Background

Attainment of sexual maturity is an integral aspect of developmental transition from youth to adulthood. The percentage of Taiwanese college students who have had a sexual experience has increased from less than 10% in 1979 to 36% in 2007 (Yen, Liu, & Cheng, 2009). Prior research suggests that adolescents' early sex debut is associated with negative mental health symptoms (Hallfors et al., 2004) and health consequences, such as sexually transmitted diseases and unexpected adolescent pregnancy (Ma et al., 2009; Madkour, Farhat, Halpern, Godeau, & Gabhainn, 2010; Smith, 1997). Other studies have documented strong associations between early sex debut and other deviant behaviors such as substance use, prompting suggestions that early sexual debut is an indicator of an underlying problem behavior syndrome (Madkour et al., 2010; Whitbeck, Yoder, Hoyt, & Conger, 1999). A cohort study of over 2000 Taiwanese adolescents showed that adolescent smoking was significantly associated with premarital sexual activity among males (Chiao, Yi, & Ksobiech, 2012). Therefore, an understanding of risk predictors of early sex experience among Taiwanese adolescents is essential for the prevention of consequential health and social problems.

Previous studies have identified numerous correlates of adolescent early sex onset, most of which have focused on one or two social systems, such as family (Longmore, Manning, & Giordano, 2001), school (Whitbeck et al., 1999), peer (Killoren, Updegraff, Christopher, & Umaña-Taylor, 2011), or neighborhood factors (Browning, Leventhal, & Brooks-Gun, 2005). A broader theoretical model, which simultaneously examines risk factors at all levels of social systems, will likely improve the predictability of timing of first intercourse (Crockett, Bingham, Chopak, & Vicary, 1996). In this regard, Bronfenbrenner's ecological systems theory (Bronfenbrenner, 1979) provides a broad framework by which one may

comprehend the dynamic of influences from different social systems.

According to Bronfenbrenner's ecological systems theory, the ecology of human development involves four system levels which may influence human behavior (Bronfenbrenner, 1979). The first is the micro-system involving an individual's characteristics and roles in any setting (such as family). Micro-system factors often included age, mood and behavioral disorder, risk-seeking attitudes, or substance use (Corcoran, 1999; Voisin, DiClemente, Salazar, Crosby, & Yarber, 2006). The second is the meso-system involving variables related to peers, family, school, and community which provide the social context for direct interaction with others (Corcoran, 1999; Voisin et al., 2006). The third is the exo-system, the settings within which the individual does not interact directly but that, however, may have an effect on the individual's development, such as parent's workplace. Factors at the exo-system system level are, however, usually unspecified in prior adolescent sex studies. The final system is the macro-system, which include factors such as race, socioeconomic status, or gender norms (Chen, 2005; Corcoran, 1999; Van Horne, Wiemann, Berenson, Horwitz, & Volk, 2009; Voisin et al., 2006).

Reviews of the studies on adolescent sexual activity in general suggest that antecedents of adolescents' sex initiation are distributed across multi-levels of social systems, including individual, family, school, peer, and neighborhood factors (Corcoran, 1999; Kirby, 2002; Kotchick, Shaffer, Miller, & Forehand, 2001; Markham et al., 2010; Zimmer-Gembeck & Helfand, 2008). However, very few empirical studies have examined simultaneous effects of multi-level social systems on adolescent sexual activity. Moreover, much less is known about racial and gender differences in these processes (Zimmer-Gembeck & Helfand, 2008).

The lifecourse developmental perspective suggests that the social meaning of sexual initiation may be contingent upon racial/ethnic culture, gender-specific norms, and sex attitude of members in the adolescents' proximal social environments, including family, school, and peer networks (Whitbeck et al., 1999).