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Father Absence and Early Family Composition as a Predictor of Menarcheal Onset: Psychosocial and Familial Factors That are Associated with Pubertal Timing.

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Father Absence and Early Family Composition as a Predictor of Menarcheal Onset:
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In partial fulfillment
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Master of Arts in Marriage and Family Counseling

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by
Amanda C. Healey
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ABSTRACT

Father Absence and Early Family Composition as a Predictor of Menarcheal Onset:
Psychosocial and Familial Factors that Mitigate Pubertal Timing

by

Amanda Healey

Father absence and the introduction of a stepfather before menarche have been shown to

contribute to the early onset of menarche. The present study analyzes the effects of father

absence situations that tend to result on the onset of menarche. Presence of a related male in a

father-absent homes is also considered as a protective factor for menarcheal onset. Participants

consisted of 342 female students enrolled in undergraduate work at a southeastern university.

The mean age of participants was 20.7 years. Participants completed a survey consisting of 12

questions pertaining to their family environment before menarche. Participants were asked to

give their age at first menarche in years and months. Results indicted a significant difference in

menarcheal age between those from homes where both biological parents were present and those

where the biological father was absent before menarche. No other significant results were found.

Implications for future research discussed.

ACKNOWLEDGEMENTS

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CHAPTER 1

INTRODUCTION

Statement of the Problem

This study analyses the connection between familial stress, specifically father absence and stepfather introduction occurring before first menstruation, on the commencement of menarche. In addition to these factors, the presence of a related adult male in the home during the period of father absence is considered as a possible contributing factor to variance in pubertal timing. Previous research has shown that father absence, the introduction of a stepfather, and other stressful events in the childhoods of women tend to lead to the early onset of puberty and menarche. This is thought to have been adaptive on an evolutionary scale to best serve the continuation of the family and is thought to act on a separate mechanism than physical stress (malnutrition, disease, intensive exercise), which has been shown to delay menarche (Golub, 1983). It has also been shown in previous studies that divorce and socioemotional stressors (conflictual family relationships, psychopathology, etc.) also seem to involve mechanisms associated with earlier onset of menarche (Ellis & Garber, 2000).

Currently, some factors associated with early onset of menarche have been suggested, such as psychopathology of the mother (Ellis & Garber, 2000), birth order of the children (Chasiotis, Keller, & Scheffer, 2003), and presence of unrelated adult males (Ellis & McFayden-Ketchum, 1999). This study is an attempt to assess only father absence, the presence of unrelated adult males in a father-absent home, and whether the presence of related adult males in a father-absent home plays a stabilizing role in the onset of puberty so that the timing is similar to those who are in homes where the biological father is present. Onset of menarche will be assessed as a single dependent factor in relation to the aforementioned influences. Genetic

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effects will also attempt to be assessed by inquiring about the mother's onset of menarche through questioning of the participant. Because this may be unknown to the participant, questions regarding the mother's age at first marriage and age at first childbirth will be asked. Age at first marriage and first birth have been shown to have a high correlation to early menarche in previous studies and are used here to help determine if the mother did have early menarche, as genetics are thought to explain up to 15% of the variance in menarcheal age (Surbey, 1990). If such stressful family situations, in some significant way, influence the early onset of menarche in girls and, in turn, early and unstable relational and family development, perhaps the cycle of dysfunction in families can be better understood from an evolutionary perspective.

Null Hypothesis

The hypotheses of this study rest on many factors considered in three suppositions.

Hypothesis I. Women from father-absent homes will have experienced earlier menarche than women from father-present homes.

Hypothesis II. Women from father-absent homes who had an unrelated adult male living in the home will have experienced earlier menarche than both women from father-present homes and women from father-absent homes without another related adult male present.

Hypothesis III. Women from father-absent homes who had a related adult male present will have experienced later menarche than women from father-absent homes without a related adult male present.

Null Hypothesis. Factors such as father absence and introduction of unrelated adult males into a father-absent home will have no effect on menarcheal timing and that due to this lack of effect,

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the presence of a related adult male in the father-absent home will be irrelevant as a mitigating factor for pubertal timing as would the presence of unrelated males in the home.

Review of Literature

The role of psychosocial factors in the onset of menarche is extensive. This study focuses on the psychosocial factors of father absence, step-father or other unrelated male presence in the home, general family stressors, and touches on the effects of having an older related male in the home and how these influence the early or late onset of menarche for those girls in a home where the father is absent. The quality of the relationships between the child and the paternal male figure are not assessed or considered in this study. However, the length of the father figures presence in the home is used as a frequency indicator of the child's contact with related and unrelated males. The presence of unrelated males in the home has been shown to cause menarcheal onset to occur earlier, as has father absence. The reasons for this have been considered in multiple theoretical views, all centering under the umbrella of Life History Theory, especially as it was formulated by Belsky, Steinberg, and Draper (1991), which is based on parental investment, attachment, and evolutionary theory. This study draws its theoretical orientation from seminal views developed by Belsky et al. and later refinements and additions made by other researchers, the most recent of which is Ellis's (2004) child development theory. The development of Belsky's theory and its pertinence to the progression and onset of menarche is made clear through an understanding of evolutionary postulations and known biological processes.

Process of Menarche and Pubertal Timing

Menarche typically begins when a girl is somewhere between the ages of 10 and 16 years old, with the average onset occurring around the age of 12 years and 8 months in the United

States and at a similar time in most European countries. The neuro-chemical process of menstruation begins in the brain, specifically the cerebral cortex moving to the hypothalamus and then to the pituitary gland (Minkin & Wright, 2003). Hormones are then produced by the pituitary gland, which leads to the production of follicles in the ovaries, which then, ultimately, lead to menstruation. There are two widely agreed upon stages of menarche. The first is adrenarche and the second stage is gonadarche. During adrenarche androgens in the body begin to rise producing the first signs of puberty (hair growth, breast development, etc.) during the fifth and seventh year of life. Adrenarche then overlaps with gonadarche, which occurs at around ages 9 or 10 in girls. Gonadarche is the stage at which the production of the hormones necessary for menarche and fertility are produced.

