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RESEARCH ARTICLE

Sex-Specific Developmental Effects of Father Absence on Casual Sexual Behavior and Life History Strategy

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Abstract

A substantial body of research has investigated the effects of early family environments on the sexual maturity and behavior of adolescents and young adults. Most of this research has focused primarily on (i) early childhood environments, (ii) these effects in females with much less attention devoted to males' sexual maturity and behavior, and (iii) sexual behavior of adolescents and young adults. To address these limitations, we asked 392 adults (209 males, 183 females; ages 17–62) to report the ages at which they lived with their biological father across their first 20 years of development, their number of casual sex partners, and to complete a life history (LH) strategy measure. Consistent with theoretical predictions, males had more casual sex partners and a faster LH strategy than females. For both males and females, longer time spent growing up with their biological father was associated with fewer casual sex partners and a slower LH strategy. The current study also provides clear evidence of sex-specific developmental effects on reproductive strategies as a function of when during development father absence (FA) occurs. When FA occurred during middle childhood, females exhibited faster LH strategies; whereas, when FA occurred during adolescence, males exhibited faster LH strategies. Together, these findings suggest the effects of FA are not specific to females nor early childhood environments. In addition, effects of FA appear to persist beyond adolescence and early young adulthood with opposite effects on males' and females' reproductive strategies depending on when during development it occurs.

Keywords Casual sex · Life history strategy · Father absence · Sex-specific effects

There has been an extensive amount of research conducted on the effects of early family environments on the sexual maturity and behavior of adolescents and young adults. Most of this attention, however, has focused (i) on the effects on females with considerably less attention devoted to these effects on males' development and behavior (also noted in Sheppard and Sear 2011, and evident in a summary of this line of research in Buss 2015; exceptions to this are discussed later) and (ii) on early childhood environments (i.e., only the first 5–7 years of life). In addition, to our knowledge, these effects have largely been investigated primarily with regard to the sexual behavior of adolescents and young adults lacking exploration of whether these effects persist across the life span. The current study attempts to address these limitations in the existing literature.

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Life History Strategies and Psychosocial Acceleration Theory

Life history theory attempts to explain individual differences in the allocation of energy and resources across the life span with regard to survival and reproduction (Brumbach et al. 2009). Different life history strategies adopted by individuals are posited to be adaptive solutions in response to varying environmental conditions and to exist on a slow-fast continuum (Del Giudice et al. 2015; Figueredo et al. 2015; Figueredo et al. 2005). Relevant environmental cues that lead to differences in life history strategy include information about morbidity and mortality in the surrounding ecology as well as information about environmental stability (Ellis et al. 2012b). Based on these environmental cues, individuals then develop either a slower or faster life history strategy. Specifically, cues that suggest life is short (e.g., high morbidity and mortality rates), harsh (e.g., exposure to violence or harsh parenting tactics), and/or unstable (e.g., changes in family composition or economic circumstances) lead to a faster life history strategy (Belsky 2012; Chisholm et al. 2005; Ellis

et al. 2009; Ellis et al. 2012a). Faster life history strategies are characterized by earlier sexual maturity and sexual debut, engagement in short-term pair bonds with a focus on mating opportunities versus investment in long-term relationships, and reproduction at an earlier age; whereas, individuals who adopt a slower life history strategy show an opposite pattern of sexual development and behavior (Ellis et al. 2009; Figueredo et al. 2006). It is important to note, however, while there is a host of environmental cues that influence the development of life history strategies (e.g., cues of environmental harshness and/or unpredictability such as morbidity and mortality rates, resource availability, pathogen exposure, climatic factors, parental divorce, harsh parenting, etc.), family composition has been identified as a factor distinct from the others—that is, family composition makes an unique contribution to the development of life history strategy on the slow-fast continuum (Brumbach et al. 2009; Ellis et al. 2009; Ellis et al. 2012a).

Psychosocial acceleration theory integrates evolutionary and developmental perspectives in an attempt to explain how childhood experiences can lead to divergent developmental pathways with regard to sexual maturation and behavior (Belsky et al. 1991). Specifically, psychosocial acceleration theory suggests as a result of natural selection early environmental cues influence subsequent pubertal timing and reproductive strategies contingent on the environment in order to match individuals' development and behaviors to best fit their environments. As such, faster life history strategy develops in response to stressful childhood environments resulting in accelerated sexual maturation, increased sexual promiscuity, and less investment in offspring (Belsky 2012). In other words, when raised in a dangerous or unstable environment, the body and behavior develop in such a way to speed up reproduction (i.e., an adaptive response to environmental challenges). Whereas, a stable and "safe" environment leads to the development of a slower life history, characterized by later sexual maturation, decreased sexual promiscuity, and greater investment in their offspring (Belsky 2012). One characteristic of stressful childhood environments that has received a lot of attention with regard to sexual maturity and behavior is growing up in a father absent home.

