1016/j.tics.2004.12.005

Valle, A.-K., Roysamb, E., Sundby, J., & Klepp, K. I. (2009). Parental social position, body image and other psychosocial determinants and first sexual intercourse among 15- and 16-year olds. *Adolescence*, *44* (174), 479–498.

Van Loon, A. J. M., Tijhuis, M., Picavet, H. S. J., Surtees, P. G., & Ormel, J. (2003). Survey non-response in the Netherlands: Effects on prevalence estimates and associations. *Annals of Epidemiology*, *13*, 105–110.

Wichstrøm, L., Berg-Nielsen, T. S., Angold, A., Egger, H. L., Solheim, E., & Sveen, T. H. (2012). Prevalence of psychiatric disorders in preschoolers. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, *53*(6), 695–705. doi:10.1111/j.1469-7610.2011.02514.x

PUBLICATION II

Parental involvement, depression, and sexual experiences across adolescence: a cross-sectional survey among adolescents of different ages

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Parental involvement, depression, and sexual experiences across adolescence: a cross-sectional survey among adolescents of different ages

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ABSTRACT

Background: Early sexual activity and multiple sexual partners are deemed risky sexual behaviors and connected to mental disorders such as depression. Parent–adolescent relationship is connected both to risky sexual behaviors and depression.

Objective: To ascertain if there is a connection between parental involvement and adolescent sexual behavior in different age groups from early to late adolescence, and the role of depression in this association.

Methods: Data from School Health Promotion Study, a cross-sectional school survey in Finland from the years 2010 and 2011 with 186,632 adolescents as informants was used. We examined the association of sexual behaviors and parental involvement with self-reported depression, at first separately and then in the same model. Analyses were conducted in seven age groups, separately for girls and boys. The main outcomes were analyzed by χ^2 test and logistic regression.

Results: Among both girls and boys, low level of parental involvement was connected to having experienced sexual intercourse and, among those sexually active, reporting more sexual partners in early and middle adolescence. Parental involvement and depression were independently associated with the sexual behaviors studied and had only a slight modifying effect on each other in this context.

Conclusion: Promoting parental involvement in adolescents' lives is likely to be beneficial to adolescents' sexual health.

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Adolescence; risky sexual behavior; depression; parental involvement; self-reported measures

Introduction

Sexual development in adolescence requires maturation in physical, psychological, and social domains. Emotional development takes place over a much longer period than does physical and cognitive development (Steinberg, 2005). First intercourse is often

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characterized as sexual debut. It is normative and developmentally appropriate to have experiences of intercourse in late adolescence, while sexual debut in early adolescence can be seen as problem behavior (Madkour, Farhat, Halpern, Godeau, & Gabhainn, 2010; Savioja, Helminen, Fröjd, Marttunen, & Kaltiala-Heino, 2015). Early sexual activity is connected to risky sexual behaviors such as a greater number of sexual partners and failure to use contraception, which in turn exposes these adolescents to unwanted pregnancies and sexually transmitted infections (Edgardh, 2000, 2002; Kotchick, Shaffer, Forehand, & Miller, 2001; O'Donnell, O'Donnell, & Stueve, 2001). What is more, a large body of research shows that sexual activity per se among early and middle adolescents, and sexual risk-taking in particular, are connected to low socioeconomic status, living without both parents, and conflicts between parents and between parent and adolescent (Boislard P & Poulin, 2011; Davila et al., 2009; Kotchick et al., 2001; Madkour et al., 2010; Miller, Benson, & Galbraith, 2001; Wight, Williamson, & Henderson, 2006). All these correlates suggest that early and risky sexual activity are indicative of developmental problems rather than of rapid and favorable maturation.

In addition to sociodemographic family characteristics, research on early and/or risky sexual behavior in adolescence has focused on aspects of parenting as a risk/protective factor. Low level of parental monitoring is connected to early sexual activity, more sexual partners, and less condom use, while conversely higher levels of parental monitoring are a protective factor (DiClemente, Wingood, Crosby, Sionean, et al., 2001; Markham et al., 2010; Meschke, Bartholomae, & Zentall, 2002; Wight et al., 2006). In the USA, it was found that adolescents spending more time alone at home and with less supervision than their peers were more likely to be sexually active, and among boys the amount of unsupervised time also correlated with more lifetime sexual partners (Cohen, Farley, Taylor, Martin, & Schuster, 2002). Adolescents whose parents know their friends and whereabouts are less likely to have engaged in risky sexual behaviors (Coley, Votruba-Drzal, & Schindler, 2009). On the other hand, positive, open parent–adolescent communication was connected to greater use of contraception (DiClemente, Wingood, Crosby, Cobb, et al., 2001; Stanton, Li, Pack, & Cottrell, 2002), postponing first sexual intercourse (Rai et al., 2003), and less sexual risk-taking in general (Wang et al., 2013). However, excessive perceived parental control or stricter parental rules were considered a risk factor for ever having sex in adolescence (Markham et al., 2010).

The prevalence of depressive disorders rises significantly from childhood to adolescence (Costello, Erkanli, & Angold, 2006; Egger & Angold, 2006; Wichstrøm et al., 2012). Depression is almost twice as common among adolescent girls as among adolescent boys (Patton et al., 2014). Sexual activity in early adolescence is connected to depression (Hallfors et al., 2004; Jamieson & Wade, 2011; Kaltiala-Heino, Kosunen, & Rimpelä, 2003; Oshri, Tubman, & Jaccard, 2011; Valle, Roysamb, Sundby, & Klepp, 2009) and there is also evidence that this association persists until middle adolescence (Hallfors, Waller, Bauer, Ford, & Halpern, 2005; Savioja et al., 2015). This association has been shown to gradually disappear, and to be even reversed in late adolescence (Savioja et al., 2015), concurring with developmental theories (Moshman, 2011; Steinberg, 2005). Adolescents suffering from depressive symptoms are further at greater risk for sexual risk-taking (Brown et al., 2006; Donenberg, Emerson, & Mackesy-Amiti, 2011; Hallfors et al., 2004, 2005; Kosunen, Kaltiala-Heino, Rimpelä, & Laippala, 2003; Langille, Asbridge, Kisely, & Wilson, 2012; Lehrer, Shrier, Gortmaker, & Buka, 2006; Mazzaferro et al., 2006; Mun,

Windle, & Schainker, 2008; Paxton & Valois, 2007; Rubin, Gold, & Primack, 2009; Seth et al., 2011; Turner, Latkin, Sonenstein, & Tandon, 2011).

Positive aspects of parenting, such as parental involvement, appropriate monitoring and care together with sound interpersonal relations in a family are beneficial for an adolescent's mental health (Burnett-Zeigler et al., 2012; Fröjd, Kaltiala-Heino, & Rimpelä, 2007; Yu, Clemens, Yang, Li, & Stanton, 2006). Adolescents whose parents know their friends and whereabouts are less likely to have depressive symptoms (Fröjd et al., 2007; Hamza & Willoughby, 2011). Depressive symptoms are more common among adolescents who have difficulties communicating with parents (Fletcher, 2004; Fröjd et al., 2007; Schwartz et al., 2012; Stanton, Li, & Galbraith, 2000; Yu et al., 2006). Depressed adolescents perceive parental monitoring to be at lower levels than average (Yu et al., 2006).

To summarize, research has associated certain aspects of parenting/ parent–adolescent relationships with both adolescent depression and early and risky sexual behavior and has demonstrated an association between adolescent depression and sexual activity. Depression could explain the associations between parent–adolescent relationship and sexual behavior, or vice versa, or depression and aspects of parenting could be independently associated with sexual behavior. Schuster, Mermelstein, and Wakschlag (2013) did not find parental control or parent–adolescent communication to be significant factors for depressive symptoms and risky sexual behavior in adolescence. Wilson and Donenberg (2004) found that high-quality parent–adolescent sexual health communication was connected to less sexual risk-taking among adolescents receiving psychiatric treatment. These findings suggest an independent role of aspects of parenting in adolescent sexual behavior.

The studies reviewed above have focused on slightly different aspects of parenting and parent–adolescent interaction. Terms describing aspects of parenting, such as involvement, monitoring, and care may also to some extent be used interchangeably, or at least they likely overlap, even if some focus more on limit setting and directing by parents, and others on showing interest and communicating positively. Nevertheless, it can be summarized that positive parental involvement that includes parental interest in and knowledge about the adolescent's personal life, and good parent–adolescent communication have been connected to better outcomes regarding adolescents' sexual behavior and mental health. However, there are hardly any studies focusing simultaneously on the associations between all three factors, aspects of parenting, sexual behavior, and mental health in adolescence. Taking simultaneous account of all three factors can result in an important evidence base for promoting adolescent sexual health.

The aim of this study was to ascertain if there is a connection between parental involvement and adolescent sexual behavior in different age groups from early to late adolescence, and the role of depression in this association. This study addressed the following questions:

(1) Is parental involvement connected to adolescent sexual behavior, namely to having experienced sexual intercourse and having had sexual intercourse with five or more partners?
(2) Do the possible associations between parental involvement and adolescent sexual behavior persist when depression is adjusted for?

(3) Are the associations between parental involvement, depression, and adolescent sexual behavior similar or different among early, middle, and late adolescents?
(4) Are the possible associations in (1), (2), and (3) similar among adolescent boys and girls?

In light of the existing literature, we hypothesized that low levels of parental involvement reported by adolescents would be associated with more experiences of sexual intercourse and more sexual risk-taking in early and middle adolescence. Depression could be a cause and also a consequence of both adolescent's early and risk-taking sexual behavior and of low parental involvement. Low parental involvement and depression could each independently be associated with adolescents' early and risky sexual behaviors or one of them could cancel out the other when studied simultaneously. We left the hypothesis open as to whether depression would partially or totally explain the possible associations between parental involvement and sexual behaviors. Although depression is more common among girls than boys, the association between depression and experience of sexual intercourse has been shown to be quite similar across genders (Savioja et al., 2015). We therefore anticipated no major gender differences in the associations to be studied. However, because of the known gender differences in the prevalence of adolescent depression, we still deemed it worthwhile to conduct the analyses separately for girls and boys.

Materials and methods

This study used the data of the Finnish School Health Promotion Study (SHPS), which is a nationwide classroom survey dealing with health behaviors and is based on self-reported measures (www.thl.fi/kouluterveyskysely). Every student answered the questionnaire anonymously. The SHPS has been conducted yearly since 1995. Originally only 14- to 16-year-old secondary school students responded to the survey, but since 1999 the survey has also been conducted among upper secondary and vocational school students (16–20 years old). Until 2011, the SHPS was carried out in alternate years in western parts of Finland and eastern parts and then the results of two consecutive years were combined to represent the whole of Finland. The SHPS was granted approval by the ethics committees of Pirkanmaa Hospital District and the National Institute of Health and Welfare. This study utilized the data of the SHPS from 2010 to 2011 including all the age groups, 14- to 20-year-olds, included in the study.

In Finland the vast majority, 99% of 14- to 16-year-old adolescents attend secondary school. Although compulsory education ends after secondary school, attendance at upper secondary education, where students are typically 16–18 years old, is about 93%. Accordingly, the data of the SHPS covered the majority of 14- to 18-year-old Finnish adolescents. Students aged 19–20 were not so well represented in the study because they have usually already graduated from the schools at which the study is conducted. Students attending school on the study day responded to the survey. Students absent on the survey day (10–15%) were not contacted. Furthermore, a slight loss of potential respondents was due to the fact that not every school participates in the SHPS. The survey was sent to every municipality, and each municipality decided if the schools in their area would participate in the survey. The final coverage of the 2010–2011 study was 80% of all 14- to 16-year-old secondary school students, 73% of 16- to 18-year-old

upper secondary school students, and 43% of 16- to 18-year-old vocational school students in the whole of Finland.[1] The total number of respondents was 186,632 of whom 92,478 (49.6%) were boys and 94,154 (50.4%) were girls. The respondents cannot be identified from the data.

Sexual activity was elicited by the question 'Have you ever had sexual intercourse?' The response alternatives were 'yes' and 'no'. In the whole sample ($n = 186,632$), 36.9% of the girls and 32.7% of the boys had experienced sexual intercourse. In Finland, girls experience their first sexual intercourse at age 16.5 on average and boys at age 17.5.[2]

The number of sexual partners was elicited by the question 'How many sexual partners have you had sexual intercourse with?' The response alternatives were 'one', 'two', 'three or four', and 'five or more'. The number of sexual partners was analyzed as a dichotomized variable, the cutpoint being in five or more sexual partners, which, according to earlier research, was regarded as risky sexual behavior (Kaltiala-Heino, Fröjd, & Marttunen, 2015). Among those adolescents who were sexually active ($n = 65,063$), 15.2% of the girls and 16.9% of the boys reported having had intercourse with five or more sexual partners.

Depressive symptoms were measured with a Finnish modification of the short (13-item) Beck Depression Inventory (Beck & Beck, 1972; Beck, Rial, & Rickels, 1974), Raitasalo's modification of the BDI (R-BDI) (Raitasalo, 2007). The Beck Depression Inventory is a widely used scale with established validity and reliability among both adults and adolescents (Beck et al., 1974; Bennett et al., 1997; Olsson & Von Knorring, 1997). The 13-item BDI has been shown to be a valid method for identifying depressive symptoms among adolescents (Beck & Beck, 1972; Beck et al., 1974; Bennett et al., 1997; Kaltiala-Heino, Rimpela, Rantanen, & Laippala, 1999). The Finnish version, R-BDI, is equivalent to the original 13-item BDI, but to every item an opening question and one positive response alternative have been added. The scoring is as in the original 13-item version (Kaltiala-Heino et al., 1999). Each item is scored 0–3 and the maximum score is 39. Adolescents with a sum score of 0–4 were categorized as non-depressed, those scoring 5–7 as mildly depressed, 8–15 as moderately depressed and those scoring 16 and over as severely depressed. Scores indicating moderate or severe depression (8 or more) are referred to as self-reported depression. Moderate or severe self-reported depression was present in 16.9% of the girls and 7.7% of the boys.

Parental involvement was measured with three questions. The first question was 'Do your parents know most of your friends?' with response alternatives 'they both know' (coded for the analyses (=2), 'only father knows' (=1), 'only mother knows' (=1), and 'neither of them knows' (=0)). The second question was 'Do your parents know about your whereabouts on Friday and Saturday nights?' with response alternatives 'always' (=2), 'sometimes' (=1), and 'mostly not' (=0). The third question was 'Are you able to talk with your parents about matters important to you?' with response alternatives 'often' (=3), 'fairly often' (=2), 'now and then' (=1), and 'hardly ever' (=0). A sum score was formed of the responses so that the maximum score was 7. Scores 0–3 were referred to as low parental involvement, scores 4–5 to as average parental involvement, and scores 6–7 to as high parental involvement. Of the girls (boys), 17.7% (18.4%) reported low, 44.7% (44.3%) average, and 37.6% (37.2%) high parental involvement.

The sociodemographic variables used were family structure (living with mother and father vs. in any other family constellation) and mother's and father's highest educational

qualification (comprehensive school only/ upper secondary school or vocational school/ upper secondary school or vocational school and further vocational studies/university or university of applied sciences).

Data analysis

Distributions are given above for having experienced sexual intercourse, for parental involvement, and for depression in the whole sample, and for having had five or more partners for intercourse among those sexually active, separately for girls and boys. Bivariate associations between having experienced sexual intercourse and parental involvement, and, among those who were sexually active, having had five or more partners for intercourse and parental involvement were examined with cross-tabulations and significance was tested with χ^2 test/Fisher's exact test where appropriate. In all the analyses we used all available data. Those participating in the survey may have occasionally skipped some questions, and due to this, there may be slight variation in number of respondents in different analyses. Multivariate associations were studied using logistic regression. Having experienced sexual intercourse was entered as the dependent variable. First, depression (yes vs. no) and then parental involvement (high/average/low, using high as reference category) were entered each alone as independent variables. Crude odds ratios (ORs) with 95% confidence intervals (CI) were calculated. Next depression and parental involvement were entered simultaneously, yielding adjusted ORs (95% CI) (Model 1). Finally, sociodemographic variables were adjusted for (Model 2). The analyses were run separately for boys and girls, among the whole sample and stratified for age group (age in years: 14/15/16 …). Age groups 19 and 20 were combined because of their smaller size and because they were less representative than age groups 14–18. Among those reporting they were sexually active, similar analyses were performed using risk-taking sexual behavior (having had five or more partners for intercourse) as the dependent variable. Because of the large data size, and to avoid bias due to multiple testing, we set the limit for statistical significance at $p < .01$.

Attrition

Of the respondents, 1230 (0.7%) had skipped questions on parental involvement items, 31 (0.0%) had skipped the depression scale, and 4929 (2.6%) had not responded on if they had experienced sexual intercourse. Of those who had experienced intercourse, 449 (0.7%) had not reported with how many different partners they had had intercourse. Not responding on parental involvement questions and experience of intercourse were more common among boys (3.1% vs. 2.1% and 0.9% vs. 0.4%, respectively; in both, $p < .001$). Non-response in all was statistically significantly associated with younger age (mean (SD), but in practice, differences in age between those responding and those skipping were negligible: non-response to parental involvement 16.1 (1.2) vs. 16.3 (1.3); non-response to depression scale 16.2 (1.3) vs. 16.3 (1.3); and non-response to experience of intercourse 16.2 (1.2) vs. 16.3 (1.3). Among those who had experienced intercourse, non-response on number of partners was more common among boys (1.0% vs. 0.4%, $p < .0001$), and those not responding were slightly younger (mean (SD) 16.3 (1.3) vs. 16.9 (1.2) years, $p < .001$).

Results

Bivariate associations

Across age groups 14–18, the proportion of those who had experienced sexual intercourse was lowest among adolescents who reported high parental involvement. Experience of sexual intercourse was more common among those reporting average parental involvement, and most common among those reporting low parental involvement (Table 1). Differences between parental involvement groups were greater in the younger age groups.

Among sexually active girls, reporting five or more partners for intercourse was more common in the average parental involvement group than in the high parental involvement group, and most common in the low parental involvement group. This was seen in all age groups (Table 2). Among sexually active boys, the proportion of those reporting five or more partners for intercourse was higher in the group with low parental involvement than among those reporting high parental involvement, but no such systematic differences were seen between high and average parental involvement group (Table 2).

In the whole sample, 44.5% of depressed adolescents had had sexual intercourse, while among non-depressed adolescents, the figure was 34.6% ($p \leq .001$). Among sexually active adolescents, 25.1% of depressed adolescents had had five or more partners for intercourse, while among non-depressed respondents the figure was 14.4% ($p \leq .001$).

Multivariate associations between parental involvement, depression, and sexual behavior

In the whole sample, ORs for having experienced intercourse were increased in the average parental involvement group and highest in the low parental involvement group, among both boys and girls. The finding persisted when depression, and finally sociodemographics were adjusted for (Table 3). Among those sexually active, ORs for risk-taking sexual behavior (five or more partners) were increased in those who reported low parental involvement among both boys and girls, and this persisted when depression, and finally sociodemographics were adjusted for (Table 4).

Table 1. Proportions (% (n/N)) of those having experienced sexual intercourse among adolescents with high, average, and low parental involvement.