Menarche typically occurs when a certain body fat to height ratio is reached that is necessary to maintain menstrual cycles. Poor diet, disease, poverty, and physical stress have all been linked with delayed menarche (Golub, 1983). This has been shown in research studies by Ellison (1990, 2001) and others and is consistent with energetics theory, which addresses the issue of physical stress and postulates that poor health and nutrition lead to a delay in menarche as the body focuses its energy on survival rather than growth and reproduction. This theory is not disputed by Belsky and other life history theorists. The age at which a mother begins menarche has also been shown to contribute to the age at which her daughter will experience menarche (Golub, 1983). Not only do physical and genetic factors play a role in menarche, but it seems that various psychological and social factors are also very significant in determining the onset of menarche (Belsky et al., 1991). This study attempts to look at both genetic and environmental factors of menarcheal onset while relying on several theoretical frameworks to guide what factors are researched and scrutinized and the degree to which genetics and

psychosocial environment may influence menstruation and pubertal timing for development of expected outcomes.

Life History Theory and Belsky

The evolutionary theory of socialization and interpersonal development suggested by Belsky et al. (1991) provides the theoretical basis for investigation in this study. The theory was developed from two earlier theories. Trivers (1974) proposed a parental investment theory which basically stated that the parenting behavior influenced the future pair-bonding behavior in terms of lasting involvement when engaged in intimate relationships, and parenting style of the children. This was expanded upon by Draper and Harpending (1982) who focused specifically on the role of the father, in that children growing up in father-absent homes develop a reproductive strategy in which paternal care and investment in child rearing is not expected. These theories have been developed and amalgamated into what is known as life history theory, which attempts to explain how environmental conditions in childhood influence a genetic predisposition that initiates or delays puberty and in turn the reproductive strategy of an individual or group of individuals. It is assumed that evolution has designed humans to change their reproductive behavior according to environmental or contextual conditions so as to maximize reproductive success. This assumption is based on processes found in many animal species. One of these studies was conducted by Steinberg (1988) on primates and found that pubertal maturation is associated with distance, be it physical or emotional (i.e. aggressive), in the parent-child relationship. It has also been found that when pre-pubertal juvenile primates were forcibly separated from the parent, reproductive maturity rapidly develops (Evans & Hodges, 1984).

The theory developed by Belsky et al. (1991), which has come to be referred to as psychosocial acceleration theory, attempts to meld evolutionary thought with socialization and interpersonal development. According to this theory, the family environment to which the child is exposed during the first 5 to 7 years of life (before onset of adrenarche) determines not only the onset of puberty and menarche but also the internal model of the child concerning relationships, others, and themselves into adolescence and adulthood. In order for an individual to successfully reproduce, that individual must first direct energy toward three things: growth and development, mating, and parenting. When a child is exposed to one or a combination of environmental stressors, such as low socioeconomic status, parental conflict, and negative rearing patterns, the result will be an early onset of puberty and the internalized view that they are unlovable, that others are not to be depended on, and relationships are unreliable and brief (Belsky et al.). This early family environment serves to push reproductive effort into growth, development, and mating rather than toward parenting. This is believed to have been beneficial from an evolutionary perspective in that a child faced with inadequate parenting and an unstable environment, and hence less probability of survival, would be more likely to extend his or her genes into the next generation by reaching reproductive ability earlier.

The assumption is that genetic polymorphism (which refers to multiple genes responding independently to a given environment to produce varying results for a single phenotype) plays a role in the onset of puberty. This supposes that individuals are genetically predisposed to one developmental pathway over another given certain environmental conditions and that the genetic reaction to environmental conditions is different from one individual to the next in that each person may have a different threshold of susceptibility to the same environmental factors. In other words, nature determines the likelihood and extent to which an individual is influenced by

a particular set of environmental conditions and nurture determines the direction development takes (Belsky et al., 1991). Therefore, girls who are exposed to families of origin that involve fairly high levels of socioemotional stress will develop more quickly in terms of pubertal maturation and those from families of low stress conditions will have later pubertal maturation. In summation, Belsky focuses on the quality of parental investment, the relationship of the parent towards one another and towards their children, father absence, and socio economic status as indicators of the home environment and how these variables affect the outcome of the child's behavioral development in terms of pair-bonding, sexual activity, and their future parental investment towards their children. Belsky sees these variables as affecting the onset of puberty and resulting menarche, which in turns directly affects the predicted outcomes. It should be noted that these predicted outcomes are seen as an internalized response to environmental conditions and therefore not a conscious or calculated response. Currently, there are two additional theories in use, derived from Belsky's theory and based on the life history approach. These two theories serve to further clarify and add to Belsky's position and also serve to predict or amend certain behavioral outcomes. [See Table 1 for a brief outline of these theories as they relate to one another, including theories involving the effects of physical stress on menarche.]

The first of these theories to be based on Belsky is the paternal investment theory, which is very similar to the core belief of Belsky's theory and helps to further clarify Belsky's father absence variable, focusing on the special role fathers play in the development of their daughters. It is believed that the biological father, and other men who may serve a paternal role, affect the regulation and onset of sexual development of girls exclusive of other environmental factors in the family. It focuses specifically on the father's role and the mother's sexual attitudes and behavior towards men. This theory looks at several variables with regards to the father-daughter

relationship including whether or not he is present in the home, the quality of the father's relationship with the mother, and the frequency of father-daughter interaction. This theory postulates that early experiences associated with low quality paternal investment will result in the acceleration of pubertal maturation and an onset of sexual activity orienting towards unstable pair-bonds. Step fathers and other unrelated men in the home serve as indicators of low quality paternal investment and the mother's sexual attitude and behavior (Ellis, 2004).

Studies have been conducted to show the validity of this theory in terms of the acceleration of menarche in girls. Ellis and Garber (2000), in a study that included 87 adolescent girls and their mothers from a metropolitan American city, found that both father absence together and the presence of unrelated males in the home before adrenarche resulted in earlier menarche. Surbey (1990), drawing on a sample of 1,247 subjects and a review of data from previous studies, found that father absence seemed to act as an accelerant of pubertal timing in girls. These studies also showed the role of general family stress, low SES, and divorce as predictors of early pubertal timing.