Father Absence

It has been suggested that the presence or absence of biological fathers affects the reproductive strategies of their offspring (Draper and Harpending 1982). Specifically, consistent with psychosocial acceleration theory, research on the development of girls has found that girls raised in father absent homes are more likely to reach sexual maturation earlier, engage in sexual activity earlier, have more sexual partners, and younger age of first pregnancy relative to girls raised in father present homes (Anderson 2015; Ellis et al. 2003; Quinlan 2003). These findings were supported by a 2014 meta-analysis of correlations between father absence and daughters' age of menarche indicating that father absence is associated with earlier pubertal timing in females (Webster et al. 2014). Recent research has suggested, however, rather than father absence per se it is the quantity and quality of paternal investment that influences females' sexual maturity and behavior (DelPriore et al. 2017; Ellis and Essex 2007; Ellis et al. 1999; Ellis et al. 2012a; Tither and Ellis 2008). If it is the quantity and quality of paternal investment that is the driving force behind differences in sexual maturity and behavior, the use of father absence as a dichotomous variable of whether individuals grew up in a father absent home during the first 5–7 years of development seems especially problematic. That is, to us, those findings reinforce the need to use father absence as a continuous variable across development rather than a dichotomous variable focused only on young childhood.

Sex-Specific Developmental Effects

As noted earlier, the focus of most of this research has been on females (for a review of this literature, see meta-analysis by Webster et al. 2014). From evolutionary and developmental perspectives, however, it does not make sense that cues to environmental stability (e.g., father presence vs. absence) would only affect sexual maturation and behavior of females. Numerous studies have documented the effects of certain environments on the behavior of young males (Anderson 2015, 2017; Bogaert 2005; James et al. 2012; Sheppard and Sear 2011; Shenk and Scelza 2012; Wilson and Daly 1997). In addition to documenting effects of father absence, other environmental factors investigated in those studies include low socioeconomic status, early markers of adversity such as birth weight and/or BMI at age 7, exposure to violence and/or trauma in early childhood, as well as maternal depression, mental illness, alcohol, and/or drug use. So, from a theoretical perspective, why would natural selection sensitize females' sexual development and behavior to early environmental cues regarding durability (or lack thereof) of pair bonds, but not influence the development and behavior of males? Also, why would individuals only be sensitive to these cues occurring within the first 5–7 years of life and not beyond that developmental period?

The focus primarily on females, however, presumably stems from consistent evidence of earlier puberty as a function of father absence for females with a lack of similar findings for males in most of the existing literature (James et al. 2012; exceptions to this are discussed later). This lack of findings in the literature for males, as well as the difficulty in measuring onset of puberty for males (i.e., absence of salient clear marker equivalent to menarche in females) has led to considerably less attention devoted to the effects of father absence on males (as has also been noted in Sheppard and Sear 2011, and is

evident in a summary of this line of research in Buss 2015). Recent work, however, suggests this lack of findings for males could be an artifact of two common methodological features of studies investigating the developmental effects of father absence. Specifically, these methodologically limiting features are (1) using father absence as a dichotomous variable (absent vs. present) and (2) focusing on father absence in only early childhood environments (i.e., the first 5–7 years of life). These methodological limitations are highlighted by research that has extended investigation of father absence beyond the first few years of life finding effects on sexual maturity and behavior of males (Bogaert 2005; Salmon et al. 2016; Shenk and Scelza 2012; Sheppard and Sear 2011). For example, in a US national probability sample, Bogaert (2005) found that that father absence at age 14 predicted earlier puberty for both males (indexed by voice change) and females (indexed by menarche).

