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Publication date: 2019

Document Version
Peer reviewed version

Citation for published version (Harvard):
Currie, C 2019, 'Applying a bio-ecological framework to increase understanding of the determinants of adolescent sexual and reproductive health', Frontiers in Global Reproductive Health.

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Download date: 24. Apr. 2020
Applying a bio-ecological framework to increase understanding of the determinants of adolescent sexual and reproductive health

Positive sexual and reproductive health (SRH) in adolescence is fundamental to a good quality of life. Young people who have positive interpersonal relationships and sexual experiences are more likely to grow through adolescence to have good reproductive health. SRH is critical to general health and wellbeing during adolescence and is likely to contribute not only to the health and well-being of individuals, but also of families, communities and nations. Social and emotional health and well-being of adolescents also impacts on SRH as mediated through self-worth and self-esteem, body pride and self-identity. Adolescents with positive mental well-being are more likely to possess assets such as problem-solving skills, social competence and sense of identity, all of which enable them to negotiate relationships, sexual encounters and SRH services. However, beyond this individual perspective, it is vital to consider the wider social, cultural, economic and political contexts within which adolescents live their lives and experience their SRH in order to understand the risks for poor SRH and what policies, practices and services can be put in place to optimise SRH.

There is still an incomplete understanding of the complexity of factors that impinge on adolescent SRH and how these interact to shape outcomes in various contexts and environments within which adolescents are living. A complex set of interacting factors underlies the explanation for why some young people negotiate a healthy pathway through adolescence and experience positive SRH while others suffer negative experiences and poor SRH outcomes.

Adolescence is defined by the United Nations as the period between the ages of 10 and 19; this group numbers around 1.2 billion making up 16 per cent of the world's population. It is a key phase in the life course that can be defined by the biological process of puberty which begins as early as 9 or 10 years and can extend to the late teens. Indeed, the latter stages of puberty in males can continue to around 18 years and growth in height and body size until their early 20s. Puberty is central to reproductive health since it is the process by which biological maturation is achieved and demarcates childhood from adulthood. During puberty, adolescents are immersed in a complexity of changes to their physical selves, cognitive function, emotional range, impulsivity, desire for risk taking and hormonal function (Patton and Viner 2007). These changes affect their health-related behaviour, well-being, social and gender identity, social relations and ability to concentrate and learn (Currie, 2019a). In particular, the SRH of adolescents is intrinsically determined by the pubertal process.

There are known to be a very wide range of social, cultural, economic and political determinants that impact upon the SRH of adolescents and an abundance of scientific articles have been published to provide a rich but nevertheless disparate evidence base on the subject. The aim of this section focusing on Adolescent Reproductive Health and Well-being is to gather papers that fill in the current gaps in knowledge, introduce new perspectives, point to needed innovations in research, and indicate interventions, programs, policies and practice, to improve outcomes. In order to learn from research, identify emerging new ideas, and indicate where further evidence is required, this paper proposes the use of a bio-ecological framework. With such a framework the aim is to be able to organise and synthesise evidence on determinants of adolescent SRH. This would take into account how young people live their lives and experience their SRH within the context of
wider society, and the social and structural domains they inhabit. Furthermore, it should help to inform the design of interventions, programmes and practice to improve adolescent SRH.

What is good and poor SRH in adolescence?

It is clear from the literature that multiple understandings exist of what good and poor SRH is during adolescence. This is partly due the moral and political nature of some of the debates that surround subjects such as sex education, contraceptive use, SRH services, female genital mutilation and abortion. It is also related to the different disciplinary perspectives on adolescent SRH coming from academics working in fields such as sociology, psychology, medicine, anthropology, public health, epidemiology, policy and evolutionary biology. Added to this are the more recent cross-disciplinary perspectives including human behavioural ecology and evolutionary anthropology. Perspectives also differ on what is considered culturally acceptable SRH behaviour for adolescents. This depends on where the adolescent is growing up in the world and what social, economic, racial, religious, native versus migrant group as well as other defining strata, such as sexuality and sexual identity; and whether of a member of an indigenous or non-indigenous population. We need all these perspectives to have a deep integrated understanding of what healthy/ unhealthy SRH looks like for different adolescents growing up in different environments in different parts of the world.