	High parental involvement	Average parental involvement	Low parental involvement	*p*-Value
Age (years)	Girls			
14	**6.8 (378/5530)**	**12.6 (861/6834)**	**26.0 (708/2720)**	<.001
15	**16.2 (1375/8511)**	**23.7 (2613/11016)**	**38.3 (1678/4383)**	<.001
16	**34.2 (2884/8435)**	**40.4 (4019/9938)**	**50.8 (2012/3960)**	<.001
17	**50.5 (4092/8107)**	**55.9 (4840/8657)**	**63.4 (2064/3256)**	<.001
18	**63.8 (2056/3225)**	**64.2 (2196/3423)**	**69.6 (960/1379)**	<.001
19–20	78.2 (583/746)	79.8 (863/1082)	83.4 (456/547)	.064
all	**32.9 (11368/34554)**	**37.6 (15392/40950)**	**48.5 (7878/16245)**	<.001
Age (years)	Boys			
14	**8.2 (462/5625)**	**13.3 (830/6226)**	**25.4 (576/2266)**	<.001
15	**16.2 (1379/8524)**	**21.6 (2242/10384)**	**32.8 (1406/4287)**	<.001
16	**31.1 (2496/8021)**	**35.3 (3431/9715)**	**43.1 (1712/3971)**	<.001
17	**44.6 (3375/7574)**	**47.9 (4163/8188)**	**53.6 (1972/3683)**	<.001
18	**53.9 (1640/3041)**	**58.5 (2126/3616)**	**63.4 (1089/1719)**	<.001
19–20	66.8 (270/404)	73.8 (484/656)	73.2 (300/410)	.038
all	**29.0 (9622/33189)**	**33.8 (13276/39285)**	**43.2 (7055/16335)**	<.001

Note: Statistically significant differences are shown in bold.

Table 2. Proportions (% (n/N)) of those having had five or more sexual partners among sexually active adolescents with high, average, and low parental involvement.

	High parental involvement	Average parental involvement	Low parental involvement	*p*-Value
Girls				
Age (years)				
14	**6.4 (24/373)**	**7.4 (63/856)**	**12.5 (88/702)**	<.001
15	**5.1 (69/1365)**	**7.6 (197/2592)**	**12.5 (208/1669)**	<.001
16	**9.9 (285/2879)**	**11.4 (456/4006)**	**16.2 (325/2004)**	<.001
17	**14.3 (585/4086)**	**15.6 (751/4283)**	**22.0 (451/2052)**	<.001
18	**17.6 (362/2051)**	**21.4 (468/2190)**	**27.6 (263/954)**	<.001
19–20	**31.5 (183/581)**	**33.9 (292/861)**	**42.1 (191/454)**	<.001
all	**13.3 (1508/11335)**	**14.5 (2227/15328)**	**19.5 (1526/7835)**	<.001
Boys				
Age (years)				
14	**13.9 (62/445)**	**19.1 (154/806)**	**31.7 (178/562)**	<.001
15	**12.9 (176/1360)**	**12.6 (277/2194)**	**24.0 (334/1389)**	<.001
16	**12.8 (318/2477)**	**12.3 (419 / 3407)**	**19.9 (336/1690)**	<.001
17	**14.5 (487/3362)**	**13.0 (537/4141)**	**20.3 (397/1954)**	<.001
18	**18.1 (295/1633)**	**18.3 (387/2110)**	**25.9 (281/1083)**	<.001
19–20	**29.6 (80/270)**	**32.6 (157/481)**	**42.4 (126/197)**	.003
all	**14.9 (1418/9547)**	**14.7 (1931/13139)**	**23.7 (1652/6975)**	<.001

Note: Statistically significant differences are shown in bold.

Multivariate analyses stratified for age

ORs for having experienced sexual intercourse among 14- to 16-year-old girls were increased among those with depression and among those reporting average and low parental involvement when depression and parental involvement were studied separately (Table 3 crude ORs), simultaneously (Table 3 Model 1), and after sociodemographic variables were adjusted for (Table 3 Model 2). Experience of sexual intercourse was also associated with average and low parental involvement among 17-year-old girls. In age groups 18 and 19–20, associations between low parental involvement and having experienced sexual intercourse were leveled out in the multivariate models. Among boys aged 14–16 ORs for having experienced sexual intercourse were increased among those displaying depression as well as among those reporting average and low parental involvement, when depression and parental involvement were entered separately (Table 3 crude ORs), simultaneously (Table 3 Model 1), and after adjusting for sociodemographic variables (Table 3, Model 2). An association between low parental involvement and having experienced intercourse also persisted among 17- and 18-year-olds in the multivariate models. After age 17, depression was no longer associated with experience of intercourse among boys. Among the oldest, 19- to 20-year-old boys, adjusting for sociodemographics leveled out associations between parental involvement and having experiences sexual intercourse.

Among sexually active girls, ORs for reporting five or more partners for intercourse were increased among those displaying depression and among those reporting low parental involvement in all 15- to 20-year-olds when each of these variables was entered into the model alone (Table 4 crude ORs) or simultaneously (Table 4 Model 1). After further adjusting for sociodemographics, these findings persisted in all age groups except the oldest (19–20), where only depression was associated with risk-taking sexual behavior (Table 4 Model 2). In 14-year-old girls, only depression was statistically significantly associated with experience of intercourse with multiple partners, and this finding persisted after adjusting for sociodemographics (Table 4).

Table 3. ORs (95% CI) for having experienced sexual intercourse according to self-reported depression (yes vs. no) and parental involvement (average vs. high, low vs. high), stratified for age groups.

		Girls	Boys		Girls	Boys
14					Sociodemographics controlled for	
Crude	Depression	2.7 (2.4–3.0)**	4.7 (4.1–5.4)**			
	Average involvement	2.0 (1.7–2.2)**	1.7 (1.5–1.9)**			
	Low involvement	4.8 (4.2–5.5)**	3.8 (3.3–4.4)**			
M1	Depression	1.9 (1.7–2.1)**	3.6 (3.1–4.1)**	M2	1.8 (1.6–2.1)**	3.4 (2.9–4.0)**
	Average involvement	1.8 (1.6–2.0)**	1.6 (1.4–1.8)**		1.7 (1.5–2.0)**	1.5 (1.3–1.7)**
	Low involvement	3.8 (3.3–4.4)**	2.9 (2.5–3.4)**		3.3 (2.8–3.9)**	2.6 (2.2–3.0)**
15						
Crude	Depression	2.0 (1.9–2.2)**	2.6 (2.3–2.8)**			
	Average involvement	1.6 (1.5–1.7)**	1.4 (1.3–1.5)**			
	Low involvement	3.2 (3.0–3.5)**	2.5 (2.3–2.8)**			
M1	Depression	1.6 (1.5–1.7)**	2.3 (1.8–2.3)**	M2	1.5 (1.4–1.6)**	1.9 (1.7–2.1)**
	Average involvement	1.5 (1.4–1.6)**	1.4 (1.3–1.5)**		1.5 (1.4–1.6)**	1.3 (1.2–1.4)**
	Low involvement	2.8 (2.5–3.0)**	2.2 (2.0–2.4)**		2.4 (2.2–2.6)**	2.0 (1.8–2.2)**
16						
Crude	Depression	1.5 (1.4–1.6)**	1.6 (1.4–1.8)**			
	Average involvement	1.3 (1.2–1.4)**	1.2 (1.1–1.3)**			
	Low involvement	2.0 (1.8–2.1)**	1.7 (1.6–1.8)**			
M1	Depression	1.3 (1.2–1.4)**	1.4 (1.3–1.6)**	M2	1.2 (1.1–1.3)**	1.3 (1.2–1.5)**
	Average involvement	1.3 (1.2–1.4)**	1.2 (1.1–1.3)**		1.2 (1.2–1.3)**	1.2 (1.1–1.2)*
	Low involvement	1.9 (1.7–2.0)**	1.6 (1.5–1.7)**		1.7 (1.6–1.8)**	1.5 (1.4–1.6)**
17						
Crude	Depression	1.1 (1.1–1.2)**	1.1 (1.0–1.2)			
	Average involvement	1.2 (1.2–1.3)**	1.1 (1.1–1.2)**			
	Low involvement	1.7 (1.6–1.8)**	1.4 (1.3–1.6)**			
M1	Depression	1.0 (0.9–1.1)	1.0 (0.9–1.1)	M2	1.0 (0.9–1.1)	0.9 (0.8–1.0)
	Average involvement	1.2 (1.2–1.3)**	1.1 (1.1–1.2)**		1.2 (1.1–1.3)**	1.0 (1.0–1.2)
	Low involvement	1.7 (1.6–1.8)**	1.4 (1.3–1.6)**		1.5 (1.4–1.7)**	1.3 (1.2–1.5)**
18						
Crude	Depression	1.0 (0.9–1.1)	1.1 (0.9–1.3)			
	Average involvement	1.0 (0.9–1.1)	1.2 (1.1–1.3)**			
	Low involvement	1.3 (1.1–1.5)**	1.5 (1.3–1.7)**			
M1	Depression	0.9 (0.8–1.1)	1.0 (0.9–1.2)	M2	0.9 (0.8–1.0)	1.0 (0.8–1.1)
	Average involvement	1.0 (0.9–1.1)	1.2 (1.1–1.3)**		1.0 (0.9–1.1)	1.2 (1.1–1.3)*
	Low involvement	1.3 (1.2–1.5)**	1.5 (1.3–1.7)**		1.1 (1.0–1.3)	1.3 (1.1–1.5)**
19–20						
Crude	Depression	0.9 (0.7–1.1)	0.8 (0.6–1.1)			
	Average involvement	1.1 (0.9–1.4)	1.4 (1.1–1.8)			
	Low involvement	1.4 (1.1–1.9)	1.4 (1.0–1.8)			
M1	Depression	0.8 (0.6–1.0)	0.7 (0.5–1.0)	M2	0.8 (0.7–1.0)	0.7 (0.5–1.0)
	Average involvement	1.1 (0.9–1.4)	1.4 (1.1–1.9)*		1.1 (0.9–1.4)	1.3 (1.0–1.8)
	Low involvement	1.5 (1.1–2.0)*	1.5 (1.1–2.0)		1.3 (1.0–1.8)	1.3 (0.9–1.9)
All						
Crude	Depression	1.4 (1.3–1.4)**	1.7 (1.7–1.8)**			
	Average involvement	1.2 (1.2–1.3)**	1.3 (1.2–1.3)**			
	Low involvement	1.9 (1.8–2.0)**	1.9 (1.8–1.9)**			
M1	Depression	1.2 (1.1–1.2)**	1.5 (1.4–1.6)**	M2	1.1 (1.1–1.2)*	1.4 (1.3–1.5)*
	Average involvement	1.2 (1.2–1.2)**	1.2 (1.2–1.3)**		1.2 (1.1–1.2)*	1.2 (1.1–1.2)*
	Low involvement	1.8 (1.8–1.9)**	1.7 (1.7–1.8)**		1.6 (1.5–1.7)*	1.6 (1.5–1.6)*

Note: First, crude ORs are given. In Model 1 (M1), depression and parental involvement are entered as independent variables, and in Model 2 (M2), sociodemographic variables are adjusted for.

**ORs statistically significant at level $p < .001$.

*At level $.01 < p < .001$.

Among sexually active boys, similarly, reporting five or more partners for intercourse was associated with depression and low parental involvement among 14- to 18-year-olds when each of these independent variables was entered into the model alone (Table 4 crude ORs) or simultaneously (Table 4, Model 1). In 14- and 15-year-olds,

Table 4. OR (95% CI) for having had five or more sexual partners according to self-reported depression (yes vs. not) and parental involvement (average vs. high, low vs. high) among those sexually active, stratified for age groups.

		Girls	Boys		Girls	Boys
14					Sociodemographics controlled for	
Crude	Depression	2.1 (1.5–2.9)*	3.4 (2.6–4.3)**			
	Average involvement	1.1 (0.7–1.8)	1.5 (1.1–2.0)*			
	Low involvement	2.1 (1.3–3.3)	2.9 (2.1–4.0)**			
M1	Depression	1.8 (1.3–2.5)**	2.8 (2.2–3.7)**	M2	1.9 (1.3–2.7)**	2.7 (2.0–3.6)**
	Average involvement	1.0 (0.6–1.7)	1.4 (1.0–1.9)		1.1 (0.6–1.8)	1.3 (0.9–1.8)
	Low involvement	1.7 (1.0–2.7)	2.1 (1.5–2.9)**		1.5 (0.9–2.5)	2.0 (1.4–2.8)**
15						
Crude	Depression	2.5 (2.1–3.0)**	4.1 (3.5–4.9)**			
	Average involvement	1.5 (1.2–2.0)*	1.0 (0.8–1.2)			
	Low involvement	2.7 (2.0–3.5)**	2.1 (1.7–2.6)**			
M1	Depression	2.2 (1.8–2.7)**	3.6 (3.0–4.4)**	M2	2.1 (1.7–2.6)**	3.6 (3.0–4.4)**
	Average involvement	1.4 (1.1–1.9)*	0.9 (0.7–1.1)		1.4 (1.0–1.8)**	0.9 (0.7–1.1)
	Low involvement	2.1 (1.5–2.8)**	1.5 (1.2–1.9)**		1.8 (1.3–2.5)**	1.5 (1.2–1.9)**
16						
Crude	Depression	1.8 (1.5–2.1)**	3.6 (3.1–4.3)**			
	Average involvement	1.2 (1.0–1.4)	1.0 (0.8–1.1)			
	Low involvement	1.8 (1.5–2.1)**	1.7 (1.4–2.0)**			
M1	Depression	1.6 (1.4–1.9)**	3.3 (2.7–3.9)**	M2	1.5 (1.3–1.8)**	3.1 (2.5–3.7)**
	Average involvement	1.1 (0.9–1.3)	0.9 (0.7–1.1)		1.1 (0.9–1.3)	0.8 (0.7–1.0)
	Low involvement	1.5 (1.3–1.8)**	1.3 (1.1–1.5)*		1.4 (1.2–1.7)**	1.2 (1.0–1.4)
17						
Crude	Depression	1.8 (1.6–2.1)	2.4 (2.1–2.9)**			
	Average involvement	1.1 (1.0–1.2)	0.9 (0.8–1.0)			
	Low involvement	1.7 (1.5–1.9)	1.5 (1.3–1.7)**			
M1	Depression	1.7 (1.5–1.9)**	2.2 (1.9–2.8)**	M2	1.6 (1.4–1.9)**	2.1 (1.8–2.6)**
	Average involvement	1.1 (0.9–1.2)	0.9 (0.7–1.0)		1.0 (0.9–1.1)	0.8 (0.7–1.0)
	Low involvement	1.5 (1.3–1.7)**	1.3 (1.1–1.5)**		1.4 (1.2–1.6)**	1.2 (1.0–1.4)
18						
Crude	Depression	1.8 (1.6–2.2)**	1.7 (1.4–2.2)**			
	Average involvement	1.3 (1.1–1.5)*	1.0 (0.9–1.2)			
	Low involvement	1.8 (1.5–2.1)**	1.6 (1.3–1.9)**			
M1	Depression	1.7 (1.4–2.0)**	1.5 (1.2–1.9)**	M2	1.7 (1.4–2.0)**	1.4 (1.1–1.8)
	Average involvement	1.2 (1.0–1.4)	1.0 (0.8–1.2)		1.2 (1.0–1.3)	1.0 (0.8–1.2)
	Low involvement	1.6 (1.3–1.9)**	1.5 (1.2–1.8)**		1.4 (1.2–1.7)*	1.4 (1.1–1.7)*
19–20						
Crude	Depression	1.7 (1.3–2.1)**	2.2 (1.6–3.2)**			
	Average involvement	1.1 (0.9–1.4)	1.2 (0.8–1.5)			
	Low involvement	1.6 (1.2–2.0)**	1.8 (1.2–2.5)*			
M1	Depression	1.5 (1.2–2.0)**	2.0 (1.4–2.9)**	M2	1.1 (1.2–2.1)**	2.0 (1.4–3.0)
	Average involvement	1.1 (0.9–1.4)	1.1 (0.8–1.5)		1.1 (0.8–1.4)	1.0 (0.7–1.4)
	Low involvement	1.4 (1.1–1.9)*	1.5 (1.1–2.2)		1.4 (1.0–1.8)	2.0 (1.4–3.0)**
All						
Crude	Depression	1.6 (1.5–1.8)**	3.0 (2.7–3.2)**			
	Average involvement	1.1 (1.0–1.2)	1.0 (0.9–1.1)			
	Low involvement	1.5 (1.5–1.7)**	1.8 (1.6–1.9)**			
M1	Depression	1.5 (1.4–1.6)**	2.6 (2.4–2.9)**	M2	1.5 (1.4–1.6)**	2.5 (2.3–2.8)**
	Average involvement	1.1 (1.0–1.1)	0.9 (0.9–1.)		1.0 (1.0–1.1)	0.9 (0.8–1.0)
	Low involvement	1.4 (1.3–1.5)**	1.4 (1.3–1.6)**		1.3 (1.2–1.4)**	1.3 (1.2–1.5)**

Note: First, crude ORs are given. In Model 1 (M1), depression and parental involvement are entered as independent variables, and in Model 2 (M2), sociodemographic variables are adjusted for.

**ORs statistically significant at level $p < .001$.

*At level $.01 < p < .001$.

these findings persisted when sociodemographics were adjusted for. In 16- and 17-year-old boys, adding sociodemographics leveled out parental involvement, but in 18-year-olds, depression was leveled out (Table 4, Model 2). Even among 19- and

20-year-old boys low parental involvement in the final model was associated with risk-taking sexual behavior (Table 4).

Discussion

We found that less parental involvement in an adolescent's life was connected to the adolescent more often having experienced sexual intercourse in early and middle adolescence. As was our hypothesis, this was found among both girls and boys. Compared to same-aged adolescents with high parental involvement, having experienced sexual intercourse was more common if parental involvement was on an average level, and still more common if an adolescent reported low parental involvement. These associations were strongest among the youngest adolescents, and diminished gradually toward the older age groups. Low level of parental involvement also implied more risky sexual behaviors among those adolescents who were sexually active, and this was seen across the different age groups. These findings concur with those of existing research, suggesting that parent–adolescent connectedness and appropriate parental monitoring may be protective of very early and risk-taking sexual behaviors during adolescent development (Markham et al., 2010; Meschke et al., 2002; Miller et al., 2001).

Our study adds to the existing body of research by showing that the associations between lower parental involvement and adolescent's early and risk-taking sexual behavior persist when depression is adjusted for. In early and middle adolescence, being sexually active has been associated with mental disorders, particularly depression (Hallfors et al., 2004, 2005; Jamieson & Wade, 2011; Kaltiala-Heino et al., 2003; Oshri et al., 2011; Savioja et al., 2015; Valle et al., 2009), and so has risk-taking sexual activity (Kaltiala-Heino et al., 2015; Kosunen et al., 2003). Depression has also been associated with poorer parent–adolescent communication, less parental knowledge of and involvement in the adolescent's life (Burnett-Zeigler et al., 2012; Fröjd et al., 2007; Hamza & Willoughby, 2011; Schwartz et al., 2012; Yu et al., 2006). Our results demonstrate that depression and low parental involvement both have independent associations with early and risk-taking sexual behavior among early and middle adolescents, and they only slightly modify each other in this context. Even though the findings are based on cross-sectional data, they suggest that both low level of parental involvement and depression are independent predisposing factors to initiating sex life inappropriately early and engaging in risky sexual behaviors. Of course, the data being cross-sectional, we cannot rule out the alternative explanation that adolescents who initiate sex life early distance themselves from their parents by not disclosing to the parents information on their whereabouts.