Furthermore, others have identified the importance of environmental experiences (e.g., familial instability) in adolescence positing adolescence is a sensitive period for changes to occur in developmental pathways, including the adoption of different life history strategies (Ellis et al. 2012a). If this is the case, why limit investigations of father absence to only the first years of life? In one of the few studies to use father absence as a continuous variable, Salmon et al. (2016) found that for males (as well as females) more time spent in a father absent home during the first 18 years of development was associated with engaging in more casual sexual behavior (i.e., one night stands and hookups without the intention of pursuing a long-term relationship with that sexual partner). In addition, these effects seem to be specific to when in development father absence occurs. For example, a study investigating the effect of father absence in a sample of British men found that (after controlling for other markers of childhood adversity) father absence occurring by age 7 was associated with early reproduction (i.e., having at least one child by age 23); father absence occurring between ages 7 and 11 was associated with less likelihood of marriage by age 23, suggesting these males were less likely to invest in long-term relationships relative to men who experienced father absence at other developmental stages; and father absence occurring between ages 11 and 16 was associated with delayed puberty (Sheppard and Sear 2011). An investigation of father absence (operationalized strictly as father death versus absence due to divorce/abandonment) in a strictly patrilineal society found stronger negative effects on status-related life outcomes of both males and females, including acquisition of education, adult income, and ability to acquire a high-quality mate, when father absence occurred in late childhood and adolescence (Shenk and Scelza 2012). Together these findings suggest that father absence differentially affects individuals at different times in development (Sheppard and Sear 2011; Shenk and Scelza 2012) and further reinforces the idea that father absence is perhaps best measured as a continuous variable across the entire span of development rather than a dichotomous variable limited to only the first 5–7 years of life. Doing so not only allows researchers to investigate sex differences in the effect of father absence on sexual maturation and behavior, but also allows us to investigate differential effects of the developmental timing of father absence for males and females.

The expectation for sex-specific effects of father absence on sexual behavior and life history strategy is consistent with findings of distinct developmental influences of early childhood environments on males' and females' sexual maturation and behavior. A longitudinal study of adolescents from age 12 to 18 found that while father absence in the first 7 years of life, maternal depression, and low socioeconomic status predicted lower quality familial relationships for both males and females, males and females differed in terms of the developmental effects of those low quality relationships (James et al. 2012). Although low quality familial relationships was associated with earlier sexual debut for both males and females, earlier puberty as a function of those low quality relationships was found only for females. Specific to the effects of father absence in the first 7 years of life, father absence was found to have a unique and direct effect on earlier sexual debut and increased risky sexual behavior for females, but not for males. Therefore, it does appear there are sex-specific developmental effects of early environmental cues (such as father absence) which may be identified by extending investigation of father absence beyond early childhood.

Current Study

The purpose of the current study was to replicate previous findings of sex differences in casual sexual behavior and the effect of father absence on such behavior for both males and females. In addition, the current study attempted to extend these findings (i) to life history strategy and (ii) with an older sample than has been typically used in this line of research to investigate whether the effects extend beyond adolescence and early young adulthood. Finally, by looking at father absence across different developmental ages (e.g., early childhood; middle childhood; adolescence), we attempted to investigate potential sex-specific effects of father absence on casual sexual behavior and life history strategy as a function of the developmental timing of when father absence occurs.

This study began with the general hypothesis that sexually dimorphic strategies underlie casual sexual behavior (hookups) and life history strategy. Although men and women would have faced many similar problems across our evolutionary past (e.g., finding shelter, avoiding parasitic infection, etc.), men and women would have faced different adaptive problems when it came to reproduction. According to Trivers' (1972) parental investment theory, females have a

greater minimal obligatory parental investment than do males (i.e., greater initial investment in terms of ova, internal fertilization, gestation, and post-birth lactation versus a male's minimal required investment of sperm). As a result of these differences in minimal parental investment, males and females evolved different strategies to solve their different reproductive problems (Buss and Schmitt 1993; Salmon and Symons 2001; Symons 1979). Specifically, whereas female psychological mechanisms developed to assess a man's ability and willingness to invest in her and her offspring; male psychological mechanisms developed to dissociate sexual pleasure from investment, to desire a variety of sexual partners, and to be less concerned about long-term intentions (Buss and Schmitt 1993; Salmon and Symons 2001; Symons 1979). This is consistent with evidence that males engage in more casual sexual behavior with less negative emotional reactions than do females (Salmon et al. 2016).

Prediction 1a and 1b: Males and females will differ in their number of casual sex partners (replication of Salmon et al. 2016, findings) and life history strategy (extension of Salmon et al. 2016). Specifically, males are expected to have more casual sex partners and a faster life history strategy than females.