Possible mechanisms for this effect have been considered. These include the idea that social cues related to the importance of paternal investment in child rearing may affect the expectations for relationship stability that the child will have in the future. This learned expectation is thought to activate unknown physiological mechanisms that trigger earlier menarche. The first 5 to 7 years of life are seen as a sensitive period for activation of this mechanism. There is also evidence that male pheromones may play a role in the regulation of a woman's reproductive functioning (Stern & McClintock, 1998). Pheromones are social-environmental chemical stimuli (similar to odors) and are produced by one individual and typically detected by another of the same species. The purpose of pheromones is to produce a

physiological and behavioral change expected to benefit both individuals involved. Those

stimulated by pheromones may not be consciously aware of their response to it. There has been

evidence from human studies that suggest pheromones influence the gonadotropin releasing

hormone (GnRH), which is the precursor hormone involved in stimulating and the cycling of

menstruation (Minkin & Wright, 2003). In a now famous studies conducted by McClintock

(1971, 2004) it was found that human ovarian function can be synchronized by pheromone

excretion from other women within the same air supply of one another. In later studies, this

finding was verified by using frozen sweat excretions to alter the menstrual cycle of female

participants who allowed themselves to be exposed to the excretions taken from different points

in the donor's menstrual cycle. A study conducted by Weisfeld, Czilli, and Phillips (2003)

involving 40 adults and 37 children found that when exposed to sweat excretions from family,

acquaintances, and strangers, recognition of parents and biological full siblings occurred

significantly higher than chance with significant sibling recognition occurring between those of

the opposite gender, which was thought to be a development to prevent incest. McClintock,

Jacob, and Zelano (2002) also conducted another study that found women could discern

differences in the human leukocyte antigen (HLA) of different male donors and tended to choose

those donors based on the HLA alleles they inherited from their father's genome, but not their

mother's.

Another explanation concerns heritable differences in reproductive strategy resulting

from genetically derived traits. Comings, Muhleman, Johnson, and MacMurray (2002) proposed

that the effect of father absence could be passed on genetically. He found that fathers carrying

an X-chromosome linked androgen receptor (AR) gene were more likely to abandon a marriage.

In turn, the carrier men could then pass this gene on to their daughters, which may then produce

an earlier age of menarcheal onset and behavioral problems. In the results of this study, which involved 121 males and 164 females, a significant association was found between presence of a specific combination of the AR gene and a range of measures of impulsivity and aggression and increased number of sexual partners in males and paternal divorce, father absence, and early age of menarche in females. Belsky (2000) proposed that the genetic and environmental models could both be correct in that the timing of puberty may be primarily genetic for some individuals but not for others and that different proportions of individuals may or may not be susceptible to a particular environmental experience. The individual response would be due to not only the genes they inherited, but the genetic polymorphism present within those genes combined with the environment they are exposed to over their childhood.

Child development theory proposed by Ellis (2004), as an addendum to Belsky, attempts to resolve the evolutionary critiques of Belsky by suggesting that those previous theories reach too far in linking parental investment to the pair-bond stability of the child after sexual maturation. This theory does not depart in any way from the predictions of Belsky concerning what environmental factors in childhood would lead to post-pubertal outcomes of early menarche; rather it departs in the predicted outcomes of early menarche. Pubertal timing is reconceptualized as an "end point of a developmental strategy that conditionally alters the length of childhood in response to the composition and quality of family environments (Ellis, 2004)." Rather than viewing pubertal timing as part of an integrated reproductive strategy, as Belsky does, it is reconceptualized in terms of a developmental strategy that alters length of childhood in response to family environments and in turn affects timing of sexual activity and reproduction but does not predict effects on mating and parenting. Therefore, childhood is extended in high quality social environments and shortened in adverse social environments. Earlier pubertal

timing has been shown to predict earlier onset of sexual activity and reproduction. Childhood

development theory includes this as an outcome of low quality environmental exposure. This

theory does not link reproductive timing variables, such as the quality of family environments, to

qualitative differences in the girls later mating and parenting strategies. Ellis's childhood

developmental theory also departs from Belsky's predicted outcomes in that it does not predict

for resulting unstable pair-bonds, greater number of sexual partners, or a lower parental

investment. The core idea of attachment theory, that childhood experience influences the

development of qualitative dimensions of sexual behavior and parenting investment, is still

intact; however, pubertal timing is not seen as a causal mechanism. The revisions proposed by

childhood developmental theory allows it to be more in line with the current outcomes found on

father absence and early familial stress. Simply put, this theory does not support the belief that

pubertal timing is the only intervening factor in future sexual behavior and parental investment

as suggested by Belsky et al. (1991). Ellis (2004) also attempts to integrate energetics theory by

proposing a U-shaped relation between early exposures to adversity and development of stress-

reactive profiles, with high-reactivity phenotypes disproportionately emerging within both highly

stressful and highly protective social environments.

      To further support the outcomes predicted by Belsky and other theorists, there has been

much research done relating to menarche. The outcomes of earlier first birth and sexual activity

predicted by Belsky to be linked with earlier pubertal timing have been substantiated by several

studies. Miller, Norton, Curtis, and Hill (1997), using data from a national survey of children in

the U.S. in a longitudinal study of over 1,000 children, conducted one of the studies that found

earlier pubertal development to be linked with earlier ages at first sexual intercourse. Manlove

(1997), using nationally representative data from Great Britain, produced one of the studies

linking earlier puberty with higher rates of adolescent pregnancy. There have also been several studies linking father absence and the presence of unrelated males in the home with earlier menarche. Some of these studies have been mentioned earlier including Surbey's (1990) link of father absence to early menarche and Ellis and Garber's (2000) study which not only served to link father absence to early menarche but also showed that the presence of an unrelated male in the father-absent homes served to further influence the early onset of menarche.