Among girls aged 18–20 and among boys aged 19–20, parental involvement was not associated with having experienced sexual intercourse, and depression was leveled out from age 17. In late adolescence and early adulthood, being sexually active is developmentally normative (Cromer, 2011; Madkour et al., 2010) and more likely indicates positive development than any psychosocial problems. Seeking greater emotional and behavioral autonomy, accepting oneself, becoming capable of balanced interaction with others, and taking responsibility for one's own decisions are essential skills to develop during adolescence (Steinberg & Morris, 2001). It is developmentally appropriate that toward early adulthood the role of relationships with parents loses significance regarding an adolescent's romantic and erotic relationships.

In the age group studied, having had intercourse with five or more partners can be considered to be risk-taking sexual behavior (Kaltiala-Heino et al., 2015). In early and middle adolescence, among girls up to age 18, sexually active adolescents reporting low level of parental involvement had more commonly had five or more partners for intercourse. High level of parental involvement in an adolescent's life can thus be assumed to be protective against risk-taking sexual behavior, even though this cross-sectional study cannot show causal relationships. Reporting five or more partners for intercourse was also associated with depression among sexually active adolescents, in boys up to age 17 and in girls even among 19- to 20-year-olds.

Cultural aspects and expectations regarding sexual behaviors may differ between boys and girls. For example, a double standard may prevail, attaching different values to boys' and girls' sexual activity (Bordini & Sperb, 2013; Crawford & Popp, 2003), approving boys' sexual activity, whereas girls' sexual activity may be viewed with disapproval. Low level of parental involvement, implying inadequate support and lack of care, was in the present study a significant factor among both girls and boys for having experienced sexual intercourse in early or middle adolescence, and among sexually active adolescents, low parental involvement was associated with risky sexual behavior even in the oldest age groups. The role of parental involvement seems rather similar for both girls' and boys' sexual behavior. However, depression retained its statistically significant association with risk-taking sexual behavior even among 19- to 20-year-old girls, which may suggest that for girls being sexually very active is more reprehensible even in late adolescence/emerging adulthood, which lends support to the notion of a sexual double standard.

Methodological considerations

A strength of this study was the large population-based sample representing Finnish comprehensive school students well. The response rate was high. Yet it is possible that the students absent from school on the day of the survey (10–15%) suffered more commonly from various psychiatric and psychosocial problems. Therefore, the prevalence of self-reported depression and risk-taking sexual behavior in this study may be underestimated. Nonetheless it is unlikely that non-response had an effect on the associations studied (Van Loon, Tijhuis, Picavet, Surtees, & Ormel, 2003). Among those who participated, non-response to the variables relevant for the present study was more common among boys and statistically significantly associated with younger age, but in practice, differences according to sex and age were minimal and not likely to bias the findings.

The study sample was divided into seven age groups for the analyses. The majority of respondents were in the age groups 14–18. There were fewer respondents in the age groups 19–20, accounting for approximately 2% of the whole study population. This is because 19- to 20-year-old adolescents have usually already left the schools in which the SHPS is conducted. They may not be as representative of their age group as are the younger subjects of this study in their respective age groups, but as the size of the 19- to 20-year age group sample is still considerable, about 4000, the data size sufficed to conduct the analyses in these groups as well. It is possible that students still attending the study schools at ages 19–20 are experiencing social, psychological, or other problems that have delayed their graduation from the studied educational institutions, and thus both

depression and problems related to sexuality could be more common among them than in the age group at large.

Sexual activity was measured by asking whether or not the adolescent had experienced sexual intercourse. Adolescents' sexual development is known to progress gradually from holding hands and first kisses to intimate relationships and sexual intercourse. However, research often measures whether an adolescent has experienced his/her first sexual intercourse since it is connected to pregnancies and other outcomes. The cutpoint for having had multiple sexual partners was set as high as five or more partners. Yet, at least among the youngest age groups, for example, three or four sexual partners may indicate risky sexual behavior. Actually we further ran the analyses with three or more partners as indicator of risky sexual behavior, with corresponding findings among all the age groups 14–18 (data not shown). Sexual behavior in adolescence may have different meanings in different countries, and therefore testing the validity of our findings in different cultures is warranted.

The use of only self-reported measures for depression and parental involvement can be considered a limitation in our study.

Self-reported depression was assessed using the R-BDI, a state measure giving no information on the duration of depressive symptoms. However, self-reported depression in adolescence is known to be a persistent problem and to correspond well with clinical depression (Charman, 1994). To avoid overestimating the rates of depression, the cutpoint was set as high as 8 so that adolescents scoring for mild depression were not considered depressed in this study.

Different concepts to illustrate adolescent–parent interaction and quality of the relationship likely overlap, and these terms may be used interchangeably. We included in parental involvement that parents are aware of adolescents' whereabouts and friends, and whether the adolescent feels s/he can discuss important matters with parents. As far as we know there is no validated method to measure parental involvement. Scott et al. (2013) measured parental involvement by assessing the frequency of parents' engagement in conversations and activities with their child and scored the items on a 3-point scale. King, Berg, Butner, Butler, and Wiebe (2014) divided the construct of parental involvement into behavioral involvement, monitoring, and relationship quality. Stattin and Kerr (2000) for their part criticized the concept of monitoring by claiming that measures called 'monitoring' often actually focus on what information adolescents disclose to parents, and not on what parents do to check or control. They concluded that 'monitoring' often actually means knowledge, and knowledge is disclosed by adolescents themselves. Our measure of parental involvement does not confuse the aspects emanating from parents and adolescents, but focuses on the adolescent's perspective, and adds to disclosure/knowledge the aspect of connectedness, that the adolescent feels that the parents are accessible. Our measure is a report of parental involvement as perceived by adolescents themselves. The assessment of parental involvement could have gained more reliability, or different views, if it had also been possible to elicit responses to the same questions from the parents. However, this was not possible due to the design of the study. Nevertheless, the adolescent's own perception is likely important for her/his well-being and behavior.

Given that the SHPS provides only cross-sectional data, we cannot draw conclusions about causality. Future research needs to explore causalities in longitudinal study designs.

Summary

Low level of parental involvement and depression are independently associated with early sexual experiences and risk-taking sexual behavior among early and middle adolescents. Promoting parental involvement in adolescents' lives is likely beneficial for adolescents' sexual health.

Notes

1. Well-being of adolescents in Finland 2000–2013. National Institute for Health and Welfare (THL). Report 25/2014. http://www.julkari.fi/handle/10024/1.
2. http://www.vaestoliitto.fi/tieto_ja_tutkimus/vaestontutkimuslaitos/seksologinen_tutkimus/suomalaisten-seksuaalisuus-finse/finsex-seksielaman-aloittaminen/.

Disclosure statement

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References

Beck, A., & Beck, R. (1972). Screening depressed patients in family practice. A rapid technic. *Postgraduate Medicine*, *52*, 81–85.

Beck, A., Rial, W., & Rickels, K. (1974). Short form of depression inventory: Cross-validation. *Psychological Reports*, *34*, 1184–1186.

Bennett, D. S., Ambrosini, P. J., Bianchi, M., Barnett, D., Metz, C., & Rabinovich, H. (1997). Relationship of Beck Depression Inventory factors to depression among adolescents. *Journal of Affective Disorders*, *45*, 127–134.

Boislard P, M.-A., & Poulin, F. (2011). Individual, familial, friends-related and contextual predictors of early sexual intercourse. *Journal of Adolescence*, *34*, 289–300. doi:10.1016/j.adolescence.2010.05.002

Bordini, G. S., & Sperb, T. M. (2013). Sexual double standard: A review of the literature between 2001 and 2010. *Sexuality & Culture*, *17*(4), 686–704. doi:10.1007/s12119-012-9163-0

Brown, A., Yung, A., Cosgrave, E., Killackey, E., Buckby, J., Stanford, C., … McGorry, P. (2006). Depressed mood as a risk factor for unprotected sex in young people. *Australasian Psychiatry*, *14*, 310–312. doi:10.1111/j.1440-1665.2006.02291.x

Burnett-Zeigler, I., Walton, M., Ilgen, M., Barry, K. L., Chermack, S. T., Zucker, R., … Blow, F. (2012). Prevalence and correlates of mental health problems and treatment among adolescents seen in primary care. *The Journal of Adolescent Health*, *50*, 559–564. doi:10.1016/j.jadohealth.2011.10.005

Charman, T. (1994). The stability of depressed mood in young adolescents: A school-based survey. *Journal of Affective Disorders*, *30*, 109–116.

Cohen, D. A., Farley, T. A., Taylor, S. N., Martin, D. H., & Schuster, M. A. (2002). When and where do youths have sex? The potential role of adult supervision. *Pediatrics*, *110*(6), 1–6.

Coley, R., Votruba-Drzal, E., & Schindler, H. (2009). Fathers' and mothers' parenting predicting and responding to adolescent sexual risk behaviors. *Child Development*, *80*, 808–827. Retrieved from http://onlinelibrary.wiley.com/doi/10.1111/j.1467-8624.2009.01299.x/full

Costello, J. E., Erkanli, A., & Angold, A. (2006). Is there an epidemic of child or adolescent depression? *Journal of Child Psychology and Psychiatry*, *47*, 1263–1271. doi:10.1111/j.1469-7610.2006.01682.x

Crawford, M., & Popp, D. (2003). Sexual double standards: A review and methodological critique of two decades of research. *Journal of Sex Research*, *40*(1), 13–26. Retrieved from http://www.tandfonline.com/doi/abs/10.1080/00224490309552163

Cromer, B. (2011). Adolescent development. In R. Kliegman, R. Behrman, H. Jenson, & B. Stanton (Eds.), *Nelson textbook of pediatrics* (19th ed., pp. 649–660). Philadelphia, PA: Saunders Elsevier.

Davila, J., Stroud, C. B., Starr, L. R., Miller, M. R., Yoneda, A., & Hershenberg, R. (2009). Romantic and sexual activities, parent-adolescent stress, and depressive symptoms among early adolescent girls. *Journal of Adolescence*, *32*, 909–924. doi:10.1016/j.adolescence.2008.10.004

DiClemente, R. J., Wingood, G. M., Crosby, R., Cobb, B. K., Harrington, K., & Davies, S. L. (2001). Parent-adolescent communication and sexual risk behaviors among African American adolescent females. *The Journal of Pediatrics*, *139*, 407–412. doi:10.1067/mpd.2001.117075

DiClemente, R. J., Wingood, G. M., Crosby, R., Sionean, C., Cobb, B. K., Harrington, K., … Oh, M. (2001). Parental monitoring: Association with adolescents' risk behaviors. *Pediatrics*, *107*, 1363–1368. doi:10.1542/peds.107.6.1363

Donenberg, G. R., Emerson, E., & Mackesy-Amiti, M. E. (2011). Sexual risk among African American girls: Psychopathology and mother-daughter relationships. *Journal of Consulting and Clinical Psychology*, *79*(2), 153–158. doi:10.1037/a0022837

Edgardh, K. (2000). Sexual behaviour and early coitarche in a national sample of 17 year old Swedish girls. *Sexually Transmitted Infections*, *76*(2), 98–102. Retrieved from http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1758300&tool=pmcentrez&rendertype=abstract

Edgardh, K. (2002). Sexual behaviour and early coitarche in a national sample of 17-year-old Swedish boys. *Acta Paediatrica*, *91*(9), 985–991. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/12412877

Egger, H. L., & Angold, A. (2006). Common emotional and behavioral disorders in preschool children: Presentation, nosology, and epidemiology. *Journal of Child Psychology and Psychiatry*, *47*(3-4), 313–337. doi:10.1111/j.1469-7610.2006.01618.x

Fletcher, A. (2004). Parental influences on adolescent problem behavior: Revisiting Stattin and Kerr. *Child Development*, *75*, 781–796. Retrieved from http://onlinelibrary.wiley.com/doi/10.1111/j.1467-8624.2004.00706.x/full

Fröjd, S., Kaltiala-Heino, R., & Rimpelä, M. (2007). The association of parental monitoring and family structure with diverse maladjustment outcomes in middle adolescent boys and girls. *Nordic Journal of Psychiatry*, *61*, 296–303. doi:10.1080/08039480701415277

Hallfors, D. D., Waller, M. W., Bauer, D., Ford, C., & Halpern, C. T. (2005). Which comes first in adolescence--sex and drugs or depression? *American Journal of Preventive Medicine*, *29*(3), 163–170. doi:10.1016/j.amepre.2005.06.002

Hallfors, D. D., Waller, M. W., Ford, C., Halpern, C. T., Brodish, P. H., & Iritani, B. (2004). Adolescent depression and suicide risk: Association with sex and drug behavior. *American Journal of Preventive Medicine*, *27*(3), 224–231. doi:10.1016/j.amepre.2004.06.001

Hamza, C., & Willoughby, T. (2011). Perceived parental monitoring, adolescent disclosure, and adolescent depressive symptoms: A longitudinal examination. *Journal of Youth and Adolescence*, *40*, 902–915. doi:10.1007/s10964-010-9604-8

Jamieson, L. K., & Wade, T. J. (2011). Early age of first sexual intercourse and depressive symptomatology among adolescents. *Journal of Sex Research*, *48*, 450–460. doi:10.1080/00224499.2010.509892

Kaltiala-Heino, R., Fröjd, S., & Marttunen, M. (2015). Depression, conduct disorder, smoking and alcohol use as predictors of sexual activity in middle adolescence: A longitudinal study. *Health Psychology and Behavioral Medicine*, *3*(1), 25–39.

Kaltiala-Heino, R., Kosunen, E., & Rimpelä, M. (2003). Pubertal timing, sexual behaviour and self-reported depression in middle adolescence. *Journal of Adolescence*, *26*, 531–545. doi:10.1016/S0140-1971(03)00053-8

Kaltiala-Heino, R., Rimpela, M., Rantanen, P., & Laippala, P. (1999). Finnish modification of the 13-item Beck Depression Inventory in screening an adolescent population for depressiveness and positive mood. *Nordic Journal of Psychiatry*, *53*, 451–457.

King, P. S., Berg, C. A., Butner, J., Butler, J., & Wiebe, D. (2014). Longitudinal trajectories of parental involvement in type 1 diabetes and adolescents' adherence. *Health Psychology*, *33*, 424–432. doi:10.1037/a0032804.Longitudinal

Kosunen, E., Kaltiala-Heino, R., Rimpelä, M., & Laippala, P. (2003). Risk-taking sexual behaviour and self-reported depression in middle adolescence – a school-based survey. *Child: Care, Health and Development*, *29*, 337–344. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/12904241

Kotchick, B., Shaffer, A., Forehand, R., & Miller, K. S. (2001). Adolescent sexual risk behavior: A multi-system perspective. *Clinical Psychology Review*, *21*, 493–519. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/11413865

Langille, D., Asbridge, M., Kisely, S., & Wilson, K. (2012). Risk of depression and multiple sexual risk-taking behaviours in adolescents in nova scotia, Canada. *Sexual Health*, *9*, 254–260. Retrieved from http://www.publish.csiro.au/?paper=SH11029

Lehrer, J., Shrier, L., Gortmaker, S., & Buka, S. (2006). Depressive symptoms as a longitudinal predictor of sexual risk behaviors among US middle and high school students. *Pediatrics*, *118*, 189–200. doi:10.1542/peds.2005-1320

Madkour, A. S., Farhat, T., Halpern, C. T., Godeau, E., & Gabhainn, S. N. (2010). Early adolescent sexual initiation as a problem behavior: A comparative study of five nations. *Journal of Adolescent Health*, *47*, 389–398. doi:10.1016/j.jadohealth.2010.02.008

Markham, C. M., Lormand, D., Gloppen, K. M., Peskin, M. F., Flores, B., Low, B., & House, L. D. (2010). Connectedness as a predictor of sexual and reproductive health outcomes for youth. *The Journal of Adolescent Health*, *46*(3 Suppl), S23–S41. doi:10.1016/j.jadohealth.2009.11.214

Mazzaferro, K. E., Murray, P. J., Ness, R. B., Bass, D. C., Tyus, N., & Cook, R. L. (2006). Depression, stress, and social support as predictors of high-risk sexual behaviors and STIs in young women. *The Journal of Adolescent Health*, *39*, 601–603. doi:10.1016/j.jadohealth.2006.02.004

Meschke, L. L., Bartholomae, S., & Zentall, S. R. (2002). Adolescent sexuality and parent-adolescent processes: Promoting healthy teen choices. *Journal of Adolescent Health*, *31*, 264–279. doi:10.1016/S1054-139X(02)00499-8

Miller, B. C., Benson, B., & Galbraith, K. (2001). Family relationships and adolescent pregnancy risk: A research synthesis. *Developmental Review*, *21*(1), 1–38. doi:10.1006/drev.2000.0513

Moshman, D. (2011). *Adolescent rationality and development: Cognition, morality, and identity* (3rd ed.). New York, NY: Psychology Press.

Mun, E. Y., Windle, M., & Schainker, L. M. (2008). A model-based cluster analysis approach to adolescent problem behaviors and young adult outcomes. *Development and Psychopathology*, *20*, 291–318. doi:10.1017/S095457940800014X

Olsson, G., & Von Knorring, A.-L. (1997). Beck's depression inventory as a screening instrument for adolescent depression in Sweden: Gender differences. *Acta Psychiatrica Scandinavica*, *95*, 277–282.

Oshri, A., Tubman, J. G., & Jaccard, J. (2011). Psychiatric symptom typology in a sample of youth receiving substance abuse treatment services: Associations with self-reported child maltreatment and sexual risk behaviors. *AIDS and Behavior*, *15*, 1844–1856. doi:10.1007/s10461-011-9890-5

O'Donnell, L., O'Donnell, C. R., & Stueve, A. (2001). Early sexual initiation and subsequent sex-related risks among urban minority youth: The reach for health study. *Family Planning Perspectives*, *33*, 268–275.

Patton, G. C., Coffey, C., Romaniuk, H., Mackinnon, A., Carlin, J. B., Degenhardt, L., … Moran, P. (2014). The prognosis of common mental disorders in adolescents: A 14-year prospective cohort study. *Lancet*, *383*, 1404–1411. doi:10.1016/S0140-6736(13)62116-9

Paxton, R., & Valois, R. (2007). Associations between depressed mood and clusters of health risk behaviors. *American Journal of Health Behavior*, *31*, 272–283. Retrieved from http://www.ingentaconnect.com/content/png/ajhb/2007/00000031/00000003/art00005

Rai, A. a, Stanton, B., Wu, Y., Li, X., Galbraith, J., Cottrell, L., … Burns, J. (2003). Relative influences of perceived parental monitoring and perceived peer involvement on adolescent risk behaviors: An analysis of six cross-sectional data sets. *Journal of Adolescent Health*, 33, 108–118. doi:10.1016/S1054-139X(03)00179-4

Raitasalo, R. (2007). Mood questionnaire. Finnish modification of the short form of the beck depression inventory measuring depression symptoms and self-esteem. *Studies in Social Security and Health*, *86*, 87.