Prediction 2a and 2b: Males and females who grew up in stressful childhood environments (indexed by father absence) are more likely to engage in casual sex encounters (replication of Salmon et al. 2016, findings) and to have a faster life history strategy (extension of Salmon et al. 2016). It should be noted that previous research investigating the effects of father absence on pubertal timing in females found that rather than father absence per se, it was the presence of an unrelated male father figure (e.g., stepfather and/or mother's boyfriend) that explained earlier pubertal timing of females in homes in which biological fathers are absent (Ellis and Garber 2000). Therefore, tests will also be conducted to investigate the alternative explanation of stepfather presence.

Prediction 3: There are sex-specific developmental effects of father absence on casual sex behavior and life history strategy dependent on when during development father absence occurs.

Method

Participants

Participants included 392 adults (209 males, 183 females) between the ages of 17 and 62 ($M = 26.66$, $SD = 9.1$). Undergraduate students ($n = 166$; 63 males, 103 females; age range 17–40, $M = 19.30$, $SD = 2.34$) were recruited from psychology courses at a private university in the southwestern USA and received course credit for their participation. In order to extend the age range, which allows us to investigate whether some of the effects of stressful childhood environments previously found in college students persist beyond adolescence and early young adulthood, participants were also recruited through M-Turk ($n = 226$; 146 males, 80 females; age range 18–62, $M = 32.07$, $SD = 8.39$) and received $5 for their participation. Overall, approximately 65% of the participants self-reported their ethnicity as being Caucasian, 12% Asian, 9% Hispanic, 6% African American, 3% Latino/a, 1% Middle Eastern, 1% South Asian, .3% Native American, and 4% "other."

A subsample of participants who experienced father absence at some point across development was used to investigate sex-specific developmental effects of father absence. The subsample consisted of 149 individuals (80 males, 69 females) between the ages of 18 and 60 ($M = 29.03$, $SD = 8.9$). Out of these, 46 females and 51 males reported father absence occurring by the age of 7; 8 females and 11 males reported father absence occurring between ages 7 and 11; and 15 females and 18 males reported father absence occurring between ages 11 and 16. Approximately 68% of the participants in the subsample self-reported their ethnicity as being Caucasian, 10% African American, 8% Asian, 7% Hispanic, 4% Latino/a, 1% Middle Eastern, and 2% "other."

Measures

Demographics Participants were asked to self-report their age, sex, and ethnicity. Consistent with the method utilized in Salmon et al. (2016), father absence was operationalized as a continuous variable and measured by asking participants to respond to family composition questions. Specifically, participants were asked to indicate who (and at what age) they lived with each of the following people growing up: biological mother and/or father, stepmother and/or stepfather, adoptive mother and/or father, and/or extended family (e.g., grandparents, aunt/uncle). Although most of the research on this topic has used father absence as a dichotomous variable (e.g., interested in father absence in the first 5–7 years of life only), the use of father absence as a continuous variable allows us to (i) investigate the effect of father absence across a wider age of development and (ii) investigate potential sex differences in the effect of the timing of father absence on behavioral outcomes (e.g., casual sex behavior and life history strategy).

Sexual Behavior One question from the revised Sociosexual Orientation Inventory (SOI-R; Penke and Asendorpf 2008) was used to assess casual sexual behavior: "With how many different partners have you had sexual intercourse without having an interest in a long-term committed relationship with

this person?" There were nine possible response options for the question ranging from "0" to "20 or more."

Life History Strategy Life history strategy was measured using the K-SF-42 (Figueredo et al. 2017). With 42 questions, the K-SF-42 was designed as an alternative short form of the 199 item Arizona Life History Battery (ALHB) and provides an overall life history score with lower scores indicating a faster life history strategy. Analysis of the K-SF-42 scale relative to the ALHB using five cross-cultural samples (including Australia, Italy, Mexico, Singapore, and the USA) indicated the K-SF-42 has high reliability and validity (Figueredo et al. 2017). Specifically, internal consistency reliabilities showed Cronbach's alphas ranging from .84 to .89 with a Cronbach's alpha of .86 for the US sample and correlation coefficients between the K-SF-42 and ALHB ranged from .81 to .98 with a median correlation of .93 and a range of .87 to .95 specific to the US sample. The scale also showed high convergent validity among the subscales with incremental validities for the latent multivariate construct of life history strategies (i.e., total R^2 values across the five cross-cultural samples ranged from .89 to .96, with the R^2 for the USA being .93).