Indicators of adolescent SRH

Temmerman et al. (2006) proposed a range of SRH indicators for the European Region and of the 14 most are appropriate for the adolescent age group. It is suggested these include: Core Indicator 1a: acceptance of HIV testing among pregnant women and 1b: HIV seroprevalence among HIV tested pregnant; 2: chlamydia prevalence; 3: reported condom use at last high-risk sexual contact; 4: median age at first intercourse; 5: proportion of contraceptive use at first intercourse; 6: age-specific birth rates in teenagers; 7: contraceptive prevalence; 8: maternal age at first childbirth; 9: total fertility rate; (10: proportion of women trying to get pregnant for 1 year or more; 11: proportion of deliveries associated with assisted reproductive technology); 12: frequency of induced abortions. Those in parentheses may be less relevant in some societies or only at the higher end of the adolescent age range.

To this list Avery and Lazdane (2010), taking a more adolescent specific perspective, would add: pregnancy rate, age at first sexual intercourse, contraceptive use at first and last intercourse, contraceptive prevalence, HIV knowledge, and STI rates.

Taking a global perspective, Bearinger et al (2007) identify the particular SRH risks for adolescents growing up in low income settings in low income countries. Very early sex is not uncommon in such contexts and creates particular SRH risks due to the biological immaturity of reproductive and immune systems of adolescent girls. These translate to increased susceptibility to STIs and HIV transmission; early pregnancy and delivery. Other risks stem from societal, cultural and gender norms in these settings and include large age differences between heterosexual partners (younger girl and older male partner), expectations of early sexual involvement among boys that is conversely negatively sanctioned for girls, and early marriage for girls with potential for sexual coercion. Furthermore, some young adolescents experience social and economic pressure to become
sex workers bringing the heightened risk of STIs, pregnancy, and violence; and avoidance of health services for fear of being judged or stigmatised.

While the negative aspects of adolescent SRH are well defined, rather little is written about positive sexual or reproductive health experiences of adolescents yet these are very important dimensions of SRH to be taken into account in a holistic approach. Further research is needed to develop our understanding of this aspect of adolescent SRH.

**Conceptual Framework**

The conceptual perspective proposed for the purpose of framing adolescent SRH is based on Bronfenbrenner’s (1992) systems' theory, in which adolescent SRH and SRH related behaviours would be considered as embedded in the context of the social micro-systems of family, peers, and school; themselves embedded in meso-, macro-, exo and chrono-systems. A later adaptation of the framework is called the bio-ecological or ‘process person context time’ model which critically acknowledges the relevance of biological and genetic aspects of the individual and also the personal characteristics that individuals bring with them into any social situation (Figure 1) (Bronfenbrenner and Ceci, 1994). The development stage of the individual is included which is key as it allows the pubertal process, an integral determinant of SRH, to be taken into account.

**Figure 1: Bronfenbrenner’s Bio-Ecological Model of Human Development**
An inequalities perspective

The bio-ecological framework also allows for the integration of an inequalities perspective on adolescent SRH. This is important since social inequalities in SRH are commonplace and there is a large body of literature addressing this issue (Varga, 2003; Gutiérrez et al., 2019; Madkour et al., 2014). Inequalities in SRH can operate at different levels in the system. For example, family can be considered to represent a socioeconomic context related to parental income, occupation and economic assets. Community and nation likewise can be considered as socioeconomic contexts which can influence the SRH of adolescents, related to wealth and income inequalities that affect their lives. As well as socioeconomic measures other demographic factors including sex, age, and developmental stage of puberty, migrant status and other personal characteristics may also be included in the inequalities perspective.
Applying a bio-ecological framework to determinants of adolescent SRH

The proposed framework has been previously successfully used to organise and synthesise research evidence on the determinants of adolescent mental health stemming from the published work over 35 years of the Health Behaviour in School-Aged Children (HBSC) Study (Currie, 2019b). The way in which this approach can be applied to adolescent SRH research evidence will now be demonstrated. Moving outwards from the centre of the bio-ecological model in Figure 1, examples, where available, from the published literature will be used to populate each level. This is not intended to be an exhaustive presentation of all relevant literature but is aimed at being illustrative of the value of applying a bio-ecological framework.

Individual level

**Developmental patterns**

As Currie (2019a) points out, development is not the same as ageing therefore both age differences and patterns associated with pubertal timing need to be considered in relation to SRH. Age is clearly a factor in sexual debut but so is puberty and early maturing adolescents are more likely to have early sex and have risky sex (Downing et al., 2009).

**Associations between SRH and other aspects of health:**

There is an intricate link between SRH and mental health and poor SRH is known to be associated with worse mental health in adolescence (Kaltiala-Heino et al., 2003). Less is known about the benefits to mental health of positive SRH in adolescence.