Rubin, A. G., Gold, M., & Primack, B. (2009). Associations between depressive symptoms and sexual risk behavior in a diverse sample of female adolescents. *Journal of Pediatric and Adolescent Gynecology*, *22*, 306–312. doi:10.1016/j.jpag.2008.12.011

Savioja, H., Helminen, M., Fröjd, S., Marttunen, M., & Kaltiala-Heino, R. (2015). Sexual experience and self-reported depression across the adolescent years. *Health Psychology and Behavioral Medicine*, *3*, 337–347. doi:10.1080/21642850.2015.1101696

Schuster, R. M., Mermelstein, R., & Wakschlag, L. (2013). Gender-specific relationships between depressive symptoms, marijuana use, parental communication and risky sexual behavior in adolescence. *Journal of Youth and Adolescence*, *42*, 1194–1209. doi:10.1007/s10964-012-9809-0

Schwartz, O. S., Dudgeon, P., Sheeber, L. B., Yap, M. B. H., Simmons, J. G., & Allen, N. B. (2012). Parental behaviors during family interactions predict changes in depression and anxiety symptoms during adolescence. *Journal of Abnormal Child Psychology*, *40*, 59–71. doi:10.1007/s10802-011-9542-2

Scott, L. N., Whalen, D. J., Zalewski, M., Beeney, J. E., Pilkonis, P., Hipwell, A. E., & Stepp, S. D. (2013). Predictors and consequences of developmental changes in adolescent girls' self-reported quality of attachment to their primary caregiver. *Journal of Adolescence*, *36*, 797–806. doi:10.1016/j.adolescence.2013.06.005

Seth, P., Patel, S. N., Sales, J. M., DiClemente, R. J., Wingood, G. M., & Rose, E. S. (2011). The impact of depressive symptomatology on risky sexual behavior and sexual communication among African American female adolescents. *Psychology, Health & Medicine*, *16*, 346–356. doi:10.1080/13548506.2011.554562

Stanton, B., Li, X., Pack, R., & Cottrell, L. (2002). Longitudinal influence of perceptions of peer and parental factors on African American adolescent risk involvement. *Journal of Urban Health: Bulletin of the New York Academy of Medicine*, *79*, 536–548. Retrieved from http://link.springer.com/article/10.1093/jurban/79.4.536

Stanton, B. F., Li, X., & Galbraith, J. (2000). Parental underestimates of adolescent risk behavior: A randomized, controlled trial of a parental monitoring intervention. *Journal of Adolescent Health*, *26*(1), 18–26. Retrieved from http://www.sciencedirect.com/science/article/pii/S1054139X99000221

Stattin, H., & Kerr, M. (2000). Parental monitoring: A reinterpretation. *Child Development*, *71*, 1072–1085.

Steinberg, L. (2005). Cognitive and affective development in adolescence. *Trends in Cognitive Sciences*, *9*(2), 69–74. doi:10.1016/j.tics.2004.12.005

Steinberg, L., & Morris, A. (2001). Adolescent development. *Annual Review of Psychology*, *52*, 83–110. Retrieved from http://www.ingentaconnect.com/content/springer/jcep/2001/00000002/00000001/art00006

Turner, A. K., Latkin, C., Sonenstein, F., & Tandon, S. D. (2011). Psychiatric disorder symptoms, substance use, and sexual risk behavior among African-American out of school youth. *Drug and Alcohol Dependence*, *115*(1-2), 67–73. doi:10.1016/j.drugalcdep.2010.10.012

Valle, A.-K., Roysamb, E., Sundby, J., & Klepp, K. I. (2009). Parental social position, body image and other psychosocial determinants and first sexual intercourse among 15- and 16-year olds. *Adolescence*, *44*, 479–498.

Van Loon, A. J. M., Tijhuis, M., Picavet, H. S. J., Surtees, P. G., & Ormel, J. (2003). Survey non-response in the Netherlands: Effects on prevalence estimates and associations. *Annals of Epidemiology*, *13*, 105–110.

Wang, B., Stanton, B., Li, X., Cottrell, L., Deveaux, L., & Kaljee, L. (2013). The influence of parental monitoring and parent–adolescent communication on Bahamian adolescent risk involvement: A three-year longitudinal examination. *Social Science & Medicine*, *97*, 161–169.

Wichstrøm, L., Berg-Nielsen, T. S., Angold, A., Egger, H. L., Solheim, E., & Sveen, T. H. (2012). Prevalence of psychiatric disorders in preschoolers. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, *53*, 695–705. doi:10.1111/j.1469-7610.2011.02514.x

Wight, D., Williamson, L., & Henderson, M. (2006). Parental influences on young people's sexual behaviour: A longitudinal analysis. *Journal of Adolescence*, *29*, 473–494. doi:10.1016/j.adolescence.2005.08.007

Wilson, H., & Donenberg, G. (2004). Quality of parent communication about sex and its relationship to risky sexual behavior among youth in psychiatric care: A pilot study. *Journal of Child Psychology and Psychiatry*, *45*, 387–395. Retrieved from http://onlinelibrary.wiley.com/doi/10.1111/j.1469-7610.2004.00229.x/full

Yu, S., Clemens, R., Yang, H., Li, X., & Stanton, B. (2006). Youth and parental perceptions of parental monitoring and parent-adolescent communication, youth depression, and youth risk behaviors. *Social Behavior and Personality: an International Journal*, *34*, 1297–1310. Retrieved from http://www.ingentaconnect.com/content/sbp/sbp/2006/00000034/00000010/art00010

PUBLICATION III

Delinquency and sexual experiences across adolescence: does depression play a role?

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Delinquency and sexual experiences across adolescence: does depression play a role?

Abstract

Purpose: To elucidate a possible connection between delinquency and adolescent sexual behaviours in different age groups from 14 to 20, and the role of depression therein. **Materials and methods:** Data was gathered from the cross-sectional Finnish School Health Promotion Study 2010 and 2011 with 186,632 respondents. We first examined the bivariate relationship between delinquency and sexual behaviour, and then proceeded to multivariate models accounting for self-reported depression. Analyses were conducted separately for girls and boys, in seven age groups. The main outcomes were analysed by χ^2 test and logistic regression. **Results:** Delinquency was connected to having experienced sexual intercourse across all age groups, and was related to reporting multiple sexual partners among sexually active adolescents, in both boys and girls, before and after controlling for depression. Delinquency and depression were independently associated with the sexual behaviours studied. **Conclusions:** Being sexually active and engaging in risky sexual behaviours are related to delinquency in the adolescent population throughout the developmental phase, even in late adolescence when being sexually active is developmentally normative. Being sexually active is further connected to depression until middle adolescence, and risky sexual behaviours across adolescence. Clinicians working with adolescents presenting with delinquent behaviour with or without depression need to address their sexual health needs.

Keywords: adolescence, risky sexual behaviour, depression, delinquency, self-reported measures

Introduction

Early sexual activity and risky sexual behaviour are of major concern during adolescent development. As puberty heightens emotional arousability, sensation-seeking and reward-orientation much earlier than frontal lobe maturation facilitates regulatory competencies [1], adolescents may engage in sexual encounters before they are sufficiently emotionally mature. Early sexual activity is connected to risky sexual behaviour such as failure to use contraception and multiple sexual partners, which in turn expose adolescents to sexually transmitted diseases and unwanted pregnancies [2]. While experience of intercourse is normative and developmentally appropriate in late adolescence [3], sexual debut in early and even middle adolescence can be seen as problem behaviour [4,5].

Problem behaviours tend to cumulate in adolescence [6,7]. Delinquency is one of these [8]. Characterized by involvement in fighting or theft, delinquency harms both adolescents and their environments. It is associated with multiple other problems, such as academic failure [9,10], substance abuse and conduct disorders [11,12]. Furthermore, delinquency often persists from childhood or adolescence into young adulthood [13]. Delinquency is a fundamental part of conduct disorder, even if not sufficient to diagnose it [14,15].

Delinquency and conduct disorder have been associated with early sexual activity [2,16–19], and with risk taking sexual behaviour in population samples across adolescence [16,18,19]. Kotchick et al. [2] suggested that the relationship between delinquent behaviours and sexual risk-taking may be partly explained by impulsivity or sensation-seeking. Tubman et al. [16] suggested that early initiation of delinquent behaviour may direct adolescents to deviant peer networks, and membership of such networks may predispose to early and risky sexual behaviour and related adverse health outcomes. However, delinquency may also signal acting out of distress related to premature sexual activity before being emotionally mature for intimacy, or of risk-taking sexual behaviour the adolescent later regrets.

Most research on delinquency and sexual behaviour has focused on either early or middle adolescence, with few studies establishing these connections throughout adolescence all in one study. As far as we know only a few studies (e.g. [20,21]) explore the connection between delinquent and sexual behaviours among late adolescents, but updated documentation with an extensive data is lacking. Given that towards late adolescence, being sexually active becomes normative in Western countries [4], associations between delinquency and being sexually active may not be

seen in late adolescence. However, delinquency and risky sexual behaviour, both reportedly driven by pronounced impulsivity and sensation-seeking [2] can be expected to persist in association in late adolescence and even early adulthood.

Depression rises in prevalence from childhood to adolescence [22,23]. Being sexually active in early and middle adolescence is connected to presenting with depression [5,24–27]. Sexual risk-taking is moreover connected to depression [24,25,28–30]. The association between early and/or risky sexual activity and depression in adolescence could be explained through different pathways. Depression may be followed by risky sexual behaviours [31], as depressed adolescents may be less able and motivated to protect themselves, or they may seek intimacy to alleviate distress. Depression could also be a consequence of premature sexual encounters or risk taking that adolescents later regret [5,19].

Interconnections between adolescent sexual behaviour, depression and delinquency are manifold. Depression and delinquency correlate [10,32]. Depression, delinquency and early and/or risky sexual behaviour are all associated with adolescent related factors such as early puberty [27,33,34], and family related factors such as low socioeconomic status, parental discord and inadequate parenting [2,4,35,36]. All three were shown to overlap in multiproblem high-risk adolescents [10]. However, research has rarely focused on the associations between delinquency, depression and adolescent sexual behaviours across adolescence in the same models. Such studies are needed to properly target prevention and interventions among adolescent population.

Additionally, gender differences in associations between psychopathology and sexual behaviours are underresearched. Delinquency is more common among boys [37], whereas depression is more common among girls [38]. As psychopathology profiles differ between girls and boys, associations between sexual behaviour and psychopathology may also differ. Girls mature earlier than boys [39,40], and this could imply that among girls, intimate sexual behaviour becomes developmentally favourable – and no more associated with psychopathology - at an earlier chronological age than among boys. Conversely the sexual double standard, namely that boys are socially rewarded and girls socially criticized for sexual activity, still prevails [41]. Thus intimate sexual behaviours may be more controversial among girls, which could strengthen the associations between sexual behaviour and psychopathology. Hallfors et al. [24,25] reported stronger associations between being sexually active and depression, and risky sexual behaviour and depression among girls than boys, but did not include delinquency. On the other hand, having experienced sexual intercourse may correlate with delinquency more among boys

than girls [16]. Kaltiala-Heino et al. [19] reported that both depression and conduct disorder at age 15 were associated with being sexually active and having multiple sexual partners two years later among girls. Among boys an association was only found between earlier conduct disorder and later reporting multiple sexual partners.

We have previously shown that among early and middle adolescents depression is associated with having experienced sexual intercourse and that depression and risk-taking sexual behaviours are connected even in late adolescence [5,42]. This study aims to elucidate the relation between delinquent behaviours and sexual behaviour in different age groups until late adolescence, and the role of depression therein. We seek answers to the following questions:

1 Is delinquent behaviour connected to sexual behaviour during adolescence; to having experienced sexual intercourse and having had sexual intercourse with five or more partners?

2 Do the possible relations between delinquent behaviours and sexual behaviours persist when depression is controlled for?

3 Are the possible relations between delinquent behaviours, sexual behaviour and depression similar or different in different age groups until late adolescence?

4 Are the possible relations in (1), (2), and (3) similar or different among adolescent boys and girls?

In light of the research presented above we expect that delinquent behaviour would be associated with having experienced sexual intercourse and the risky sexual behaviour of having five or more partners for intercourse. We suppose that towards late adolescence delinquency loses significance as a correlate of having experienced sexual intercourse but presumably nevertheless persists as correlated with risky sexual behaviour. Depression is connected to both delinquent behaviours and sexual behaviours. We expect to see that in girls, depression is a stronger correlate of sexual behaviour than delinquency, but that in boys, delinquency will persist and depression level out as a correlate of sexual behaviours when studied in the same model.

Materials and Methods

The School Health Promotion Study (SHPS) (www.thl.fi/kouluterveyskysely) is a nationwide anonymous classroom survey on health behaviours in Finland. The SHPS has been conducted in Finland yearly since 1995. The survey is sent to every

municipality, inviting comprehensive school students aged 14-16 and upper secondary education students aged 16-20 to participate. Municipalities decide if the schools in their area will participate. The SHPS was granted approval by the ethics committees of Pirkanmaa Hospital District and the National Institute of Health and Welfare. This study used the SHPS data of from 2010-2011 including all 14-20 year old respondents.

Virtually all (99%) 14 to 16-year-old adolescents attend secondary school in Finland. About 93% of adolescents proceed to upper secondary education. Students absent on the survey day (10-15%) were not contacted. The final coverage of the 2010-2011 study was 80% of all 14 to 16-year-old secondary school students, 73% of 16 to 18-year-old upper secondary school students and 43% of 16 to 18-year-old vocational school students throughout Finland.[1] Students aged 19-20 were not so well represented because they have usually already graduated from the study schools. Respondents totalled 186,632, with 92,478 (49.6%) boys and 94,154 (50.4%) girls.

Delinquency was elicited with six questions: During the past 12 months have you 1) drawn tags or graffiti on walls or elsewhere?, 2) deliberately damaged or destroyed school property or the school building, 3) deliberately damaged or destroyed other property, 4) stolen from a shop or a stall, 5) been involved in a fight, 6) beaten someone up? The response alternatives for each question were no (=0) / once (=1) / 2-4 times (=2) / more than 4 times (=3), and a sum score was formed of the delinquent behaviours ranging from 0 to 18. A sum score of 4 or more indicated the 90th percentile, and was used to indicate delinquency. The self-report questions on delinquency were adopted from the Finnish Self-Report Delinquency Study questionnaire, a modified version of the International Self-Report Delinquency Study (ISRD) instrument [43]. The ISRD instrument has been shown to possess adequate reliability in test–retest studies [44]. Of the boys, 12.2%, and of the girls, 6.2% scored above the 90th percentile ($p<0.001$).

Sexual activity was elicited by the question "Have you ever had sexual intercourse?" The response alternatives were "yes" and "no". In the whole sample (n= 186,632) 36.9% of the girls and 32.7% of the boys had experienced sexual

[1] Wellbeing of adolescents in Finland 2000–2013. National Institute for Health and Welfare (THL). Report 25/2014. http://www.julkari.fi/handle/10024/1

intercourse. In Finland girls experience their first sexual intercourse at age 16.5 on average and boys at age 17.5.[1]

The number of sexual partners was elicited by the question "How many sexual partners have you had sexual intercourse with?" The response alternatives were "one", "two", "three or four", and "five or more". The number of sexual partners was analysed as a dichotomized variable, the cutpoint being five or more sexual partners, which, according to earlier research, was regarded as risky sexual behaviour [19]. Among sexually active adolescents (n= 65,063), 15.2% of the girls and 16.9% of the boys reported having had intercourse with five or more sexual partners.

Self-reported depression was measured with a Finnish version of the short (13-item) Beck Depression Inventory [45], R-BDI [46]. The 13-item BDI has been shown to be a valid method for identifying depressive symptoms among adolescents [45,47,48]. The Finnish version, R-BDI, is equivalent to the original 13-item BDI, but to every item an opening question and one positive response alternative have been added. Each item is scored 0-3 and the maximum score is 39. Scores indicating moderate or severe depression (8 or more) are referred to as self-reported depression. Moderate or severe self-reported depression was present in 16.9% of the girls and 7.7% of the boys.

The sociodemographic variables were family structure (living with mother and father vs. in any other family constellation) and mother's and father's highest educational qualification (comprehensive school only/ upper secondary school or vocational school/ upper secondary school or vocational school and further vocational studies/ university or university of applied sciences).

Data Analysis

Bivariate associations between having experienced sexual intercourse and delinquency, and, among the sexually active, having had five or more partners for intercourse and delinquency were examined with cross-tabulations and significance was tested with χ^2 test / Fisher's exact test where appropriate. Multivariate associations were studied using logistic regression. Having experienced sexual

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1 http://www.vaestoliitto.fi/tieto_ja_tutkimus/vaestontutkimuslaitos/seksologinen_tutkimus/suomalaisten-seksuaalisuus-finse/finsex-seksielaman-aloittaminen/

intercourse was first set as the dependent variable. Delinquency was entered as an independent variable, and Crude Odds Ratios with 95% confidence intervals (CI) were calculated. Delinquency was then entered simultaneously with depression, yielding adjusted Odds Ratios (95% CI) (Model 1). The analyses were run for the whole sample and stratified for age in years (14/15/16/17/18/19-20). Among those reporting being sexually active similar analyses were performed using risky sexual behaviour (having had five or more partners for intercourse) as the dependent variable. Because of the large data size, and to avoid bias due to multiple testing, we set the limit for statistical significance at $p<0.01$. Finally, sociodemographic variables were controlled for.

Attrition

Some 10-15% of students are absent from school on any given day, and no information was available on them. Of the participants, 4,929 (2.6%) had not responded on experiences of intercourse. Of those who had experienced intercourse, 449 (0.7%) had not reported with how many different partners. Not responding on experience of intercourse was more common among boys (0.9% vs. 0.4%, $p<0.001$) and was also associated with being younger (mean (SD) 16.2 (1.2) vs. 16.3 (1.3), $p<0.001$). Among those who had experienced intercourse, non-response on number of partners was more common among boys (1.0% vs. 0.4%, $p<0.0001$), and those not responding were slightly younger (mean (SD) 16.3 (1.3) vs. 16.9 (1.2) years, $p<0.001$).

Results

Bivariate Associations

Among delinquent adolescents the proportion who had experienced sexual intercourse was higher than among adolescents reporting no delinquency (Table 1). Only in girls aged 19-20 this finding was not statistically significant.