Procedure

Participants were sent a link to complete the survey online. Participants first responded to the demographic questions, followed by the sexual behavior and life history questions. After completion of the survey, participants were compensated for their time.

Results

All statistical analyses were performed using IBM SPSS Statistics for Windows, Version 25.0 (IBM Corp. 2017). The means (and standard deviations) for age until which respondent lived with his/her biological father, number of casual sex partners (i.e., number of different partners participants had sexual intercourse without having an interest in a long-term committed relationship with that person), and overall life history score as a function of sex appear in Table 1. Inspection of the independent sample *t* tests indicates that although there was no significant sex difference in the age until which respondents lived with their biological father, males did have significantly more casual sex partners and a faster life history strategy than did females.

Effect of Father Absence on Casual Sexual Behavior

We conducted a hierarchical regression analysis to examine the effect of father absence on the number of casual sex partners (i.e., number of different partners participants had sexual intercourse without having an interest in a long-term committed relationship with that person). The main effects of sex of respondent and age until which the respondent lived with his/her biological father were entered in step 1; and the interaction between those two variables was entered in step 2. Results from this analysis are summarized in Table 2.

In step 1, the main effects of sex and age until the respondent lived with their biological father explained approximately 13% of the variance in the number of casual sex partners, $F(2, 375) = 26.74$, $p < .001$. An inspection of the standardized regression coefficients (βs) indicates that sex of respondent and age until the respondent lived with their biological father were significant unique predictors of number of casual sex partners. The main effect of sex indicates that males have significantly more casual sex partners than females. The main effect of age until which the respondent lived with his/her biological father indicates that as number of years individuals lived with their biological father growing up increases, their number of casual sex partners decreases.

In step 2, the two-way interaction effect of sex × age until which respondent lived with his/her biological father did not explain any additional variance in the number of casual sex partners, $F(1, 374) = .19$, $p = .67$.

Table 1 Means (and standard deviations) for age until which the respondent lived with his/her biological father, number of casual sex partners, and life history strategy scores as a function of respondents' sex

Measure	Males Mean (*SD*)	Females Mean (*SD*)	*t* (*p* value)
Age until which the respondent lived with his/her biological father[a]	12.77 (8.07)	11.91 (7.96)	− 1.04 ($p = .30$)
Number of casual sex partners	3.36 (2.41)	2.28 (1.85)	− 4.96[b] ($p < .001$)
Life history scores	− 1.02 (4.02)	1.16 (4.17)	4.97 ($p < .001$)

[a] The range of both males' and females' responses on this variable was from 0 to 20 years, indicating there was a full range of responses from complete father absence to complete father presence

[b] The degrees of freedom for this *t* test were corrected to account for unequal variances based on Levene's test for equality of variances

Table 2 Hierarchical regression analysis predicting number of casual sex partners as a function of respondent sex and age until which respondent lived with his/her biological father

Step	Variable	*B*	*SE* (*B*)	β	ΔR^2
Step 1					.13***
	Sex of respondent[a]	1.13	.21	.26***	
	Age lived with bio dad	− .07	.01	− .26***	
Step 2					.00
	Sex × age lived with bio dad	− .01	.03	− .05	

***$p < .001$

[a] Coded as 0 = female, 1 = male

Effect of Father Absence on Life History Strategy

We conducted a separate hierarchical regression analysis to examine the effect of father absence on life history strategy. The variables were entered into the model following the same procedure described above (i.e., the main effects were entered in step 1 and the two-way interaction entered in step 2). Results from this analysis are summarized in Table 3.

In step 1, the main effects of sex and age until which the respondent lived with his/her biological father explained approximately 14% of the variance in life history strategy scores, $F(2, 336) = 28.19$, $p < .001$. An inspection of the standardized regression coefficients (βs) indicates that sex of respondent and age until which the respondent lived with their biological father were significant unique predictors of life history strategy scores. The main effect of sex indicates that males have a significantly faster life history strategy than females. The main effect of age until which the respondent lived with his/her biological father indicates that as number of years individuals lived with their biological father growing up increases, their life history strategy score increases (i.e., they follow a slower life history strategy).

In step 2, the two-way interaction effect of sex × age until respondent lived with his/her biological father did not explain any additional variance in life history strategy scores, $F(1, 335) = .06$, $p = .80$.