Studies have also examined the quality of the parent-child relationship and its association with the timing of pubertal onset. Steinberg (1988) did a study of the relationship between the emotional distance of the parent and child and pubertal maturation on 157 first born adolescent males and females and their parents. Twice over a 1-year period Steinberg surveyed his subjects about pubertal status and the autonomy of the child, conflict in the home, and closeness of the parents with their children. Among other findings, his data showed that parent-child emotional distance accelerates pubertal maturation among girls. Hulanicka (1999) reviewed several studies involving Polish subjects through which he looked at several aspects of what he defined as dysfunction in a family. This consisted of the presence of only the mother in the home as the sole parent, divorce, death of a parent, prolonged illness of a parent, parental alcohol abuse, and parental criminal activity. Hulanicka found that these factors, separately and in combination, accelerated maturation in girls. Quinlan (2003) found, in a survey of 10,847 women in the United States, that timing of parental separation is associated with reproductive development and was not confounded by socioeconomic status or the mother's reproductive behaviors. Specifically, he found that divorce and separation taking place between birth and the fifth year of life predicted earlier menarche, first sexual intercourse, first pregnancy, and shorter duration of first marriage in women. Women who experienced the divorce of their parents during their first

5 to 7 years of life were found to have significantly more sexual partners than women whose parents divorced after that period. He also found that this factor was the strongest predictor of the number of sexual partners a woman would have. He also found that living with a step-father was a significantly associated with the timing of reproductive development, in that it accelerated development. Maestripieri, Roney, DeBias, Durante, and Spaepen (2004) surveyed 83 girls between the ages of 11 and 14 and found that those living in father-absent homes exhibited earlier menarche and greater attraction to infant visual stimuli signifying, according to Maestripieri et al., earlier readiness for reproduction and parenting.

The hypothesis concerning the presence of a related adult male in father-absent homes has not yet been considered by Belsky or the other theorists preceding him. Ellis and Garber (2000) stated that further research needed to be done to determine if male relatives would produce the same effect as the presence of an unrelated male or if the effect of early menarche due to presence of an unrelated male would only occur if the male was genetically unrelated. It could be that in extended families where an older adult related male, such as a grandfather or brother, is present in a home that becomes father-absent during the critical period proposed by Belsky that menarche may occur at a similar time as women from a father-present home. This may be due to the older related adult male taking over the role of the absent biological father. This would be beneficial from an evolutionary standpoint in that the longer a child is using his or her own biological resources for growth and development the more successful the child's future reproduction is likely to be. If older related adult males are present in the home, the home may remain stable and relatively low in stress when there are a couple or multiple adults available to provide for the children in the home. If early menarche has a pheromone-linked component then

perhaps the presence of related males may serve a similar function as the presence of the biological father.

The current study is relying mostly on Belsky's theory to make predictions on the outcome of the research. To better understand how these theories are similar and dissimilar from one another an outline of their basic beliefs and interactions has been developed (see Figure 1). This outline also includes energetics theory and stress-suppression theory (the precursor to Belsky's theory and the first to attempt to explain the results of physical and psycho-social stress on menarche) as the theories are useful in explaining the physical effects of stress on pubertal timing. Three basic hypotheses have been made with relation to this study. First, women from father-absent homes will have experienced earlier onset of menarche than women from a father-present home. Secondly, women from father-absent homes who had an unrelated adult male living in the home will have experienced earlier menarche than women from father-absent homes with no unrelated male or from a home with the father present. Finally, women from father-absent homes who had a related adult male living with them will have experienced later menarche than women from a father-absent home who had no related adult male living with them.

Figure 1. Theoretical Outline Concerning Menarcheal Onset

FOCUS	THEORIES	VARIABLES OF EARLY MENARCHE				VARIABLES OF LATER MENARCHE			
Physical	Energetics Theory	Good nutritional environment Good health		Outcome Energy for growth and development: grow quickly earlier pubertal development, larger adult size		Poor nutritional environment Poor health		Outcome Energy for survival, slow growth, later pubertal development, smaller adult size	
	Stress Suppression Theory	Adequate physical conditions Low social conditions / stress		Outcome Energy available for normal pubertal development and reproduction		Adverse physical conditions Extreme social stress / conditions		Outcome Delay of development and reproduction until less adverse conditions	
LIFE HISTORY APPROACHES									
Psycho-Social	Belsky's Psycho-social Acceleration Theory	Family Context	Marital Discord, High Stress, Inadequate Resources	Outcome more likely the more variables		Family Context	Spousal Harmony, Adequate Finances, Low Stress	Outcome more likely the more variables	
				Psychological/ Behavioral Development	Insecure, not trustful, opportunistic, anxious, depressed			Psychological/ Behavioral Development	Secure attachment, reciprocally – rewarding orientation, trusting of others.
		Child Rearing Infancy/ Early Childhood	Harsh & Rejecting, not consistent, inadequate financial resources	Reproductive Strategy	Early sex activity, more partners, short unstable pair bonds, limited parental investment	Child Rearing Infancy/ Early Childhood	Sensitive and Supportive environment, Responsive, Positive Affection	Reproductive Strategy	Later sex activity, less partners, long stable pair bonds, greater parental investment.
	Paternal Investment Theory	[See Psycho-Social Acceleration Theory] Emphasis on father absence and presence of unrelated adult males		Outcome [See Psycho-Social Acceleration Theory]		[See Psycho-Social Acceleration Theory] Emphasis on father-presence and no unrelated adult males in the home		Outcome [See Psycho-Social Acceleration Theory]	
	Child Development Theory	[See Psycho-Social Acceleration and Paternal Investment Theory]		Outcome Mistrustful and insecure, earlier sexual activity, earlier first pregnancy, earlier first birth		[See Psycho-Social Acceleration and Paternal Investment Theory]		Outcome Secure, later sexual activity, later first pregnancy, later first birth	