Table 1. Proportions (% (n/N)) of those having experienced sexual intercourse among adolescents reporting delinquent behaviours. Statistically significant differences are shown in bold.			
Girls	Delinquent behaviours	No delinquent behaviours	p-value
Age (years)			
14	**41.6 (599/1439)**	**9.9 (1346/13647)**	<0.001
15	**54.7 (1151/2103)**	**20.7 (4496/21766)**	<0.001
16	**71.4 (910/1275)**	**38.0 (7993/21036)**	<0.001
17	**83.0 (503/606)**	**54.0 (10468/19374)**	<0.001
18	**88.3 (151/171)**	**64.4 (5051/7842)**	<0.001
19-20	90.5 (67/74)	79.7 (1831/2298)	0.018
all	**59.7 (3381/5668)**	**36.3 (31185/85963)**	<0.001
Boys	Delinquent behaviours	No delinquent behaviours	p-value
Age (years)			
14	**38.9 (819/2108)**	**8.7 (1045/12007)**	<0.001
15	**52.4 (1839/3509)**	**16.2 (3172/19640)**	<0.001
16	**69.0 (1838/2665)**	**30.5 (5793/18993)**	<0.001
17	**79.2 (1325/1673)**	**44.8 (8160/18229)**	<0.001
18	**87.8 (575/665)**	**55.4 (4270/7706)**	<0.001
19-20	**92.1 (164/178)**	**69.0 (892/1292)**	<0.001
all	**60.8 (6560/10788)**	**30.00 (23332/77867)**	<0.001

Among sexually active boys and girls, reporting five or more partners for intercourse was more common among adolescents reporting delinquency than among others. This was seen in all age groups (Table 2).

Multivariate Associations between Delinquency, Depression and Sexual Behaviour

In the whole sample, the Odds Ratios for having experienced sexual intercourse according to delinquency were increased in both sexes, slightly more in boys. The Odds Ratios were only slightly reduced when depression was controlled for (Table 3). Among sexually active adolescents the Odds Ratios for risky sexual behaviour according to delinquency were highly significantly increased, and the finding persisted when depression was controlled for (Table 3).

Multivariate Analyses Stratified for Age

The Odds Ratios for having experienced sexual intercourse according to delinquency were significant among 14 to 18-year-old girls and 14 to 20-year-old boys when delinquency was studied alone (Table 3 (a) crude ORs) and simultaneously with depression (Table 3 (a) adjusted ORs). Among 16 and 18-year-old boys and girls older than 16 the association between depression and having experienced sexual intercourse was not significant when delinquency was in the same multivariate model. Among 19 to 20-year-old boys the association between depression and having experienced sexual intercourse was reversed.

Among sexually active girls, Odds Ratios for reporting five or more partners for intercourse according to delinquency were highly significant in all the age groups. This was seen when delinquency was studied alone (Table 3 (b) crude ORs) and simultaneously with depression (Table 3 (b) adjusted ORs). Reporting five or more partners for intercourse was also associated with depression in all age groups among the girls.

Likewise among sexually active boys the Odds Ratios for reporting intercourse with five or more partners according to delinquency were highly significant when studied alone (Table 3 (b) crude ORs) and when studied simultaneously with depression (Table 3 (b) adjusted ORs). Reporting multiple partners was also associated with depression except among 18-year-old boys.

Table 2. Proportions (% (n/N)) among sexually active of those having had five or more sexual partners among adolescents reporting delinquent behaviours. Statistically significant differences are shown in bold.

Girls	Delinquent behaviours	No delinquent behaviours	p-value
Age (years)			
14	**18.0 (107/596)**	**5.1 (68/1333)**	<0.001
15	**18.1 (207/1142)**	**6.0 (266/4465)**	<0.001
16	**30.3 (275/909)**	**9.9 (786/7966)**	<0.001
17	**40.6 (204/502)**	**15.1 (1580/10435)**	<0.001
18	**46.4 (70/151)**	**20.3 (1020/5034)**	<0.001
19-20	**78.8 (52/66)**	**33.6 (613/1826)**	<0.001
all	**27.2 (915/3366)**	**14.0 (4333/31059)**	<0.001
Boys	Delinquent behaviours	No delinquent behaviours	p-value
Age (years)			
14	**29.8 (240/805)**	**16.0 (160/1003)**	<0.001
15	**25.4 (460/1813)**	**10.5 (328/3111)**	<0.001
16	**28.3 (514/1819)**	**9.7 (556/5748)**	<0.001
17	**34.2 (449/1314)**	**11.9 (964/8113)**	<0.001
18	**43.2 (248/574)**	**16.7 (710/4243)**	<0.001
19-20	**59.1 (94/159)**	**30.5 (272/891)**	<0.001
all	**30.9 (2005/6484)**	**12.9 (2990/23109)**	<0.001

Table 3. Odds Ratios (OR, 95% CI) for a) having experienced sexual intercourse according to delinquent behaviors, and b) among sexually active youth, for having had intercourse with 5 or more partners, stratified for age groups. First, crude Odds Ratios are given. In the adjusted model (adj), depression and delinquency are entered as independent variables.

		a) has experienced intercourse			b) intercourse with 5 or more partners	
		Girls	Boys		Girls	Boys
	14					
crude	Delinquency	6.5 (5.8-7.3)**	6.7 (6.0-7.4)**	crude	4.1 (3.0-5.6)**	2.2 (1.8-2.8)**
adj	Delinquency	5.4 (4.8-6.2)**	5.7 (5.1-6.4)**	adj	3.7 (2.7-5.1)**	1.8 (1.5-2.3)**
	Depression	1.9 (1.7-2.2)**	3.1 (2.7-3.6)**		1.6 (1.1-2.2)*	2.9 (2.2-3.7)**
	15					
crude	Delinquency	4.6 (4.2-5.1)**	5.7 (5.3-6.1)**	crude	3.5 (2.9-4.2)**	2.9 (2.5-3.4)**
adj	Delinquency	4.1 (3.8-4.5)**	5.3 (4.9-5.8)**	adj	3.0 (2.4-3.6)**	2.3 (2.0-2.7)**
	Depression	1.7 (1.6-1.8)**	1.7 (1.6-1.9)**		2.0 (1.7-2.5)**	3.3 (2.8-4.0)**
	16					
crude	Delinquency	4.1 (3.6-4.6)**	5.1 (4.6-5.5)**	crude	4.0 (3.4-4.6)**	3.7 (3.2-4.2)**
adj	Delinquency	3.8 (3.4-4.3)**	5.0 (4.6-5.5)**	adj	3.6 (3.1-4.3)**	3.2 (2.8-3.6)**
	Depression	1.3 (1.2-1.4)**	1.1 (1.0-1.2)		1.4 (1.2-1.7)**	2.6 (2.2-3.1)**

	17					
crude	Delinquency	4.2 (3.4-5.1)**	4.7 (4.2-5.3)**	crude	3.8 (3.2-4.6)**	3.8 (3.4-4.4)**
adj	Delinquency	4.1 (3.3-5.1)**	4.8 (4.3-5.4)**	adj	3.4 (2.8-4.1)**	3.6 (3.1-4.1)**
	Depression	1.1 (1.0-1.1)	0.9 (0.8-1.0)*		1.6 (1.4-1.8)**	1.8 (1.5-2.1)**
	18					
crude	Delinquency	4.2 (2.6-6.7)**	5.8 (4.6-7.3)**	crude	3.4 (2.5-4.7)**	3.8 (3.2-4.5)**
adj	Delinquency	4.2 (2.6-6.7)**	5.9 (4.6-7.5)**	adj	3.1 (2.2-4.3)**	3.6 (3.0-4.4)**
	Depression	1.0 (0.8-1.1)	0.9 (0.8-1.1)		1.7 (1.5-2.1)**	1.3 (1.0-1.7)
	19-20					
crude	Delinquency	2.4 (1.1-5.4)	5.3 (3.0-9.2)**	crude	7.4 (4.0-13.4)**	3.3 (2.3-4.7)**
adj	Delinquency	2.6 (1.2-5.8)	6.3 (3.5-11.1)**	adj	6.5 (3.6-11.9)**	2.9 (2.0-4.1)**
	Depression	0.8 (0.6-1.1)	0.6 (0.4-0.8)**		1.5 (1.1-1.9)*	1.7 (1.2-2.5)*
	all					
crude	Delinquency	2.6 (2.5-2.7)**	3.6 (3.5-3.8)**	crude	2.3 (2.1-2.5)**	3.0 (2.8-3.2)**
adj	Delinquency	2.5 (2.3-2.6)**	3.5 (3.3-3.6)**	adj	2.1 (1.9-2.3)**	2.6 (2.4-2.8)**
	Depression	1.2 (1.2-1.3)**	1.3 (1.3-1.4)**		1.5 (1.4-1.6)**	2.3 (2.1-2.5)**
	** Odds Ratios statistically significant at level $p < 0.001$; * at level $0.01 < p < 0.001$					

All the above mentioned statistically significant associations persisted when sociodemographic variables, family structure, mother's education and father's education, were controlled for.

Discussion

Principal Findings

There was a clear relationship between reporting delinquent behaviours and having experienced sexual intercourse not only in the youngest age groups, but also among the older ones, until late adolescence. Likewise, risky sexual behaviour, having multiple partners, was clearly connected to delinquency in all age groups from 14 to 20. Further, the connections persisted when an emotional dimension, depression, was controlled for. On the other hand, previously detected associations between depression and sexual behaviours also proved to be independent, not explained by delinquency. These findings were largely similar between the sexes.

C*omparison to Other Similar Research*

Earlier studies have likewise suggested an association between delinquency and early and risk taking sexual behaviour [2,16–19]. However, to the best of our knowledge this is the first study demonstrating these associations in all different phases of adolescence.

Implications for Clinicians and Policymakers

There are some well-known sex-specific differences in psychopathology, girls mature earlier than boys, and in social domain the sexual double standard attaches different meaning to the sexual activity of boys and girls. In spite of those, the associations found between delinquency and being sexually active, and delinquency and risky

sexual behaviour behaved quite similarly among both sexes. Only in girls aged 19-20 was simply having experienced intercourse no longer associated with delinquency. Thus girls' or boys' delinquency and sexual behaviours need not be approached differently. In all studied age groups girls and boys displaying delinquent behaviours are more likely than their non-delinquent peers to be sexually active and engage in risky sexual behaviour. Given the associations between delinquency and academic failure [9,10], this sexually active and risk-taking group of adolescents is also likely to be the group lacking sexual health knowledge and skills to protect themselves and their partners in sexual encounters. Attention should be paid to sexual health needs among delinquent adolescents. Sexual health issues should be included in interventions targeted at reducing delinquency.

Accounting for depression did not level out or much modify the associations between delinquency and the sexual behaviours studied. On the other hand, in girls aged 14 to 16 and boys aged 14-15 and 17, previously [5] detected associations between depression and being sexually active persisted when studied simultaneously with delinquency. Regarding risky sexual behaviour, delinquency and depression yielded independent positive main associations. Although depression and delinquency overlap [10,32] and share common correlates [27,33–36], their associations with sexual behaviours in adolescence are unique. Associations between depression and early and risk taking sexual behaviours are not explained by delinquency. Attention needs to be given to sexual health needs of depressed adolescents, whether or not they display delinquent behaviours.

Of note is, however, that among boys aged 19-20 the association between depression and being sexually active was inversely related: depressed ones were less likely than their non-depressed peers to have experienced sexual intercourse. In this age group, having sexual experiences is normative. It is possible that being depressed results in such difficulties in social relationships that sexual development is delayed, but it is also possible that being inexperienced in the age when most of the peers have sexual relationships triggers feelings of loneliness and predisposes to depression [5]. Among girls in this age group, the association between depression and having experienced intercourse was also inversely related, although it was not statistically significant. Thus, sexual health needs warrant attention among depressed late adolescents as well as their younger peers, but the focus needs to be different.

Clinicians working with adolescents presenting with delinquent behaviour, depression, or both need to consider the sexual health needs of these adolescents, offer sexual health education, work with possible sexuality-related traumatic

experiences and help adolescents to develop skills to protect themselves in sexual encounters and to build developmentally appropriate relationships.

Strengths and Weaknesses

The uniquely large population-based sample and high response rate are notable strengths of our study. As a classroom survey the SHPS reaches the majority of adolescents in the age groups studied. Nonetheless, some 10-15% of students are absent from school on the day SHPS is conducted, and they might suffer more often from various mental and social problems, leading to underestimates of self-reported depression, delinquency and risky sexual behaviour. However, even high levels of non-response do not necessarily affect the associations studied [49]. Non-response to key variables was statistically significantly associated with being male and younger, but in practice the differences were very small and unlikely to bias the findings.

Comprising adolescents aged 14-20, our study was able to explore the associations between delinquency and sexual behaviours in different phases of adolescence, from early (14 year olds in the present study) to middle (15-17) to late adolescents (18-20) [50,51].

The data was not as representative of 19-20-year olds as of younger age groups. The 19-20-year-olds consist of approximately 2% of the whole study population. Yet their number was about 4,000, sufficient for all the analyses. It is, however, possible that students still at school at ages 19-20 have social, psychological or other problems that have delayed their graduation, and thus delinquency, depression and problems related to sexuality could be more common among them than in the age group at large.

Besides being cross-sectional, another limitation of this study is the reliance on self-reports when measuring depression and delinquency. Self-reported depression was assessed using the R-BDI, a state measure giving no information on the duration of depressive symptoms. To avoid overestimates, the cutpoint was set as high as 8 so that adolescents whose scores indicated mild depression were not considered depressed in this study. Severe depressive symptoms in adolescents, however, are likely to be persistent [52], and most of the morbidity associated with depression comes from the large numbers of people with depressive symptoms rather than from the small number of cases with diagnosable depressive disorders [53]. The self-report

questions on delinquency were based on an internationally known and reliable self-report instrument [43,44] and have been used in Finnish adolescent public health and mental health research [54,55]. Self-report of delinquency reveals more incidents than ever end up in official crime statistics, and anonymity was likely to reduce the biasing effect of social desirability in the responses.

Unanswered Questions and Future Research

To explore causal pathways to these associations, longitudinal study designs are needed. Also, results from this study are gained from an adolescent population well representing Western culture. Future research aiming at extrapolating these correlations to different adolescent populations, with other ethnic and/or school attendance characteristics is needed.

Conclusion

Being sexually active and engaging in risky sexual behaviour are connected to delinquency in adolescent general population throughout the developmental phase, even in late adolescence when being sexually active is developmentally normative. Accounting for depression does not change these associations. On the other hand, depression is associated with being sexually active in early and middle adolescence, and with sexual risk-taking throughout adolescent development, and these associations are not better explained by delinquency.

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References

[1] Steinberg L. Cognitive and affective development in adolescence. Trends Cogn Sci. 2005;9:69–74.

[2] Kotchick B a, Shaffer A, Forehand R, et al. Adolescent sexual risk behavior: a multi-system perspective. Clin Psychol Rev. 2001;21:493–519.

[3] Cromer B. Nelson Textbook of Pediatrics: Adolescent development. In: Kliegman R, Behrman R, Jenson H, et al., editors.. 19th ed. Philadelphia: Saunders Elsevier; 2011. p. 649–660.

[4] Madkour AS, Farhat T, Halpern CT, et al. Early adolescent sexual initiation as a problem behavior: a comparative study of five nations. J Adolesc Health. 2010;47:389–398.

[5] Savioja H, Helminen M, Fröjd S, et al. Sexual experience and self-reported depression across the adolescent years. Health Psychol Behav Med. 2015;3:337–347.

[6] McGee L, Newcomb MD. General deviance syndrome: expanded hierarchical evaluations at four ages from early adolescence to adulthood. J Consult Clin Psychol. 1992;60:766–776.

[7] Donovan J, Jessor R. Structure of Problem Behavior in Adolescence and Young Adulthood. J Consult Clin Psychol. 1985;53:890–904.

[8] Jessor R, Jessor S. Problem behavior and psychosocial development. New York: Academic Press; 1977.

[9] Patterson GR, DeBaryshe B, Ramsay E. A developmental perspective on antisocial behavior. Am Psychol 1989;44:329–335.

[10] Mun EY, Windle M, Schainker LM. A model-based cluster analysis approach to adolescent problem behaviors and young adult outcomes. Dev Psychopathol. 2008;20:291–318.

[11] Abram KM, Teplin LA, McClelland GM, et al. Comorbid Psychiatric Disorders in Youth in Juvenile Detention. Arch Gen Psychiatry. 2003;60:1097–1108.

[12] Fazel S, Doll H, Långström N. Mental Disorders Among Adolescents in Juvenile Detention and Correctional Facilities: A Systematic Review and Metaregression Analysis of 25 Surveys. J Am Acad Child Adolesc Psychiatry. 2008;47:1010–1019.

[13] Moffitt TE, Caspi A, Harrington H, et al. Males on the life-course-persistent and adolescence-limited antisocial pathways: Follow-up at age 26 years. Dev Psychopathol. 2002;14:179–207.

[14] World Health Organization. The ICD-10 classification of mental and behavioural disorders: Clinical descriptions and diagnostic guidelines. Geneva; World Health Organization; 1992.

[15] American Psychiatric Association. Diagnostic and statistical manual of mental disorders (5th ed.). Washington DC; 2013.

[16] Tubman JG, Windle M, Windle RC. The Onset and Cross-Temporal Patterning of Sexual Intercourse in Middle Adolescence: Prospective Relations with Behavioral and Emotional Problems. Child Dev. 1996;67:327–343.

[17] Capaldi DM, Crosby L, Stoolmiller M. Predicting the timing of first sexual intercourse for at-risk adolescent males. Child Dev. 1996;67:344–359.

[18] Ramrakha S, Caspi A, Dickson N, et al. Psychiatric disorders and risky sexual behaviour in young adulthood: cross sectional study in birth cohort. BMJ. 2000;321:263–266.

[19] Kaltiala-Heino R, Fröjd S, Marttunen M. Depression, conduct disorder, smoking and alcohol use as predictors of sexual activity in middle adolescence: a longitudinal study. Health Psychol Behav Med. 2015;3:25–39.
[20] Scaramella L V, Conger RD, Simons RL, et al. Predicting Risk for Pregnancy by Late Adolescence: A Social Contextual Perspective. Dev Psychol. 1998;34:1233–1245.
[21] Devine D, Long P, Forehand R. A prospective study of adolescent sexual activity. Description, correlates, and predictors. Adv Behav Res Ther. 1993;15:185–209.
[22] Costello JE, Erkanli A, Angold A. Is there an epidemic of child or adolescent depression? J Child Psychol Psychiatry. 2006;47:1263–1271.
[23] Egger HL, Angold A. Common emotional and behavioral disorders in preschool children: presentation, nosology, and epidemiology. J Child Psychol Psychiatry. 2006;47:313–337.
[24] Hallfors DD, Waller MW, Ford C a, et al. Adolescent depression and suicide risk: association with sex and drug behavior. Am J Prev Med. 2004;27:224–231.
[25] Hallfors DD, Waller MW, Bauer D, et al. Which comes first in adolescence--sex and drugs or depression? Am J Prev Med. 2005;29:163–170.
[26] Jamieson LK, Wade TJ. Early age of first sexual intercourse and depressive symptomatology among adolescents. J Sex Res. 2011;48:450–460.
[27] Kaltiala-Heino R, Kosunen E, Rimpelä M. Pubertal timing, sexual behaviour and self-reported depression in middle adolescence. J Adolesc. 2003;26:531–545.
[28] Lehrer J a, Shrier L a, Gortmaker S, et al. Depressive symptoms as a longitudinal predictor of sexual risk behaviors among US middle and high school students. Pediatrics. 2006;118:189–200.
[29] Mazzaferro KE, Murray PJ, Ness RB, et al. Depression, stress, and social support as predictors of high-risk sexual behaviors and STIs in young women. J Adolesc Health. 2006;39:601–603.
[30] Rubin a G, Gold M a, Primack B a. Associations between depressive symptoms and sexual risk behavior in a diverse sample of female adolescents. J Pediatr Adolesc Gynecol. 2009;22:306–312.
[31] Wickrama T, Wickrama KAS. Heterogeneity in Adolescent Depressive Symptom Trajectories: Implications for Young Adults' Risky Lifestyle. J Adolesc Health. 2010;47:407–413.
[32] Kessler RC, Mcgonagle KA, Zhao S, et al. Lifetime and 12-Month Prevalence of DSM-111-R Psychiatric Disorders in the United States Results From the National Comorbidity Survey. Arch Gen Psychiatry. 1994;51:8–19.
[33] Kaltiala-Heino R, Marttunen M, Rantanen P, et al. Early puberty is associated with mental health problems in middle adolescence. Soc Sci Med. 2003;57.
[34] Copeland W, Shanahan L, Miller S, et al. Outcomes of early pubertal timing in young women: a prospective population-based study. Am J Psychiatry. 2010;167:1218–1225.
[35] Hui Yap MB, Jorm AF. Parental factors associated with childhood anxiety, depression, and internalizing problems: A systematic review and meta-analysis. J Affect Disord. 2015;175:424–440.
[36] Murray J, Farrington D. Risk Factors for Conduct Disorder and Delinquency: Key Findings From Longitudinal Studies. Can J Psychiatry. 2010;55:633–642.
[37] Moffitt TE, Caspi A. Childhood predictors differentiate life-course persistent and adolescence-limited antisocial pathways among males and females. Dev Psychopathol. 2001;13:355–375.