**Associations between SRH and health/ risk behaviour:**

Adolescents with early puberty are more likely to begin to be sexually active at a younger age which places them at risk due to their psychological and social immaturity. They are also more likely to participate in other risk behaviours, with alcohol and drug use placing them at sexual risk (Downing et al., 2009).

**Micro-contextual relationships between SRH and family, peer and school social environments:**

**Family relationships, peer relationships, school environment**

Most research points to the value of positive relationships in the key social contexts that adolescents inhabit for reduction in SRH risk and promotion of positive SRH and there is an abundance of published work available for synthesis.

**Social inequalities**

**Socioeconomic inequalities in SRH**
There has been considerable attention of the impact of socioeconomic status / circumstances to adolescent SRH. Most outcomes are less favourable for those young people living in economic hardship; for example, Neville et al. (2018) find low family affluence males and females were less likely to use condoms than those from high affluence families. Teen births are known to be patterned by SES and one US study found that birth rate was affected by both poverty and income inequality (Gold et al., 2002).

**Gender inequalities in mental health**

*Sex/gender differences, gender norms/ sexuality effects, sexual identity/ orientation effects*

Gender is a key theme is research into adolescent SRH as there are widespread differences and inequities. This is a burgeoning global literature that needs to be organised and synthesised to draw out the key influences on adolescent SRH. A recurring theme is how the gender patterns in SRH are reflected in national level indicators of gender equality (see below). In Europe, cross-national variation in extent and patterning of gender differences in sexual behaviour have been charted by the Health Behaviour in School-Aged Children Study (HBSC) across many countries and over decades (Currie et al., 2000; 2004; 2008; 2012; Inchley et al., 2016).

**Native/ Migrant inequalities in adolescent SRH**

Another source of SRH inequality in adolescence is related to migrant status and migrant identity. Rather little research is available in this important area.

**Intersectional influences**

There is growing interest in the effect on SRH of belonging to multiple social demographic groups according to adolescent age, gender, socioeconomic status, sexuality and other group characteristics (Martinez et al., 2008). This research into the effects of being a member of intersecting social groups is in its infancy but is extremely important to the understanding of adolescent SRH in contemporary society where individual hold several social identities. It is thought that these may not simply have additive contributions to inequalities but rather interacting effects.

**Macro-level influences on SRH**

The HBSC Study has examined the role of national indicators of inequality - income, gender, migrant policy to attempt to understand the impact these macro-level characteristics have on adolescent health and wellbeing. With respect the SRH, one paper has shown that contraceptive use varies according to gender equality indices at the national level (de Looze et al., 2019). While to date national level income inequality and migrant policies have not been included in analyses of SRH inequalities with HBSC data, there is evidence that inequalities in other dimensions of adolescent health are influenced by national characteristics (Levin et al., 2010).
Exosystem

Cultural and social norms

The Global Early Adolescence Study which examines the sexual health of adolescents in countries from every continent has found that gender norms and beliefs have significant implications for both girls and boys. For girls, these national/local societal patterns can have may impact on the SRH of young girls such that they are greater risk of early marriage, premature school leaving, young teen pregnancy, HIV and sexually transmitted infection risk (Blum et al., 2017).

Chronosystem

Understanding how national and global economic, social, policy and political trends may influence adolescent SRH can only be achieved by charting time trends and examining the relationship between the macro-levels societal factors and the sexual and reproductive wellbeing of young people.

Interventions, programs, policies

Efforts to reduce SRH risk, reduce poor outcomes and positively enhance adolescent SRH could potentially be designed to operate at any of the levels in the bio-ecological framework. Using this framework it will be possible to map examples of successful (and unsuccessful) programs that address individual behaviour; operate through the school, family, peer group or community context (or combinations of these); at the national level, in terms of services or policies; or even regionally/globally in terms of laws in UN charters about adolescent SRH rights. It may also be possible to identify the need for action at higher levels than the one targeted.

Conclusion

Applying a bio-ecological framework to understanding the determinants of adolescent SRH at global, national and local levels provides a useful way to organise and synthesise research evidence, identify gaps in knowledge, provide ideas for new research, and evaluate why interventions to improve adolescent SRH may be successful or unsuccessful as well as indicate where operating at another system level may provide improvements. The journal section will aim to provide a reflective approach to the research it publishes, and regularly produce special topic collections with commentary that takes forward the systematic management of knowledge to achieve a deeper insight into the factors that shape adolescent reproductive health and well-being.

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