Menarche, or menstruation, is defined as the end-point of gonadarche and adrenarche; typically occurring towards the end of pubertal development. Gonadarche is defined as the second stage of puberty at which the production of the hormones necessary for menarche and fertility are produced. Adrenarche is defined as the first stage of puberty at which androgens in the body begin to rise producing the first signs of puberty (hair growth, breast development, etc.) during the fifth and seventh year of life. Age at menarche is the dependent variable in this study with its onset highly correlated and consistent with pubertal timing. This means that if pubertal development begins early, menarche will also begin early. Early pubertal timing will be defined in this study in terms of those participants who start menarche before age 12. Normal menarche will be defined by the sample and the mean age of menarche of all participants. Typically, for the United States, menarche first occurs at 12 years and 8 months of age. Delayed or later menarche will be defined in terms of those participants who have their first period during the later part of their twelfth year (after the sample mean) or later than age 12. Father absence is another term used often in this field of research and will serve as an independent variable in this study. For the purposes of this study, father absence refers to the biological father not being present in the home environment of the child for a continuous period before menarche. The term of unrelated adult male is also used in this study, which refers to the presence of a stepfather or live-in boyfriend who resides in a father-absent home. Related males are considered to be adult males who live in a father-absent home and are paternal (related to the biological father), such as a paternal uncle or older brother. Unrelated and related adult males are considered as sub categorical familial situations of father absence. Menarche is thought to be a polymorphic genetic trait (Belsky et al., 1991). Genetic polymorphism asserts that individuals may be

genetically predisposed to one developmental pathway depending on the environmental effect on multiple genes. For example, skin color in humans is a polymorphic trait and each individual possesses a range of skin shades that is restricted by the coding of their genes across multiple locations in a specific area on the individual's genome. Depending on environmental conditions, a person may express a lighter or darker shade that is within their own range, every individual having a different range.

Assumptions

It is assumed that there will be a significant number of participants who have experienced varying combinations of the variables being studied as to provide for a control group as well as groups of individuals meeting the necessary combinations of each variable to meet the requirements to verify each of the hypotheses posed. The results of the survey will be analyzed through statistical methods in order to show statistical significance in each hypothesized area as to prove or disprove the research questions. This study will not show whether the previous research on the evolutionary model and mechanisms involved in early pubertal onset are substantiated but will serve as further data to add to or discredit the previous models proposed by other researchers and suggest other possible factors involved in pubertal timing, such as the presence of a related adult male in the home where the biological father is absent. Participants will be asked through a retrospective survey to provide the age in years and approximate month during which their first menarche began. Previous research has found that retrospective reports concerning the onset of menarche have actually been as reliable has those obtained during puberty (Graber, Peterson, & Brooks-Gunn, 1996) and therefore it will be assumed that the self reported information gathered in this study will be fairly accurate in deriving the dependent variable. It may also be noted that there may be a percentage of participants who are unaware of

being raised from birth by non-biological parent(s). It is assumed that this percentage of participants will not be significant enough to affect this study. This study also assumes that the occurrence of father absence is a general psychosocial stressor in the lives of those who experienced it.

<div align="center">Limitations</div>

This information was gathered retrospectively from participants and did not involve impartial observation or interviewing techniques. This is limiting in that the past relationships between the participant and other family members cannot be assessed for this study. Also, information such as onset of puberty cannot be assessed as an additional dependent variable. This could be done in longitudinal research occurring throughout puberty and the age at which menarche begins would be more accurate. The participants for this study are from the undergraduate student body that attends East Tennessee State University and sampling is from several general requirement classes. However, this is not a good representation of the population and is a sample gathered through convenience. Joint custody situations are also not being assessed and father absence is simply defined as the occurrence of the biological father leaving the home. If the father did continue to visit with the participants even after separation from the participant's mother, this could serve to protect the women against early menarche. This study does not research all familial stressors that could have taken place in the participant's childhood that might have affected menarche. According to Belsky et al. (1991), there are multiple environmental stressors in addition to family compositional changes that contribute to early menarcheal onset. In this study, however, only father absence and the presence of related and unrelated adult males in a father-absent home will be considered as stressors due to time constraints.

Delimitations

The relationship between age at first menarche and father absence, presence of an unrelated males, and contextual stressors pertaining to the family are assessed. The possible genetic link between the menarcheal age of the participant's mother and that of the participant is also be assessed as a possible factor in the onset of menarche but is not used to prove or disprove whether genetics play a greater role in menarcheal onset than environmental of family compositional factors. As a supposition, the presence of a related adult male in the home is analyzed to see if there is an effect on menstrual onset in those participants who are from father-absent homes. These will be the only variables considered in the current study with respect to menarche.

CHAPTER 2

METHODS

Participants

The research was conducted using a short 12 question survey of adult college undergraduate students at East Tennessee State University. The participants were 342 female students enrolled in a variety of undergraduate courses throughout campus. These courses consisted of a range including introductory sociology to introductory chemistry. This research was carried out on campus during the start of the fall semester of 2005 with the permission of the professors overseeing the selected classes. The most common age of participants, or mode, was 18, with 115 participants being of this age. The age range fell between 18 to 49 years with a mean age of 20.7 years. The average or mean age of menarche for all participants was 12 years and approximately six months (12.59 with months coded using the factor of nine). This is consistent with the mean age of menarche of women in the United States, 12.8 ± 0.5 as reported by Golub (1983). The average educational level of participant's mothers and fathers was a bachelor's degree. Most participants were single and never married at the time of the survey.

Three-hundred fifty-one students were invited to participate, with 342 agreeing to complete the questionnaire, for a response rate of 97%. All participants were used in this study. Of the participants, 246 were considered to be from father-present homes and 96 were from father-absent homes. Father absence included three subcategories of which 26 participants were from single mother homes, 59 were from homes where an unrelated male was present either through adoption by an unrelated family or male presence with the biological mother, and 11 fell into the category of having an adult related male in the father-absent home before onset of menarche. The national mean percentage for children under the age of 18 living with one

biological parent is 28% (U.S. Census Bureau, 1998). In this study, the percentage was slightly

higher, with 38% of homes having just one biological parent present.