[38] Patton GC, Coffey C, Romaniuk H, et al. The prognosis of common mental disorders in adolescents: a 14-year prospective cohort study. Lancet. 2014;383:1404–1411.
[39] Fechner PY. Gender Differences in Puberty. J Adolesc Health. 2002;30S:44–48.
[40] Klimstra TA, Hale III W, Raaijmakers QAW, et al. Maturation of Personality in Adolescence. J Pers Soc Psychol. 2009;96:898–912.
[41] Bordini GS, Sperb TM. Sexual double standard: A review of the literature between 2001 and 2010. Sex Cult. 2013;17:686–704.
[42] Savioja H, Helminen M, Fröjd S, et al. Parental involvement, depression, and sexual experiences across adolescence: a cross-sectional survey among adolescents of different ages. Health Psychol Behav Med. 2017;5:258–275.
[43] Junger-Tas J, Terlouw G, Klein M. Delinquent Behaviour among Young People in the Western World: First Results of the International Self-Report Delinquency Study. 1994.
[44] Zhang S, Benson T, Deng X. A test-retest reliability assessment of the international self-report delinquency instrument. J Crim Justice. 2000;28:283–295.
[45] Beck A, Rial W, Rickels K. Short form of depression inventory: cross-validation. Psychol Rep. 1974;34:1184–1186.
[46] Raitasalo R. Mood questionnaire. Finnish modification of the short form of the beck depression inventory measuring depression symptoms and self-esteem. Studies in social security and health, 86. Helsinki; 2007.
[47] Bennett DS, Ambrosini PJ, Bianchi M, et al. Relationship of Beck Depression Inventory factors to depression among adolescents. J Affect Disord. 1997;45:127–134.
[48] Kaltiala-Heino R, Rimpela M, Rantanen P, et al. Finnish modification of the 13-item Beck Depression Inventory in screening an adolescent population for depressiveness and positive mood. Nord J Psychiatry. 1999;53:451–457.
[49] Van Loon AJM, Tijhuis M, Picavet HSJ, et al. Survey non-response in the Netherlands: Effects on prevalence estimates and associations. Ann Epidemiol. 2003;13:105–110.
[50] Blos P. On Adolescence. A psychodynamic interpretation. New York: Free Press. 1962.
[51] Sanders R. A. Adolescent psychosocial, social, and cognitive development. Pediatrics in Review. 2013;34:354–359.
[52] Charman T. The stability of depressed mood in young adolescents: a school-based survey. J Affect Disord. 1994;30:109–116.
[53] Harrington R, Clark A. Prevention and early intervention for depression in adolescence and early adult life. Eur Arch Psychiatry Clin Neurosci. 1998;248:32–45.
[54] Ritakallio M, Kaltiala-Heino R, Kivivuori J, et al. Brief report: delinquent behaviour and depression in middle adolescence: a Finnish community sample. J Adolesc. 2005;28:155–159.
[55] Ritakallio M, Kaltiala-Heino R, Kivivuori J, et al. Delinquency and the profile of offences among depressed and non-depressed adolescents. Crim Behav Ment Health. 2006;16:100–110.

PUBLICATION IV

Adolescent sexual behavior – family characteristics, parental involvement and associated mental disorders

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Adolescent sexual behavior - family characteristics, parental involvement and mental disorders associated

Abstract

Manifold factors connect with adolescent sexual behavior, but studies on their reciprocal associations are scarce. This study seeks to find the ways in which parental involvement, family characteristics, depression, and delinquency are connected to adolescent early/risky sexual behavior, and to what extent they modify each other. A population-based self-report survey of nearly 187,000 adolescents (50.4% girls) was utilized. The most important of the family variables was living in a two-parent family, which showed the clearest inverse association with early/risky sexual behavior throughout adolescence. Depression and delinquency persisted associated with sexual behavior in the presence of the family variables.

Keywords

sexual behavior, mental health, family characteristics, self-reported measures, adolescence

Introduction

During adolescence considerable changes take place in the physical, cognitive, and emotional domains of development, and this is followed by changes in social interaction, for example in romantic and erotic encounters. Puberty is an important milestone initiating the sequence of sexual development and extending towards physical and emotional maturity. However, during adolescence the various aspects of development mature at different rates, which has major implications for sexual behavior. Physical development precedes emotional development. Puberty intensifies emotional arousability, reward-orientation, and sensation seeking long before frontal lobe maturation facilitates regulatory competencies (Steinberg 2005). Thus, adolescents may engage in sexual encounters before they have achieved sufficient emotional maturity and be inclined to risk-taking in the sexual domain (Ge et al. 2003; Savioja et al. 2015).

Early sexual activity is connected to unprotected intercourse and multiple sexual partners, exposing adolescents to unwanted pregnancies and sexually transmitted infections (Kotchick et al. 2001). Hence sexual activity in early and middle adolescence per se can be seen as problem behavior (Madkour et al. 2010; Savioja et al. 2015). In late adolescence being sexually active becomes developmentally normative and statistically common (Cromer 2011). Sexual behaviors predisposing to unwanted pregnancy and sexually transmitted diseases nevertheless count as risky sexual behaviors, also in older adolescents. Such risky behaviors include sexual encounters while under the influence of alcohol or drugs, not using contraception and protection against diseases and having multiple partners. It has been acknowledged that girls mature earlier than boys (Fechner 2002; Klimstra et al. 2009). Consequently, some studies suggest that adolescent boys engage in more risky sexual behavior than girls (Epstein et al. 2014; Lohman and Billings 2008).

Table 1. Understanding adolescent risky sexual behavior in light of various developmental theories.

Theory	Reference	Main idea
Problem behavior theory	Jessor 1977	Problems accumulate because of a shared factor, ineffective parenting. Risky sexual behavior is one of the problem behaviors, and, for example, delinquency and/or antisocial behavior may play a role as a mediator.
Attachment theory	Ainsworth 1973	Early experiences (with caregivers) shape the attachment style between insecure and secure. For example, parental depression is connected to insensitive and non-responsive parenting, and may lead to low attachment security, which predisposes to adolescent depression and risky sexual behavior.
Social learning theory	Bandura 1971	Learning from esteemed other, such as peers and parents, leads to imitation of their behavior. Affiliating with deviant peers is the major breeding ground for risky sexual behavior. Parenting may be either protective or opposed when it comes to choosing or associating with deviant peers.
Social control theory	Hirschi 1969	Children learn to control their own behavior through their primary bond, parents. Children assimilate parents' values and norms. Thus, supportive parenting is connected to rejecting deviant norms, including risk-taking sexual behavior.
Self-control theory	Gottfredson 1990	Effective parenting leads to achieving self-control. Low self-control, such as impulsiveness and sensation-seeking, lead to risky sexual behavior.

Several theories have been frequently invoked to explain risky sexual behavior among adolescents (Ainsworth et al. 1978; Bandura 1971; Gottfredson and Hirschi 1990; Hirschi 1969; Jessor and Jessor 1977), in which early experiences and parenting behaviors are often seen as key factors (Table 1). It is indeed well documented that low level of parental monitoring, but also intrusive monitoring or excessive parental control, are connected to early sexual activity and risky sexual behavior (DiClemente et al. 2001b; Markham et al. 2010; Meschke et al. 2002; Wight et al. 2006). Positive and open parent-adolescent communication is associated with less sexual risk-taking, such as more use of contraception (DiClemente et al. 2001a; Stanton et al. 2002; Wang et al. 2013). Family connectedness and good parent-adolescent relationships protect against early sexual debut and risky sexual behaviors (Deptula et al. 2010; Markham et al. 2010). Parental knowledge about adolescents' friends and whereabouts reduces the likelihood of risky sexual behavior (Coley et al. 2009; McCauley et al. 2016). Nevertheless, these constructs may be mixed or moderate each other. For example, young people more aware of family connectedness may be more acceptive of being monitored (Ary et al. 1999). More important than monitoring by parents, may, however, be parental knowledge about the adolescent's thoughts, friends and whereabouts, which is dependent on the adolescents' disclosure of matters of importance to them (Stattin and Kerr 2000). Adolescents' perception of parental knowledge has important implications for predicting risky sexual behaviors. McCauley et al. (2016) reported that adolescents perceiving greater parental knowledge about their activities, peers, and whereabouts were less likely to engage in unprotected sex. Research has focused on slightly different psychological aspects of parenting and parent-adolescent relationships, but they all share some similarities, such as availability of parents, connectedness, and positive and supportive monitoring. In this study we use the construct of parental involvement measuring adolescents' awareness that their parents know about their friends and whereabouts and adolescent's ability to disclose to parents.

Moreover, family structure and low socioeconomic status are risk factors for adolescent early sexual behavior (Blum et al. 2000). Research suggests that living in a one-parent family compared to a two-parent household increases the risk for early sexual debut and other risky behaviors (Oman et al. 2005; Santelli et al. 2000; White and Warner 2015; Young et al. 1991, Carlsund et al. 2013). Low parental and low adolescent educational attainment are both connected to early sexual debut and other risky sexual behaviors (Bailey et al. 2008; Cavazos-Rehg et al. 2010; de Looze et al. 2012). Poorly educated parents tend to have children with low educational attainment. For example, many teenage mothers are themselves children of

adolescent parents, and history of poor academic performance persists (Klein 2005; Upchurch and McCarthy 1990). Poorer sexual health education or more permissive maternal attitudes may likewise play a role. Even though some have found that the quality of the parent-adolescent relationship may be a more important factor for adolescent sexual behavior than family sociodemographics (Upchurch et al. 1999), family structure and parental educational level warrant attention in the study of adolescent early and risk-taking sexual activities.

Depression is a key internalizing disorder in adolescence, and even a global health concern due to its high rates worldwide (Costello et al. 2006). During adolescence, depressive symptoms and depression are more common, more persistent and more often recurrent in girls than in boys (Mason et al. 2017; Patton et al. 2014). Research has linked depression decisively with early and risk-taking sexual behavior (Hallfors et al. 2004, 2005; Jamieson and Wade 2011; Kaltiala-Heino et al. 2003; Lehrer et al. 2006; Mazzaferro et al. 2006; Rubin et al. 2009; Savioja et al. 2015). Also, inadequate parenting and poor parent-child relations place adolescents at risk for depression (Fröjd et al. 2007; Schwartz et al. 2012; Yu et al. 2006). Attachment theory suggests that parental depression may lead to insensitive and non-responsive parenting, which in turn may lead to low attachment security and thereby to adolescent depression as a mediator between parenting and risky sexual behavior (Ainsworth et al. 1978). Internalizing disorders, such as depression, as potentially mediating factors between parenting and adolescent sexual behavior need more careful study.

Delinquency is one of the main externalizing problem behaviors in adolescence, and a key element of conduct disorder (Jessor and Jessor 1977, World Health Organization 1992, American Psychiatric Association 2013). Delinquency and antisocial behavior are known mediators between ineffective parenting and risky sexual behaviors (Capaldi et al. 2002; McCauley et al. 2016), as problem behavior theory also suggests (Jessor and Jessor 1977). Antisocial behavior often derives from poor parenting quality, inconsistent discipline, low monitoring, and poor parental involvement (Dogan et al. 2007; Loeber and Dishion 1983; McCord et al. 1961). Moreover, parental antisocial behavior predicts adolescent's subsequent involvement in deviant behaviors (Dogan et al. 2007). Antisocial behavior appears to begin early in life and to continue into adolescence and adulthood (Patterson et al. 1989). Boys are involved in antisocial behavior and suffer from conduct disorders more often than girls (Merikangas et al. 2009; Moffitt and Caspi 2001; Zheng and Cleveland 2013). Many studies have found connections between delinquency/antisocial behavior and early or risk-taking sexual behavior in

adolescence (Kaltiala-Heino et al. 2015; Kotchick et al. 2001; McCauley et al. 2016; Ramrakha et al. 2000; Tubman et al. 1996).

Problem behavior theory posits delinquent or antisocial behaviors as mediating factors between parenting and risky sexual behavior (Jessor and Jessor 1977). Social control theory takes the view that inconsistent discipline and lack of supervision signify disrupted parent-adolescent relationship implying failure to identify with parental and societal values. This leaves an adolescent deficient in internal control, which may lead to accepting deviant norms and engaging in risky sexual behavior (Hirschi 1969). According to social learning theory, the adolescent learns antisocial behavior from parents and peers. Inept parenting practices reinforce coercive behaviors. There is a lack of training for many prosocial skills parallel to the training of deviant behaviors (Patterson et al. 1984). Coercive behaviors lead to rejection by normal peer group, and deviant peer networks are in turn the major training ground for delinquent acts and risky sexual behavior (Coie and Kupersmidt 1983; Dodge 1983; Hirschi 1969), both of which can also be seen as sensation-seeking and impulsive behavior (Hoyle et al. 2000; Kotchick et al. 2001). Self-control theory suggests that effective parenting is a prerequisite for achieving self-control. Low self-control, to which this theory also refers as antisocial behavior, leads to risky sexual behavior (Gottfredson and Hirschi 1990).

To summarize, the connection between ineffective parenting and risky sexual behavior is well documented (DiClemente et al. 2001b; Markham et al. 2010; McCauley et al. 2016; Meschke et al. 2002; Wight et al. 2006). Different negative aspects of parenting are connected to both depression and delinquency in adolescents (de Kemp et al. 2006; Hui Yap et al. 2014; Moffitt et al. 2002), and depression and delinquency are further often co-morbid (Wolff and Ollendick 2006). Some studies have examined how parenting practices and sexual behavior connect with depression and delinquency. Studies using population-based samples suggest associations between depression and early/risky sexual behavior, between parental involvement and early/risky sexual behavior, and between delinquency and early/risky sexual behavior (Savioja et al. 2015, 2017a, 2017b). Nevertheless, as far as we know, few studies have examined the interconnections between mental health variables, family characteristics with risky sexual behavior. Moreover, many studies have utilized student samples, but not at a population-wide level. We need to examine the extent to which depression and delinquency explain each other, and possibly level out parental involvement or other family characteristics as correlates of sexual behaviors in adolescence. This study addresses the following questions:

1 Are parental involvement or family characteristics connected to sexual behavior during adolescence, to having experienced sexual intercourse, and to having had sexual intercourse with five or more partners when depression and delinquency are assessed in the same model?

2 Do depression and delinquency interconnect and/or have independent associations to adolescent sexual behavior when assessed in the same model with parental involvement and family characteristics?

3 Are the possible relations suggested above similar or different in different age groups?

4 Are the possible relations in (1), (2), and (3) similar or different among adolescent boys and girls?

Hypotheses

In light of the research presented above, we expect that high parental involvement is independently and inversely connected to adolescent sexual behavior, also in the presence of mental health variables. We moreover expect that not living in a two-parent family constellation and low parental education have independent associations with early/risky sexual behavior. Furthermore, we expect that depression and delinquency have independent associations with risky sexual behavior, also in the presence of parental measures. Prior research leaves open the question for us to study whether, and how, all the family characteristics and mental health variables interact with each other. Since sexual activity becomes fairly normative towards late adolescence, we assume that the associations between parental involvement, family characteristics, and having experienced intercourse, and between depression / delinquency and having experienced intercourse are weaker or non-significant among older adolescents, but that such associations with risk-taking sexual behavior persist.

We expect to find different kinds of associations for both sexes, because girls mature earlier, are more susceptible to depression, and tend to engage in less risky sexual behavior, whereas boys express more delinquency. Also, the double standard attaching different values to girls' and boys' sexual activity may still prevail (Bordini and Sperb 2013). We expect to find that, among girls, the associations of parental involvement and family characteristics with adolescent sexual behavior are (partially) explained by depression, and among boys, by delinquency, but that parental involvement will nevertheless also have an independent association with sexual behaviors. Because girls mature earlier than boys, we expect to find that parental

involvement and family characteristics lose significance as correlates of sexual behaviors earlier in girls than in boys.

Method

Participants

The School Health Promotion Study (SHPS) (www.thl.fi/kouluterveyskysely) is a nationwide anonymous classroom survey on adolescents' health behaviors conducted in Finland. The SHPS has been carried out annually since 1995. Both secondary school students (aged 14-16) and upper secondary and vocational school students (aged 16-20) have participated since 2008. The SHPS has been carried out in alternate years in certain parts of Finland until 2011, and then the results of two consecutive years were combined. In this article we utilized the SHPS data from 2010 and 2011 including all 14-20-year-old respondents. The SHPS was granted approval by the ethics committees of Pirkanmaa Hospital District and the National Institute of Health and Welfare.

Almost 99% of 14-16-year-old adolescents attend secondary school, and about 93% proceed to upper secondary education in Finland. Typically, adolescents in the upper secondary education are 16-18 years old. Hence, there are fewer 19-20-year-olds completing the SHPS because the majority of them have already graduated from upper secondary education. The SHPS is sent to every municipality, and the municipalities decide if the schools in their areas will participate. Also, students absent on the study day (10-15%) were not contacted. The final coverage of the 2010-2011 SHPS was 80% for 14-16-year-old secondary school students, 73% for 16-18-year-old upper secondary school students, and 43% for 16-18-year-old vocational school students.[1] Respondents totaled 186,632, with 92,478 (49.6%) boys and 94,154 (50.4%) girls.

Adolescents were stratified into two age categories according to their age calculated from the dates of birth supplied. The two groups were formed according to the average age of experiencing first sexual intercourse in Finland. On average,

[1] Wellbeing of adolescents in Finland 2000–2013. National Institute for Health and Welfare (THL). Report 25/2014. http://www.julkari.fi/handle/10024/1

girls experience their first sexual intercourse at age 16.5, and boys at age 17.5.[2] Adolescents were stratified into two age groups based on the fact that 17 is the average age for experiencing sexual intercourse among Finnish adolescents. Thus, adolescents aged 14.00–16.99 were in age group 14-16 (early-to-middle adolescence), and adolescents aged 17.00-20.99 were in age group 17-20 (middle-to-late adolescence).