Possible Effect of Stepfather Presence Vs. Biological Father Absence

One possible concern about the findings could be that it is not actually the absence of a biological father in development that is driving the effects, rather it could be the presence of a stepfather at some point during development. To test for this possible alternative explanation, we conducted separate hierarchical regression analyses to examine the effect of stepfather presence on casual sexual behavior and life history strategy. Following the procedure used for testing for father absence effects, the main effects of sex and stepfather presence were entered in step 1 and the two-way interaction was entered in step 2. Results of these analyses indicated that stepfather presence did not have an effect on either casual sexual behavior ($\beta = .023$, $p = .69$) or life history strategy ($\beta = -.073$, $p = .20$).

Sex-Specific Developmental Effects of the Timing of Father Absence

Following the developmental categories used by Sheppard and Sear (2011) in investigating the effect of father absence, respondents who experienced father absence some time during the first 20 years of life were split into three developmental age categories: young childhood (father absence occurring by age 7); middle childhood (father absence occurring between ages 7 and 11); and adolescence (father absence occurring between the ages of 11–16). It should be noted that breaking down the continuous variable of father absence into these three developmental age categories is not the same as using father absence strictly as a dichotomous variable. That is, instead of categorizing participants into dichotomous categories of father presence or absence during only the first 5–7 years of life, we used the continuous measure of father absence across the first 20 years of life to indicate at what point in development father absence occurred—did father absence occur during young childhood, middle childhood, or adolescence?

Using these developmental categories, a 2 × 3 ANOVA was used to investigate sex-specific developmental effects of the timing of father absence on respondents' life history strategy with sex of respondent (male, female) and developmental

Table 3 Hierarchical regression analysis predicting life history strategy as a function of respondent sex and age until which respondent lived with his/her biological father

Step	Variable	*B*	*SE* (*B*)	β	ΔR^2
Step 1					.14***
	Sex of respondent[a]	− 2.34	.42	− .28***	
	Age lived with bio dad	.14	.03	.26***	
Step 2					.00
	Sex × age lived with bio dad	− .01	.05	− .03	

***$p < .001$

[a] Coded as 0 = female, 1 = male

categories of when they experienced father absence (young childhood, middle childhood, adolescence) entered as between-subject factors.

Consistent with the previous analyses, there was a significant main effect of sex indicating that males have a significantly faster life history strategy than females, $F(1, 143) = 7.47$, $p = .007$. Overall, sex of respondent in the father-absent subsample explained approximately 5% of the variance in life history strategy scores. There was, however, no significant main effect of developmental categories for when father absence occurred on life history strategy scores, $F(2, 143) = .18$, $p = .83$. Relevant to the prediction that there exist sex-specific developmental effects of father absence, there was a significant interaction between sex of respondent and developmental category for when father absence occurred, $F(2, 143) = 3.41$, $p = .04$. As can be seen in Fig. 1, females had the slowest life history strategy when father absence occurred between ages 7 and 11 and the fastest life history strategy when father absence occurred between ages 11 and 16 (Tukey post-hoc comparisons indicated this difference was significant at $p = .01$); whereas males showed the opposite pattern of results. That is, males had the fastest life history when father absence occurred between ages 7 and 11 and the slowest when father absence occurred between ages 11 and 16 (Tukey post-hoc comparisons indicated this difference was marginally significant at $p = .09$).

Discussion

The purpose of the current study was to examine sex differences in the number of casual sex partners and life history strategy, the effect of father absence on such behavior, and sex-specific developmental effects of father absence dependent on when during development father absence occurs. Consistent with Salmon et al. (2016), we found males had more casual sex partners than females. We also extended the Salmon et al. (2016) findings to life history strategy, finding that males follow a significantly faster life history strategy than females which is consistent with other studies as well (Del Giudice et al. 2015; Griffin et al. 2018).