<center>Instrumentation</center>

The instrument used to collect the data for the current research is a 12-question survey

developed separately for the male and female population pertaining to onset of sexual activity

and menarche, respectively, with reference to family composition and atmosphere before

puberty. Questions concern socioeconomic status during childhood, current pair-bonding

behavior, onset of sexual activity, and onset of menarche for the female participants. The eighth

item on the survey pertains to father absence and presence of related and unrelated adult males in

the home prior to menarche and puberty in order to determine their effects, if any, on the onset of

menarche.

This detailed question was the source of familial information used for the coding and

analysis of the data pertinent to the stated hypotheses. The box that included the situation of

living with both biological parents and the situation of living with the biological father but it the

biological mother were both the source for determining father presence. Father absence included

every other situation that was marked by participants. Participants were placed in the

subcategory of single mother if they stated that lived with a single mom with no other adults

present in the home for the duration of the pre-menstrual lives after their parents divorced or

separated. Placement in the subcategory of unrelated male presence occurred if at any time prior

to menarche the participant stated that they lived with their mother but other non-related males,

such as boyfriend(s) or step-father(s), also lived in the home. Participants who stated they were

adopted by non-relatives were also placed into this category. Participants were placed in the

related male category only if they remained living with their mother for the duration of their pre-

<center>27</center>

menstrual life but had an older (more than 5 years) related male in the home or lived with related family that included an older adult related male.

Question nine then pertains to stress that may have been experienced with relation to the family before menarche and puberty, such as divorce, to determine its relevance to the hypothesis that general stress in the family context will affect the timing of menarche. There are also questions pertaining to birth order and sexual abuse for use in future analysis. Finally, questions pertaining to the biological mother are asked in order to determine a possible genetic influence on this timing of menarche in the participants.

<div align="center">Procedures</div>

Prior to collecting data, Institutional Review Board approval was obtained. The principal investigator then contacted several faculty members on the ETSU campus during the start of fall classes in 2005 in order to arrange a time to come by their class in order to give the survey. The survey took between 15 and 20 minutes to complete depending on class size. The research topic was presented fully to each ETSU instructor who offered his or her class time to allow students to participate. Classes were selected by size (those classes with more than 25 students) and generally comprised those classes that are typically general requirements for completion of a bachelor's degree. Participants in the survey were required to complete the survey within their classroom if they desired to participate. Surveys were passed out in those classes where survey administration had been approved by the professor. Administrator encouraged the use of a cover sheet, which was passed out to each participant, to protect their answers from being seen by other participants. The surveys were completed towards the beginning or end of the class time and collected from the students by having them place their survey into a box or envelope carried by the survey administrator, who was either the principal investigator or a graduate assistant. No

information was obtained linking the participant to his or her survey answers. Contact information was given on each cover sheet pertaining to the use of the counseling center on campus if participants felt they needed to discuss any issues that might have been brought to mind by the survey content. Information about the researcher was also given if participants wanted to review the results of the study or had any questions about the purpose of the study.

<div align="center">Research Design</div>

To test the first hypothesis, the mean age at first menarche of the target participants from father-absent homes was compared to the mean age at first menarche of participants from homes where the father was present. To test the second hypothesis, the mean age at first menarche of the participants from homes where an unrelated male is present in the home was compared to the mean age at first menarche of the participants from intact families (where the biological father was continuously present before onset of menarche). To test the third hypothesis, the mean age at first menarche from father-absent homes where an unrelated adult male was present was compared to father-absent homes without the presence of a related adult male. An independent t-test was run to compare the means associated for each of these situations. An analysis of variance (ANOVA) was also used to compare variables across four conditions: father-present homes, father-absent homes with no adult male present (single mother situations), father-absent homes with presence of an unrelated adult male, and father-absent homes with the presence of a related adult male. A comparison of means was also done to determine if income/education has any effect on the mean age at which menarche began. To analyze the supposition that the presence of a related adult male in the home of a participant with an absent father will counteract the effect of early menarche, the age at first menarche of father-absent homes where a related

adult male is present was compared to the age at first menarche in the homes where the

biological father is absent and no other adult male is present.

CHAPTER 3

RESULTS

Independent t-tests were used to analyze each hypothesis at the .05 level of significance. The first analysis found a significant difference between the mean age of first menarche of father-present homes (x = 12.69) and father-absent homes (x = 12.31) where t = 1.988, + (340) (p<.05) with equal variances assumed (see Table 1). This result shows that females from father-absent homes have menarche significantly earlier than females from father-present homes according to this data set, allowing for validation of the first hypothesis, which stated that women from father-absent homes will have experienced earlier menarche than women from father-present homes.

To test the second hypothesis first a t-test was done to compare mean age of menarche in single mother homes including the presence of related adult males (x = 12.34) to father-absent homes with unrelated adult males present (x = 12.29) where t = .170, + (94) (p<.05) with equal variances assumed (see Table 2). All equality of variance was determined by using the Levene's Test for Equality of Variance. This result shows a non-significant difference between the means as does the comparison of means between father-present homes (x = 12.69) and homes where an unrelated male was present (12.29) where t = 1.679, + (303), (p<.05) (see Table 3). Therefore, the second hypothesis is not supported. The second hypothesis stated that women from father-absent homes who had an unrelated adult male living in the home will have experienced earlier menarche than both women from father-present homes and women from father-absent homes without another related adult male present.

The third hypothesis consists of two steps. First, analysis was done to determine if there is a significant difference between father-absent homes, including single mother situations and

situations where an unrelated male was present, (x = 12.34) and father-absent homes where a related adult male was present before menarche (x = 12.15) where t = .400, + (94) (p<.05) with equal variances assumed. There was not a significant difference between these two means (see Table 4). When comparing the mean age of menarche of those from father-absent homes with an unrelated male present (x = 12.29) and those from father-absent homes with only a related male present (x = 12.15) where t = .290, + (68) (p<.05), no significant difference was found (see Table 5). Therefore, hypothesis three is also not supported. The third hypothesis stated that women from father-absent homes who had a related adult male present will have experienced later menarche than women from father-absent homes without a related adult male present.