Parental involvement

Parental involvement was elicited with three questions. The first one was "Do your parents know most of your friends?" with response alternatives "they both know" (coded =2), "only father knows" (=1), "only mother knows" (=1), and "neither of them knows" (=0). The second question was "Do your parents know about your whereabouts on Friday and Saturday nights?" with response alternatives "always" (=2), "sometimes" (=1), and "mostly not" (=0). The third question was "Are you able to talk with your parents about matters important to you?" with response alternatives "often" (=3), "fairly often" (=2), "now and then" (=1), and "hardly ever" (=0). The maximum sum score was 7. Scores 0-5 were used to indicate low and average parental involvement, and scores 6-7 high parental involvement. Of the girls, 62.4% reported low or average, and 37.6% high parental involvement. Of the boys, 62.7% reported low or average, and 37.2% high parental involvement.

Family structure and parental education

Family structure was dichotomized to living with mother and father vs. any other family constellation. Parental educational level was elicited with a question about mother's and father's educational qualification, the options being comprehensive school only/ upper secondary or vocational school/ upper secondary or vocational school and further vocational studies/ university or university of applied sciences. Parents' highest attainment being comprehensive school was considered low parental education.

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[2] http://www.vaestoliitto.fi/tieto_ja_tutkimus/vaestontutkimuslaitos/seksologinen_tutkimus/suomalaisten-seksuaalisuus-finse/finsex-seksielaman-aloittaminen/

Self-reported depression

Self-reported depression was measured with a Finnish modification of the short 13-item Beck Depression Inventory (Beck et al. 1974; Beck and Beck 1972), R-BDI (Raitasalo 2007). The 13-item BDI is widely used, and its validity and reliability have been established among adolescents (Beck et al. 1974; Bennett et al. 1997; Kaltiala-Heino et al. 1999). The R-BDI, Finnish version, is similar to the 13-item BDI, but to every item an opening question and one positive response alternative have been added. Each item is scored 0-3, and the maximum score is 39. Scores indicating moderate or severe depression (8 or more) are referred to as self-reported depression. Moderate or severe self-reported depression was found in 16.9% of the girls and 7.7% of the boys.

Delinquency

Delinquency was measured with six questions adopted from the Finnish Self-Report Delinquency Study, a modified version of the International Self-Report Delinquency Study (ISRD) instrument (Junger-Tas et al. 1994). The ISRD instrument has been shown to be reliable in test-retest studies (Zhang et al. 2000). The six questions were: During the past 12 months have you 1) drawn tags or graffiti on walls or elsewhere, 2) deliberately damaged or destroyed school property or the school building, 3) deliberately damaged or destroyed other property, 4) stolen from a shop or a stall, 5) been involved in a fight, 6) beaten someone up? The response alternatives for each were no (=0), once (=1), 2-4 times (=2), more than 4 times (=3). The maximum sum score was 18. A sum score of 4 or more was used to indicate delinquency because it was the 90^{th} percentile in the present data. Of the girls, 6.2% scored 4 or more, and of the boys 12.2% ($p<0.001$).

Sexual behavior

Sexual activity was elicited with the question "Have you ever had sexual intercourse?". The response alternatives were "yes" or "no". In the whole sample 36.9% of the girls, and 32.7% of the boys had experienced sexual intercourse.

Risky sexual behavior

The number of sexual partners was measured with the question "How many sexual partners have you had sexual intercourse with?". The response alternatives were "one", "two", "three or four", and "five or more". A dichotomized variable was formed the cut-point being five or more sexual partners, which, according to earlier research, has been regarded as risky sexual behavior (Kaltiala-Heino et al. 2015). Among sexually active adolescents (n=65,063), 15.2% of the girls and 16.9% of the boys reported having had intercourse with five or more sexual partners.

Data analysis

Multivariate associations were calculated using logistic regression. At first, having experienced sexual intercourse was set as a dependent variable. Delinquency, depression, and continuous age were entered as independent variables in Model 1. Next, parental involvement, parental education, family structure and continuous age were entered as independent variables in Model 2. Finally, both mental health and family variables as well as age (continuous) were added simultaneously (Model 3). Odds Ratios with 95% confidence intervals (CI) were studied. Secondly, having had sexual intercourse with five or more partners among sexually active adolescents was entered as a dependent variable. The analyses were run respectively. The analyses were stratified into two age groups: adolescents aged 14-16 and 17-20. Also, the analyses were run separately for girls and boys.

Attrition

About 10-15% of students were absent on the study day, and no information was available on them. Of the participants, 1,230 (0.7%) had not responded to questions on parental involvement, 31 (0.0%) on depression scale, and 1,526 (0.8%) on delinquency scale. Of the respondents, 4,929 (2.6%) had not responded to questions on experiences of intercourse. Of those who had experienced intercourse, 449 (0.7%) did not report the number of sexual partners. Not responding to questions on experience of intercourse was more common among boys (0.9% vs. 0.4%, $p<0.001$) and was also associated with being younger (mean (SD) 16.2 (1.2) vs. 16.3 (1.3), $p<0.001$). Among those who had experienced intercourse, non-response to the

question on number of partners was more common among boys (1.0% vs. 0.4%, $p<0.001$), and those not responding were slightly younger (mean (SD) 16.3 (1.3) vs. 16.9 (1.2) years, $p<0.001$). Nonetheless, the small amount of missing information is negligible in terms of the subject studied.

Results

Throughout the whole study population, the Odds Ratios for having experienced sexual intercourse were high according to delinquency in both sexes (Table 2 Model 1). The Odds Ratios according to self-reported depression were clearly lower in the older age group: among older girls, depression was not associated with having experienced sexual intercourse, and among boys there was an inverse association in the older age group (Table 2 Model 1).

The Odds Ratios for having experienced sexual intercourse according to high parental involvement and family characteristics were highly significant in the younger age group and in both sexes (Table 2 Model 2). High parental involvement and living with both parents were inversely associated with having experienced sexual intercourse. Low parental education was associated with having experienced sexual intercourse. In the older age group, high parental involvement and living with both parents remained significant correlates of not having experienced sexual intercourse. However, low parental education was no longer associated with experience of sexual intercourse (Table 2 Model 2).

Table 2. Odds Ratios (OR, 95% CI) for having experienced sexual intercourse according to delinquent behaviors, depression, and age (continuous) (Model 1), and according to age (continuous), high parental involvement, low parental education, and family structure (Model 2). In the adjusted model (Model 3), all these variables were entered simultaneously as independent variables. All the analyses were stratified for two age groups (14-16, 17-20).

	Model 1		Model 2		Model 3	
	Girls	Boys	Girls	Boys	Girls	Boys
14-16						
Delinquency	4.8 (4.5-5.1)**	5.6 (5.3-5.8)**	-	-	4.3 (4.0-4.6)**	5.1 (4.8-5.4)**
Depression	1.6 (1.5-1.6)**	1.7 (1.6-1.8)**	-	-	1.4 (1.3-1.5)**	1.6 (1.4-1.7)**
Age (continuous)	2.5 (2.4-2.5)**	2.2 (2.2-2.3)**	2.3 (2.2-2.3)**	2.0 (1.9-2.0)**	2.5 (2.4-2.6)**	2.2 (2.1-2.3)**
High parental involvement	-	-	0.6 (0.6-0.6)**	0.7 (0.6-0.7)**	0.7 (0.7-0.7)**	0.8 (0.8-0.9)**
Low parental education	-	-	1.2 (1.2-1.4)**	1.4 (1.3-1.5)**	1.2 (1.1-1.3)**	1.3 (1.2-1.4)**
Family structure	-	-	0.5 (0.5-0.5)**	0.6 (0.6-0.6)**	0.5 (0.5-0.6)**	0.6 (0.6-0.7)**
17-20						
Delinquency	4.1 (3.4-5.0)**	5.1 (4.6-5.7)**	-	-	3.9 (3.2-4.7)**	4.8 (4.3-5.4)**
Depression	1.0 (0.9-1.1)	0.8 (0.7-0.9)**	-	-	0.9 (0.9-1.0)	0.8 (0.7-0.8)**
Age (continuous)	1.8 (1.7-1.8)**	1.7 (1.6-1.8)**	1.7 (1.6-1.8)**	1.7 (1.6-1.7)**	1.7 (1.7-1.8)**	1.7 (1.6-1.8)**
High parental involvement	-	-	0.8 (0.8-0.9)**	0.8 (0.8-0.9)**	0.9 (0.8-0.9)**	0.9 (0.8-0.9)**
Low parental education	-	-	1.1 (1.0-1.2)	1.0 (0.9-1.1)	1.1 (1.0-1-2)	1.0 (0.9-1.1)
Family structure	-	-	0.6 (0.5-0.6)**	0.6 (0.6-0.7)**	0.6 (0.5-0.6)**	0.7 (0.6-0.7)**
** Odds Ratios statistically significant at level $p<0.001$; * at level $0.01>p>0.001$						

Table 3. Odds Ratios (OR, 95% CI), among sexually active youth, for having had sexual intercourse with 5 or more partners, according to delinquent behaviors, depression, and age (continuous) (Model 1), and according to age (continuous), high parental involvement, low parental education, and family structure (Model 2). In the adjusted model (Model 3), all these variables were entered simultaneously as independent variables. All the analyses were stratified for two age groups (14-16, 17-20).

	Model 1		Model 2		Model 3	
	Girls	Boys	Girls	Boys	Girls	Boys
14-16						
Delinquency	3.5 (3.1-3.9)**	2.6 (2.3-2.8)**	-	-	3.3 (3.0-3.8)**	2.5 (2.3-2.8)**
Depression	1.7 (1.5-1.9)**	3.0 (2.6-3.3)**	-	-	1.6 (1.4-1.8)**	2.9 (2.6-3.3)**
Age (continuous)	1.4 (1.3-1.5)**	0.9 (0.8-0.9)**	1.2 (1.1-1.2)**	0.7 (0.7-0.8)**	1.4 (1.3-1.5)**	0.9 (0.8-0.9)**
High parental involvement	-	-	0.7 (0.6-0.8)**	0.8 (0.7-0.9)**	0.9 (0.8-1.0)**	1.1 (1.0-1.2)
Low parental education	-	-	1.7 (1.4-1.9)**	1.9 (1.6-2.2)**	1.5 (1.3-1.8)**	1.6 (1.4-1.9)**
Family structure	-	-	0.7 (0.6-0.7)**	0.6 (0.6-0.7)**	0.7 (0.6-0.8)**	0.7 (0.7-0.8)**
17-20						
Delinquency	3.6 (3.0-4.2)**	3.6 (3.2-4.0)**	-	-	3.5 (3.0-4.1)**	3.4 (3.1-3.8)**
Depression	1.6 (1.5-1.8)**	1.6 (1.4-1.8)**	-	-	1.5 (1.4-1.7)**	1.5 (1.3-1.7)**
Age (continuous)	1.6 (1.5-1.7)**	1.7 (1.6-1.8)**	1.6 (1.5-1.6)**	1.6 (1.5-1.7)**	1.6 (1.5-1.7)**	1.7 (1.6-1.8)**
High parental involvement	-	-	0.8 (0.7-0.9)**	0.9 (0.8-1.0)	0.9 (0.8-1.0)*	1.1 (1.0-1.2)
Low parental education	-	-	1.2 (1.1-1.4)*	1.2 (1.0-1.4)	1.2 (1.0-1.3)	1.1 (0.9-1.3)
Family structure	-	-	0.6 (0.6-0.7)**	0.7 (0.6-0.8)**	0.7 (0.6-0.7)**	0.8 (0.7-0.8)**
** Odds Ratios statistically significant at level $p<0.001$; * at level $0.01>p>0.001$						

All the above associations persisted as statistically significant, and the actual estimates changed very little, when the mental health and the parenting/family characteristics were studied simultaneously in the same model (Table 2 Model 3).

Among sexually active adolescents the Odds Ratios for having had five or more partners for intercourse were significantly increased according to delinquency as well as according to depression in both girls and boys and in both age groups (Table 3 Model 1). Having multiple partners was positively associated with low parental education and inversely associated with high parental involvement and living with both parents in the younger age group (Table 3 Model 2). In the older age group, high parental involvement was statistically significantly inversely, and low parental education positively associated with multiple partners only among girls. Living with both parents had a significant inverse association with having multiple partners in both sexes (Table 3 Model 2). Not many changes were seen in these associations when mental health and parenting/family characteristics were studied simultaneously in the same model. High parental involvement was leveled out among younger age group boys and low parental education in the older age group girls, otherwise the detected statistically significant associations persisted, and the actual Odds Ratios changed only a little.

Discussion

Parental involvement and family characteristics, as well as mental health variables, were among both younger and older adolescents and among both boys and girls associated with being sexually active, and studying these correlates in the same model revealed hardly any interaction effect. The same held true for risk-taking sexual behavior among sexually active early-to-middle adolescents, and to certain extent also among middle-to-late adolescents. Our findings add to earlier studies by analyzing mental health and family variables in the same models, demonstrating that both these domains have independent associations with adolescent sexual behavior.

Living in a one-parent family has been significantly associated with risky sexual behaviors in adolescence (Santelli et al. 2000; Young et al. 1991). Our study concurs with earlier research, suggesting family structure as the strongest correlate for adolescent sexual behavior even when studied simultaneously with high parental involvement and mental health variables. Living with both parents, versus any other

family constellation, is throughout adolescence and between both sexes highly significantly associated with not having experienced sexual intercourse and not having had multiple sexual partners. Low parental education has earlier been associated with early and risk-taking sexual behavior in adolescence (Cavazos-Rehg et al. 2010), but in our study this was the case only among the younger subjects.

High parental involvement in adolescent's life was throughout adolescence and between both sexes inversely associated with being sexually active, and among sexually active girls it also persisted as inversely associated with risky sexual behavior in the final models. Thus, girls may benefit more than boys from high parental involvement. Perhaps this is due to girls' greater tendency to disclose to their parents (Stattin and Kerr 2000). Low parental involvement has been shown in earlier research to be connected to early and risky sexual behavior (Savioja et al. 2017a), while parent-adolescent connectedness and appropriate parental monitoring have been shown to be protective factors (Markham et al. 2010; Meschke et al. 2002; Miller et al. 2001). Our findings concur with these, but add the confirmation that parent-adolescent relationships have an independent role even when mental health aspects are controlled for.

Internalizing (depression) and externalizing (delinquency) dimensions displayed independent associations with sexual behavior variables, and these were little modified by family/parent related variables. Throughout adolescence, delinquent adolescents were more likely to be sexually active and to exhibit risky sexual behaviors. Depression was positively associated with being sexually active in early-to-middle adolescence and with risky sexual behavior on both age groups. Internalizing and externalizing disorders (Oshri et al. 2011, Kaltiala-Heino et al. 2015, Savioja et al. 2017) and low parental involvement (Kotchick et al. 2001; Madkour et al. 2010) have earlier been shown to correlate with early sexual debut and risky sexual behavior, but our novel contribution was to demonstrate that their associations with aspects of sexual behavior in adolescence persist when family influences are accounted for, even if these domains are intercorrelated *per se* (de Kemp et al. 2006; Hui Yap et al. 2014).

Low parental education was associated with being sexually active and risky sexual behavior in the younger age group but not in the older. Depression had even an inverse association with being sexually active in the older age group. This probably reflects normative adolescent development and successful adolescent passage. In late adolescence being sexually active is statistically normative (Cromer 2011; Madkour et al. 2010). Moreover, individuation from parents and achieving greater emotional and behavioral autonomy are crucial developmental tasks to accomplish in late

adolescence (Steinberg 2001). Thus, simply being sexually active can be expected not to associate with problem indicators. However, we would therefore have expected that the mental health and family variables would have been still clearly less important for sexual behavior variables in the older age group. Factors related to childhood family background define adolescent sexual behavior even in late adolescence.

The findings were largely similar between both sexes, despite the known differences in prevalence of depression (Patton et al. 2014) and delinquency (Zheng and Cleveland 2013), different meanings given to sexual behaviors of boys and girls (Bordini and Sperb 2013), and sex differences in parent-adolescent relationships (Stattin and Kerr 2000).

Of the various theories explaining adolescent sexual behavior, our findings concur with problem behavior theory. High parental involvement in adolescent's life may be seen as an aspect of effective parenting, and this is inversely connected to being sexually active during adolescent development. Stepwise analyses also suggested that to some extent, the associations between high parental involvement and sexual behavior outcomes were mediated by mental health dimensions, as also suggested in problem behavior theory. On the other hand, high parental involvement could also be an indicator or outcome of secure attachment between the adolescent and her/his parents. Further, living with both parents had the most consistent inverse association with sexual behavior outcomes, also when high parental involvement and mental health dimensions were accounted for. Living with both parents may suggest greater potential for secure attachment. Thus the findings may also yield support for attachment theory as a model of explaining adolescent sexual behavior.

A clear strength of our study is the large population-based data set. Being a classroom survey, the School Health Promotion Study achieves a notably high response rate. Nevertheless, some 10-15% of students were absent on the study day, and they were not contacted later. These adolescents may be likely than the study population as a whole to have various illnesses and problems. However, this level of non-response probably does not have any effect on the associations studied (Van Loon et al. 2003). Secondly, not all ages were equally well represented. There were fewer respondents among 19-20-year-old adolescents than other ages, accounting for slightly more than 2% of the study population. A possible explanation is that these older adolescents have usually already graduated from the schools in which the School Health Promotion Study is conducted. Nonetheless, the sample size of 19-

20-year-olds is still remarkable, about 4,000, and since they were combined with 17-18-year-olds there were no problems in conducting the analyses.

It should be noted that the data consisted of self-reported measures. In population-based data there were no opportunities for structured interviews. The self-report measures may give overestimates of self-reported depression. On the other hand, students absent on the study day were not contacted, and they may be the ones experiencing more not only physical, but also emotional problems, and therefore the depression rates may have been slightly underestimated. Yet, it is known that self-reported depression correlates well enough with clinically significant depression (Charman 1994; Lewinsohn et al. 1994). Also, depressive symptoms are known to be quite persistent in adolescence (Charman 1994).

It is also noteworthy that cross-sectional data was utilized. The models were formed by examining the main theories on adolescence and a robust evidence base. Despite the high correlations in the models, we cannot draw conclusions about causality. However, all the affirmed connections were found in the presence of all the variables studied. This shows that at the population level there are unique correlations between early and risky sexual behavior and internalizing problems, externalizing problems, not living with both parents, not experiencing high parental involvement, and low parental educational attainment. A limitation is that we do not have data on possible parental depression and parental antisocial features.

Our study is highly generalizable to Western adolescent populations. Among the youngest, experience of sexual intercourse and having multiple partners are certainly deviant and warrant special attention on the part of school health practitioners and health educators. Boys especially need to be taken into account, since many of the sexual health services tend to be directed primarily at girls (Avery and Lazdane 2010). Important targets are also adolescents exhibiting internalizing or externalizing problems, and those reporting problems with parents or deviant parenting. Exploration of causal relations remains a topic for future research.

Conclusion

Both mental health variables and family correlates demonstrate independent connections with adolescent sexual behaviors, and do not greatly modify each other. Adolescents exhibiting early sexual debut or risky sexual behaviors more commonly suffer from depression, exhibit delinquency, do not experience high parental involvement, do not live with both parents, or have parents with poor educational

level. Among older adolescents these associations are slightly attenuated. In order to promote adolescent sexual health, family factors need to be addressed and mental disorders treated effectively, and attention must be paid especially to early and middle adolescents.

References

Ainsworth, M., Blehar, M., Waters, E., & Wall, S. (1978). *Patterns of attachment: a psychological study of the strange situation.* Hillsdale, NJ: Lawrence Erlbaum.

American Psychiatric Association (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington DC.

Ary, D. V, Duncan, T. E., Duncan, S. C., & Hops, H. (1999). Adolescent problem behavior: The influence of parents and peers. *Behaviour Research and Therapy*, *37*(3), 217–230.

Avery, L., & Lazdane, G. (2010). What do we know about sexual and reproductive health of adolescents in Europe? *European Journal of Contraception & Reproductive Health Care*, *15*(S2), S54–S66.

Bailey, J. A., Fleming, C. B., Henson, J. N., Catalano, R. F., & Haggerty, K. P. (2008). Sexual risk behavior 6 months post-high school: associations with college attendance, living with a parent, and prior risk behavior. *Journal of Adolescent Health*, *42*(6), 573–579.

Bandura, A. (1971). Social learning theory. *Social Learning Theory*. doi:10.1111/j.1460-2466.1978.tb01621.x

Beck, A., & Beck, R. (1972). Screening depressed patients in family practice. A rapid technic. *Postgraduate Medicine*, *52*, 81–85.

Beck, A., Rial, W., & Rickels, K. (1974). Short form of depression inventory: cross-validation. *Psychological Reports*, *34*, 1184–1186.

Bennett, D. S., Ambrosini, P. J., Bianchi, M., Barnett, D., Metz, C., & Rabinovich, H. (1997). Relationship of Beck Depression Inventory factors to depression among adolescents. *Journal of Affective Disorders*, *45*, 127–134.

Blum, R. W., Beuhring, T., Shew, M. L., Bearinger, L. H., & Resnick, M. D. (2000). The effects of race/ethnicity, income, and family structure on adolescent risk behaviors. *American Journal of Public Health*, *90*(12), 1879–1884.

Bordini, G. S., & Sperb, T. M. (2013). Sexual double standard: A review of the literature between 2001 and 2010. *Sexuality & Culture*, *17*(4), 686–704.

Capaldi, D., Stoolmiller, M., Clark, S., & Owen, L. (2002). Heterosexual risk behaviors in at-risk young men from early adolescence to young adulthood: Prevalence, prediction, and association with STD contraction. *Developmental Psychology*, *38*(3), 394–406.

Carlsund, A., Eriksson, U., Lofstedt, P., & Sellstrom, E. (2013). Risk behaviour in Swedish adolescents: Is shared physical custody after divorce a risk or a protective factor? *European Journal of Public Health*, *23*(1), 3–8.

Cavazos-Rehg, P., Spitznagel, E., Bucholz, K., Nurnberger, J., Edenberg, H., Kramer, J., et al. (2010). Predictors of sexual debut at age 16 or younger. *Archives of Sexual Behavior*, *39*(3), 664–673.

Charman, T. (1994). The stability of depressed mood in young adolescents: a school-based survey. *Journal of Affective Disorders*, *30*, 109–116.

Coley, R., Votruba-Drzal, E., & Schindler, H. (2009). Fathers' and mothers' parenting predicting and responding to adolescent sexual risk behaviors. *Child development*, *80*(3), 808–827.

Costello, J. E., Erkanli, A., & Angold, A. (2006). Is there an epidemic of child or adolescent depression? *Journal of Child Psychology and Psychiatry*, *47*(12), 1263–71.

Cromer, B. (2011). Adolescent development. In R. Kliegman, R. Behrman, H. Jenson, & B. Stanton (Eds.), *Nelson Textbook of Pediatrics* (19th ed., pp. 649–660). Philadelphia: Saunders Elsevier.

de Kemp, R., Scholte, R., Overbeek, G., & Engels, R. (2006). Early adolescent delinquency. *Criminal Justice and Behavior*, *33*(4), 488–510.

de Looze, M., Harakeh, Z., van Dorsselaer, S. A. F. M., Raaijmakers, Q. A. W., Vollebergh, W. A. M., & ter Bogt, T. F. M. (2012). Explaining educational differences in adolescent substance use and early sexual debut: The role of parents and peers. *Journal of Adolescence*, *35*(4), 1035–1044.

Deptula, D. P., Henry, D. B., & Schoeny, M. E. (2010). How can parents make a difference? Longitudinal associations with adolescent sexual behavior. *Journal of Family Psychology*, *24*(6), 731–739.

DiClemente, R., Wingood, G., Crosby, R., Cobb, B., Harrington, K., & Davies, S. (2001a). Parent-adolescent communication and sexual risk behaviors among African American adolescent females. *Journal of Pediatrics*, *139*(3), 407–12.

DiClemente, R., Wingood, G., Crosby, R., Sionean, C., Cobb, B., Harrington, K., et al. (2001b). Parental monitoring: association with adolescents' risk behaviors. *Pediatrics*, *107*(6), 1363–1368.

Dodge, K. (1983). Behavioral antecedents of peer social status. *Child Development*, *54*(6), 1386–1399.

Dogan, S. J., Conger, R. D., Kim, K. J., & Masyn, K. E. (2007). Cognitive and parenting pathways in the transmission of antisocial behavior from parents to adolescents. *Child Development*, *78*(1), 335–349.

Epstein, M., Bailey, J. A., Manhart, L. E., Hill, K. G., & Hawkins, J. D. (2014). Sexual risk behavior in young adulthood: broadening the scope beyond early sexual initiation. *Journal of Sex Research*, *51*(7), 721–730.

Fechner, P. Y. (2002). Gender differences in puberty. *Journal of Adolescent Health*, *30S*, 44–48.

Fröjd, S., Kaltiala-Heino, R., & Rimpelä, M. (2007). The association of parental monitoring and family structure with diverse maladjustment outcomes in middle adolescent boys and girls. *Nordic Journal of Psychiatry*, *61*(4), 296–303.

Ge, X., Kim, I. J., Brody, G. H., Conger, R. D., Simons, R. L., Gibbons, F. X., & Cutrona, C. E. (2003). It's about timing and change: pubertal transition effects on symptoms of major depression among African American youths. *Developmental Psychology*, *39*(3), 430–9.

Gottfredson, M. R., & Hirschi, T. (1990). *The general theory of crime*. Palo Alto, CA: Stanford University Press.

Hallfors, D. D., Waller, M. W., Bauer, D., Ford, C. A., & Halpern, C. T. (2005). Which comes first in adolescence - sex and drugs or depression? *American Journal of Preventive Medicine*, *29*(3), 163–170.

Hallfors, D. D., Waller, M. W., Ford, C. a, Halpern, C. T., Brodish, P. H., & Iritani, B. (2004). Adolescent depression and suicide risk: association with sex and drug behavior. *American Journal of Preventive Medicinereventive medicine*, *27*(3), 224–31.

Hirschi, T. (1969). *Causes of delinquency*. Berkeley, CA: University of California.

Hoyle, R. H., Fejfar, M. C., & Miller, J. D. (2000). Personality and sexual risk taking: A quantitative review. *Journal of Personality*, *68*(6), 1203–1231.

Hui Yap, M. B., Pilkington, P. D., Ryan, S. M., & Jorm, A. F. (2014). Parental factors associated with childhood anxiety, depression, and internalizing problems: A systematic review and meta-analysis. *Journal of Affective Disorders*, *156*, 8–23.

Jamieson, L. K., & Wade, T. J. (2011). Early age of first sexual intercourse and depressive symptomatology among adolescents. *Journal of Sex Research*, *48*(5), 450–60.

Jessor, R., & Jessor, S. (1977). *Problem behavior and psychosocial development*. New York: Academic Press.

Junger-Tas, J., Terlouw, G., & Klein, M. (1994). Delinquent behaviour among young people in the Western world: first results of the international self-report delinquency study. *Studies on Crime and Justice: A Series from tthe Dutch Research and Documentation Centre.*

Kaltiala-Heino, R., Fröjd, S., & Marttunen, M. (2015). Depression, conduct disorder, smoking and alcohol use as predictors of sexual activity in middle adolescence: a longitudinal study. *Health Psychology and Behavioral Medicine: An Open Access Journal*, *3*(1), 25–39.

Kaltiala-Heino, R., Kosunen, E., & Rimpelä, M. (2003). Pubertal timing, sexual behaviour and self-reported depression in middle adolescence. *Journal of Adolescence*, *26*(5), 531–545.

Kaltiala-Heino, R., Rimpela, M., Rantanen, P., & Laippala, P. (1999). Finnish modification of the 13-item Beck Depression Inventory in screening an adolescent population for depressiveness and positive mood. *Nordic Journal of Psychiatry*, *53*(6), 451–457.

Klein, J. D. (2005). Adolescent pregnancy: current trends and issues. *Pediatrics*, *116*(1), 281–286.

Klimstra, T. A., Hale III, W., Raaijmakers, Q. A. W., Branje, S. J. T., & Meeus, W. H. J. (2009). Maturation of personality in adolescence. *Journal of Personality and Social Psychology*, *96*(4), 898–912.

Kotchick, B. a, Shaffer, A., Forehand, R., & Miller, K. S. (2001). Adolescent sexual risk behavior: a multi-system perspective. *Clinical Psychology Review*, *21*(4), 493–519.

Lehrer, J. a, Shrier, L. a, Gortmaker, S., & Buka, S. (2006). Depressive symptoms as a longitudinal predictor of sexual risk behaviors among US middle and high school students. *Pediatrics*, *118*(1), 189–200.

Lewinsohn, P., Clarke, G., Seeley, J., & Rohde, P. (1994). Major depression in community adolescents: age at onset, episode duration, and time to recurrence. *Journal of American Academy of Child & Adolescent Psychiatry*, *33*(6), 809–818.

Loeber, R., & Dishion, T. (1983). Early predictors of male delinquency: a review. *Psychological Bulletin*, *94*(1), 68–99.

Lohman, B. J., & Billings, A. (2008). Protective and risk factors associated with adolescent boys' early sexual debut and risky sexual behaviors. *Journal of Youth and Adolescence*, *37*(6), 723–735.

Madkour, A. S., Farhat, T., Halpern, C. T., Godeau, E., & Gabhainn, S. N. (2010). Early adolescent sexual initiation as a problem behavior: a comparative study of five nations. *Journal of Adolescent Health*, *47*(4), 389–98.

Markham, C. M., Lormand, D., Gloppen, K. M., Peskin, M. F., Flores, B., Low, B., & House, L. D. (2010). Connectedness as a predictor of sexual and reproductive health outcomes for youth. *Journal of Adolescent Health*, *46*(3 Suppl), S23-41.

Mason, W. A., Chmelka, M. B., Trudeau, L., & Spoth, R. L. (2017). Gender moderation of the intergenerational transmission and stability of depressive symptoms from early adolescence to early adulthood. *Journal of Youth and Adolescence*, *46*(1), 248–260.

Mazzaferro, K. E., Murray, P. J., Ness, R. B., Bass, D. C., Tyus, N., & Cook, R. L. (2006). Depression, stress, and social support as predictors of high-risk sexual behaviors and STIs in young women. *Journal of Adolescent Health*, *39*(4), 601–3.

McCauley, K. L., Shadur, J. M., Hoffman, E. M., MacPherson, L., & Lejuez, C. W. (2016). Adolescent callous-unemotional traits and parental knowledge as predictors of unprotected sex among youth. *Behavior Modification*, *40*(1–2), 70–96.

McCord, W., McCord, J., & Howard, A. (1961). Familial correlates of aggression in nondelinquent male children. *Journal of Abnormal and Social Psychology*, *62*(1), 79–93.

Merikangas, K., Nakamura, E., & Kessler, R. (2009). Epidemiology of mental disorders in children and adolescents. *Dialogues in Clinical Neuroscience*, *11*, 7–20.

Meschke, L. L., Bartholomae, S., & Zentall, S. R. (2002). Adolescent sexuality and parent-adolescent processes: promoting healthy teen choices. *Journal of Adolescent Health*, *31*(6), 264–279.

Miller, B. C., Benson, B., & Galbraith, K. a. (2001). Family relationships and adolescent pregnancy risk: a research synthesis. *Developmental Review*, *21*(1), 1–38.

Moffitt, T. E., & Caspi, A. (2001). Childhood predictors differentiate life-course persistent and adolescence-limited antisocial pathways among males and females. *Development and Psychopathology*, *13*(2001), 355–375.

Moffitt, T. E., Caspi, A., Harrington, H., & Milne, B. J. (2002). Males on the life-course-persistent and adolescence-limited antisocial pathways: Follow-up at age 26 years. *Development and Psychopathology*, *14*, 179–207.

Oman, R. F., Vesely, S. F., & Aspy, C. B. (2005). Youth assets and sexual risk behavior: the importance of assets for youth residing in one-parent households. *Perspectives on Sexual and Reproductive Health*, *37*(1), 25–31.

Oshri, A., Tubman, J. G., & Jaccard, J. (2011). Psychiatric symptom typology in a sample of youth receiving substance abuse treatment services: associations with self-reported child maltreatment and sexual risk behaviors. *AIDS and Behavior*, *15*(8), 1844–56.

Patterson, G. R., DeBaryshe, B., & Ramsay, E. (1989). A developmental perspective on antisocial behavior. *American Psychologist*, *44*, 329–335.

Patterson, G. R., Dishion, T. J., & Bank, L. (1984). Family interaction: A process model of deviancy training. *Aggressive Behavior*, *10*(3), 253–267.

Patton, G. C., Coffey, C., Romaniuk, H., Mackinnon, A., Carlin, J. B., Degenhardt, L., et al. (2014). The prognosis of common mental disorders in adolescents: a 14-year prospective cohort study. *Lancet*, *383*, 1404–11.

Raitasalo, R. (2007). *Mood questionnaire. Finnish modification of the short form of the beck depression inventory measuring depression symptoms and self-esteem. Studies in social security and health, 86*. Helsinki.

Ramrakha, S., Caspi, A., Dickson, N., Moffitt, T. E., & Paul, C. (2000). Psychiatric disorders and risky sexual behaviour in young adulthood: cross sectional study in birth cohort. *British Medical Journal*, *321*(7256), 263–6.

Rubin, A., Gold, M., & Primack, B. (2009). Associations between depressive symptoms and sexual risk behavior in a diverse sample of female adolescents. *Journal of Pediatric and Adolescent Gynecology*, *22*(5), 306–12.

Santelli, J. S., Lowiy, R., Brenei, N. D., & Robin, L. (2000). Association of sexual behaviors with socioeconomic status, family structure, and race/ethnicity among US adolescents. *American Journal of Public Health*, *90*(10).

Savioja, H., Helminen, M., Fröjd, S., Marttunen, M., & Kaltiala-Heino, R. (2015). Sexual experience and self-reported depression across the adolescent years. *Health Psychology and Behavioral Medicine*, *3*(1), 337–347.

Savioja, H., Helminen, M., Fröjd, S., Marttunen, M., & Kaltiala-Heino, R. (2017a). Parental involvement, depression, and sexual experiences across adolescence: a cross-sectional survey among adolescents of different ages. *Health Psychology and Behavioral Medicine*, *5*(1), 258–275.

Savioja, H., Helminen, M., Fröjd, S., Marttunen, M., & Kaltiala-Heino, R. (2017b). Delinquency and sexual experiences across adolescence: does depression play a role? *European Journal of Contraception & Reproductive Health Care*, *22*(4), 298–304.

Schwartz, O. S., Dudgeon, P., Sheeber, L. B., Yap, M. B. H., Simmons, J. G., & Allen, N. B. (2012). Parental behaviors during family interactions predict changes in depression and anxiety symptoms during adolescence. *Journal of Abnormal Child Psychology*, *40*(1), 59–71.

Stanton, B., Li, X., Pack, R., & Cottrell, L. (2002). Longitudinal influence of perceptions of peer and parental factors on African American adolescent risk involvement. *Journal of Urban Health*, *79*(4), 536–548.

Stattin, H., & Kerr, M. (2000). Parental monitoring: a reinterpretation. *Child Development*, *71*(4), 1072–1085.

Steinberg, L. (2001). We know some things: parent-adolescent relationships in retrospect and prospect. *Journal of Research on Adolescence*, *11*(1), 1–19.

Steinberg, L. (2005). Cognitive and affective development in adolescence. *Trends in Cognitive Sciences*, *9*(2), 69–74.

Tubman, J., Windle, M., & Windle, R. C. (1996). Cumulative sexual intercourse patterns among middle adolescents: problem behavior precursors and concurrent health risk behaviors. *Journal of Adolescent Health*, *18*, 182–191.

Upchurch, D., Aneshensel, C., Sucoff, C., & Levy-Storms, L. (1999). Neighborhood and family contexts of adolescent sexual activity. *Journal of Marriage and the Family*, *61*(4), 920–933.

Upchurch, D., & McCarthy, J. (1990). The timing of a first birth and high school completion. *American Sociological Review*, *55*(2), 224–234.

Van Loon, A. J. M., Tijhuis, M., Picavet, H. S. J., Surtees, P. G., & Ormel, J. (2003). Survey non-response in the Netherlands: Effects on prevalence estimates and associations. *Annals of Epidemiology*, *13*, 105–110.

Wang, B., Stanton, B., Li, X., Cottrell, L., Deveaux, L., & Kaljee, L. (2013). The influence of parental monitoring and parent-adolescent communication on Bahamian adolescent risk involvement: A three-year longitudinal examination. *Social Science & Medicine*, *97*, 161–169.

White, C., & Warner, L. (2015). Influence of family and school-level factors on age of sexual initiation. *Journal of Adolescent Health*, *56*(2), 231–237.

Wight, D., Williamson, L., & Henderson, M. (2006). Parental influences on young people's sexual behaviour: a longitudinal analysis. *Journal of Adolescence*, *29*(4), 473–94.

Wolff, J. C., & Ollendick, T. H. (2006). The comorbidity of conduct problems and depression in childhood and adolescence. *Clinical Child and Family Psychology Review*, *9*(3–4), 201–20.

World Health Organization (1992). *The ICD-10 classification of mental and behavioural disorders: Clinical descriptions and diagnostic guidelines*. Geneva; World Health Organization.

Young, E. W., Jensen, L. C., Olsen, J. A., & Cundick, B. P. (1991). The effects of family structure on the sexual behavior of adolescents. *Adolescence*, *26*(104), 977.

Yu, S., Clemens, R., Yang, H., Li, X., & Stanton, B. (2006). Youth and parental perceptions of parental monitoring and parent-adolescent communication, youth depression, and youth risk behaviors. *Social Behavior and Personality*, *34*(10), 1297–1310.

Zhang, S., Benson, T., & Deng, X. (2000). A test-retest reliability assessment of the international self-report delinquency instrument. *Journal of Criminal Justice*, *28*(4), 283–295.

Zheng, Y., & Cleveland, H. H. (2013). Identifying gender-specific developmental trajectories of nonviolent and violent delinquency from adolescence to young adulthood. *Journal of Adolescence*, *36*(2), 1–19.