A Univariate Analysis of Variance (ANOVA) was conducted to compare groups for mean score differences in age of first menarche. Independent variables were father-present versus single mother homes, father-present versus father-absent homes with an unrelated adult male present, and father-present homes versus father-absent homes with a related adult male present. After completion of this analysis, no significance was found between the groups (see Table 6).

In this study 64 participants provided their mother's age at first menarche along with their age own age at first menarche. This information was used to run a correlation analysis between the two to see of there was a genetic effect. The mean age of menarche for the participants who provided their mother's information was 12.76 and the mother's menarche mean was 13.23. When a Pearson's Correlation (one-tailed) was performed, the percentage of shared variation between the two variables (mother's age at first menarche and participant's age at first menarche) was found to be significant. The correlation coefficients were correlated at the .01 level and reflected a positive linear relationship.

Table 1

Independent t-Test for Hypothesis I

Item	Father Present	Father Absent
N	246	96
Mean	12.69	12.31
SD	1.63	1.42
Mean Difference	.377	
t-value	1.988	
Significance (2-tailed)	.048	

Table 2

Independent t-Test for Hypothesis 2a

Item	Unrelated	Single Mother (includes related males)
N	59	37
Mean	12.29	12.34
SD	1.59	1.13
Mean Difference	.051	
t-value	.170	
Significance (2-tailed)	.865	

Table 3

Independent t-Test for Hypothesis 2b

Item	Father Present	Unrelated
N	246	59
Mean	12.69	12.29
SD	1.63	1.59
Mean Difference	.396	
t-value	1.679	
Significance (2-tailed)	.094	

Table 4

Independent t-Test for Hypothesis 3a

Item	Related	Father Absent (single mother and unrelated combined)
N	11	85
Mean	12.15	12.34
SD	.901	1.48
Mean Difference	.183	
t-value	.400	
Significance (2-tailed)	.690	

Table 5

Independent t-Test for Hypothesis 3b

Item	Unrelated	Related
N	59	11
Mean	12.29	12.15
SD	1.59	.901
Mean Difference	.144	
t-value	.290	
Significance (2-tailed)	.773	

Table 6

Analysis of Variance

	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.
Father Present	4.04	1	4.04	1.62	.204
Single Mom	2.613	1	2.61	1.04	.307
Unrelated	1.27	1	1.27	.510	.476
Related	.434	1	.434	.174	.677

None are significant to the .05 level

CHAPTER 4

DISCUSSION

The outcome of this study with respect to the difference in onset of menarche in father-absent versus father-present homes was as expected and is consistent with previous research on this topic and consistent with the hypothesis concerning the effect of father absence on age of first menarche first developed by Belsky et al. (1991). Despite the lack of significance concerning the other hypotheses, the trend in the means is consistent with the research on this topic as well. The mean age of menarche for women from homes with unrelated males present was 12 years and 3 months, which is lower than the mean for single mother homes that mean being 12 years and 4 months. Both of these means were lower than the father-present homes where the mean age of menarche was 12 years and 6 months. Unfortunately, the number of participants in each of these situations was rather low in comparison with the father-present category; therefore, it is difficult to draw a significant conclusion from this specific data set with reference to the sub-categorical father-absent situations.

Surprisingly, the result for the presence of related males in the home was lowest of all; the mean age of menarche being 12 years and 1 month. Because pheromones from the biological father were thought to be involved in the onset of menarche it was thought that an older related male in the home might serve as a protective factor when the father became absent. However, it seems to be having the opposite effect. This could be due to some kind of incest protection mechanism (Weisfield, 2003). There are only 11 cases in this variable; therefore, further research would need to be done and a larger number of participants obtained for this familial situation in order to verify this finding.

Of the participants who provided their mother's age at first menarche along with their age own age at first menarche, a significant correlation was found. This could mean that there is a genetic effect at play between a mother's age at first menarche and the daughter's subsequent age at first menarche. This would need to be evaluated further in order to obtain a higher number of participants. The generational family situation would need to be evaluated as well. If father absence does have an effect on age at menarche, this could be a trend that is socially influenced, in that the mother comes from a home where her father was absent and therefore there is a similar effect in her future relationships. This could be due to an earlier inherited age of menarche in combination with poor family and educational environments and early ideal age of childrearing among daughters of teen mothers (Manlove, 1997). Belsky et al. (1991) and Ellis and Garber (2000) did suggest in their research that early menarche can lead to unstable pair bonding (i.e., stable intimate relationships with a partner), so it is reasonable to assume this these factors are influencing one another generationally. The influence of early menarche on pair bonding was not analyzed in this study and might be beneficial to future research in order to explore how future relationships are affected by the early family environment.

A joint custody situation in which the biological father continues to visit with children regularly after a separation was also not considered in this study. This could serve as a protective factor for the onset of menarche and would also have the implication of reinforcing the need for fathers to remain involved in the lives of their children. In this country, 84% of children who live with one parent live with their mother (U.S. Census Bureau, 1998). Given this, it is easy to assume that mothers are seen as being the one responsible for parenting and child rearing and fathers do not seem to feel this is a role necessary for them to undertake. Given that researchers such as Belsky et al. (1991) and Ellis (2004) have suggested that early menarche

is associated with earlier first intercourse and unstable pair bonding, then perhaps it would behoove fathers to become more involved in the lives of their daughters.

This research also has implications for homes in which a child has been adopted and the biological father is not present as a result. Only three of the participants in this study were from homes where they are adopted by non-relatives. This number was not high enough to run any analysis. Further research in this field would be beneficial in determining how much influence genetics provided by the biological father have on the pheromonal recognition of the father figure, if this process is indeed taking place. Perhaps there is an imprinting period near birth in which the pheromones of the male present are taken on to be those of the biological father. Imprinting has been suggested as taking place between the biological mother and the pre-weaning infant that has implications on the infant's later relational behavior with the mother (Meaney, 2001). This field of research has not been fully developed, so it is hard to say how much influence the biological father may have versus a non-biological father who is present throughout a child's life, but the implications for adoptive parents must be considered as 127,000 children in the United States were adopted in the year 2000 (U.S. Department of Health and Human Services, 2004) and this doesn't include all adopted and non-biological parenting situations.

In conclusion, there are many different family situations that have yet to be considered with concern to how they may affect the onset of menarche and how early onset affects the lives of adult women. Despite the lack of significant findings in this study, many questions are left to be answered, especially with regard to the finding concerning the presence of related adult males in the home. With more participants and consideration of generational/social effects in the family a more rounded view of this subject could emerge.

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Female Survey

Human Development and Learning
Counseling Department Female Questionnaire

Please read all questions carefully and respond to each. If you have any questions, please raise your hand and the administrator will attempt to answer them for you. Participation is optional. If you do not wish to participate please return the unmarked survey to the administrator. All responses will remain anonymous; DO NOT write your name on this survey. Thank you for your time.

1. What is your age in years?   _____

2. What is the highest educational level of your parents?

Mother	Father
__ Did not complete high school	__ Did not complete high school
__ High School/GED	__ High School/GED
__ Some College	__ Some College
__ Bachelor's Degree	__ Bachelor's Degree
__ Graduate Degree	__ Graduate Degree

3. What was the combined income level of your family as a child (when you were in elementary school)?

Approx.   _____ thousand dollars per year

4. I began menarche (first period/menstruation) when I was _____ years old and _____ months old.

5. At what age did your periods become monthly or regular?

_____ Years Old   _____ Never   _____ Don't Know

6. At what age did you have your first consensual sexual intercourse?

_____ Years old   ☐ Not Yet Occurred

7. What is your current relationship status?

___ Single, never married   ___ Married   ___ Single, Divorced

___ Re-Married   ___ Living with Partner/Committed Relationship

8. Which of the following best described your home situation prior to menarche? If the same situation occurred more than once [i.e. you lived with Mom & a step-dad at ages 4-5 and again with mom and another step-dad for a year at age 9] please add that as well. Please check every box that applied and complete ages during which time they applied. Please CHECK <u>each</u> box that has pertained to you. If you have questions, please ask administrator.

	Lived with both biological parents	This was the case from age ___ to age ___ (and again at ___ to age ___)
	Lived with both biological parents, but father gone for long periods of time (one year or more). Specify how long he was absent from the home (total): __ years __ months	This was the case from age ___ to age ___ (and again at ___ to age ___)
	Lived with single mom, no adult males in the home.	This was the case from age ___ to age ___ (and again at ___ to age ___)
	Lived with mom and step dad/ mom's boyfriend(s).	This was the case from age ___ to age ___ (and again at ___ to age ___)

If you lived with your biological mother, primarily, and you had visitation with your biological father, please indicate below the ages at which you had visitation and the approximate frequency with which you saw your biological father during that time.
	        ___ to age ___ ____ days a month or ____ days a year
	        ___ to age ___ ____ days a month or ____ days a year

	Lived with mom and other related adult male in the home (i.e., uncle, cousin, grandfather, adult brother, etc.) Specify relationship of the adult male to you: _____ _____ _____	This was the case from age ___ to age ___ (and again at ___ to age ___)
	Lived with biological father without biological mother.	This was the case from age ___ to age ___ (and again at ___ to age ___)
	Lived with grandparents, aunt and uncle, foster care, etc. Specify all who were in the home and your relationship to those people: _____ _____	This was the case from age ___ to age ___ (and again at ___ to age ___)

9. Prior to menarche, which of the following occurred in your life? If one of these occurred, please put the age(s) of each occurrence under the 'yes' column, if no, place a check mark under the 'no' column. Multiple ages can be given if situation occurred more than once, as well as age ranges.

Occurrence	Yes	No
Divorce/Separation of parents	Age ___ ___	
Death of a parent or sibling	Age ___ ___	
Unemployment of one or both parents (Not to include chosen profession of Homemaker)	Age ___ ___	
Change of residence resulting in change of school	Age ___ ___	
Remarriage of custodial parent	Age ___ ___	
Birth, adoption, and/or addition by marriage of a sibling into the home	Age ___ ___	
Use of alcohol reaching intoxication more than two days per week by one or both of your parents: (if yes, specify) _____	Age ___ ___	

10. List age, gender, and relationship of all siblings you had living with you for more than a year, prior to menarche?

Current Age of Sibling (If deceased, indicate with *)	Gender of Sibling	Relationship of Sibling (full, step, adopted, half, etc.)

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11. What was your <u>biological</u> mother's age when the following occurred?

DO NOT GUESS, if you don't know, please select UNKNOWN

Mother's First Menstruation:

Her age in years: ____   or   ___ Unknown

Mother's First Marriage:

Her age in years: ____   or   ___ Unknown

Mother Gave Birth to First Child:

Her age in years: ____   or   ___ Unknown

12. Prior to menarche, did anyone at least five years older than you ever initiate sexual contact (defined here as unwanted touching of breasts, genital areas, or having you touch their genital areas).

____ Yes (complete this column)	____ No (complete this column)

a. What relationship was the person to you?
___ Stranger
___ Someone known to your family
       (neighbor, friend, coach, etc.)
___ Family Member
       (specify relationship): _____
b. How often did the sexual contact occur?
___ Only once when I was ___ years old
___ It happened a few times (2-6 times)
       over a period from age ___ to age ___
___ It happened numerous times (more than 6)
       from the time I was ___ years old
       until I was ___ years old.
c. The sexual contact involved:
___ Person touching your genitals,
       or having you touch his/her genitals
___ Person performing oral sex on you or having you
       perform oral sex on him or her
___ Sexual intercourse involving vaginal or anal
       penetration
	a. Has anyone in your family been sexually abused?
	   ___ Yes, specify relationship to you: _____
	   ___ No
	
	b. Have you had a close friend who has told you
	about their own history of sexual abuse?
	   ___ Yes
	   ___ No
	
	c. Do you believe sexual abuse is more likely to be
	perpetrated by a family member or family friend
	rather than a stranger?
	   ___ Yes
	   ___ No

VITA

AMANDA C. HEALEY

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	Place of Birth:	Kingsport, Tennessee
	Marital Status:	Married

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