Father absence was a clear predictor of casual sexual behavior and life history that affected both males and females, rather than a specific effect on females. In addition, consistent with Sheppard and Sear (2011), this effect appears to be driven by biological father absence and *not* stepfather presence. While previous research has indicated father absence from individuals' early childhood environment leads to more risky sexual behavior (including greater engagement in casual sex), our findings suggest the effect is not specific to only early childhood environments (replication of Salmon et al. 2016, findings). Furthermore, the effect of father absence extends to life history strategy and appears to persist across the life span (i.e., beyond adolescence and young adulthood). Another recent study found similar results using a large American sample of individuals between the ages of 18 and 54 finding that stressful childhood environments (e.g., growing up with a parent who was depressed, abused alcohol and/or drugs, experiencing parental divorce during childhood, and/or exposure to violence) influence the adult reproductive strategies of males and females (Anderson 2017). Specifically, it was found that both men and women exposed to such stressful childhood environments were more likely to exhibit behaviors consistent with a faster life history strategy (i.e., remain unmarried, be divorced/separated, and engage in risky sexual behavior) after controlling for other potential confounding factors such as age, education, socioeconomic status, ethnicity, and geographical region. Together with the current findings, this suggests that the effect of father absence is not limited to adolescence and young adult behavior, rather the effect of childhood environments on adult reproductive strategies appears to persist across the life span.

Finally, as a contribution to the literature, we also found evidence for sex-specific developmental effects of father

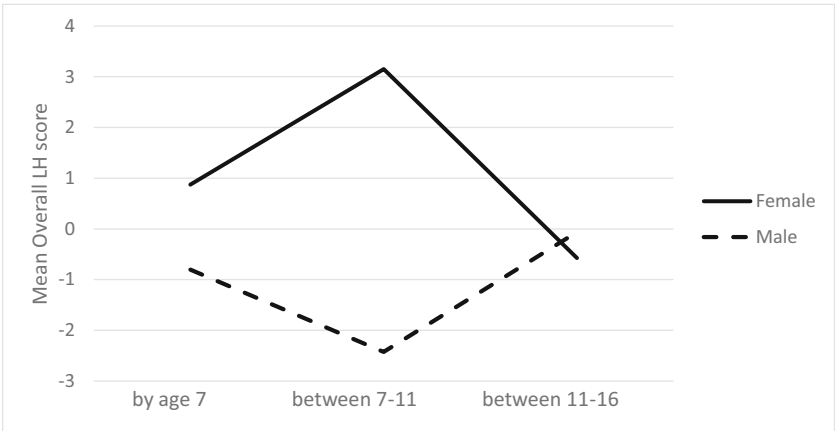

Fig. 1 Mean life history (LH) strategy scores as a function of sex of respondent and developmental age category for when father absence occurred. [Note: The same pattern of results was found when looking at the casual sexual behavior of males and females as a function of developmental timing of father absence; i.e., when father absence occurred between ages 7 and 11, females had the least casual sexual partners and males had the most relative to father absence occuring at the other ages]

absence dependent on when during development father absence occurs. Specifically, we found that father absence occurring in middle childhood (between ages 7 and 11) was associated with a slower life history strategy in females and a faster life history strategy in males. Whereas, father absence occurring during adolescence (between ages 11 and 16) was associated with a faster life history strategy in females and a slower life history strategy in males. While to our knowledge this is the first test for sex-specific effects of timing of father absence using father absence as a continuous variable across the entire span of development, our findings are consistent with studies that have investigated such effects of timing in females. For example, Sheppard et al. (2014) found that although father absence in early childhood had no effect on the girls in a Malaysian sample, father absence experience in later childhood (between ages 8 and 15) was associated with earlier age at first birth and marriage but was not associated with earlier puberty. These findings suggest that father absence differentially affected the development of females dependent on the timing in development in which father absence occurs. That is, while father absence in early childhood may lead to earlier pubertal timing in females, father absence at later ages in development may lead to accelerated reproductive behaviors. Our findings suggest that the effect of timing of father absence on sexual behavior is not only not specific to females, but differentially affects the development of reproductive strategies of males and females depending on when during development father absence occurs.

Limitations and Future Directions

As one of the goals of the current study was to extend the findings of the effects of father absence beyond adolescence and young adult behavior, we attempted to recruit individuals beyond typical college student ages. We were only marginally successful at this, however. Although the age range of the overall sample was from 17 to 62 years of age (18 to 60 years of age for the subsample for testing effect of timing of father absence), the mean age was approximately 27 years old which, although beyond the typical college student age, is still within young adulthood stage of development (mean age for the subsample was slightly higher at approximately 29 years of age). Therefore, more research focused on the sexual behavior of individuals beyond young adulthood is still needed to further investigate whether the effects of father absence on casual sexual behavior and life history strategy does indeed persist across the life span.

The relatively small subsample for the developmental analysis ($n = 149$) should also be noted as a limitation. Although we did find significant sex-specific effects of father absence dependent on when in development it occurred, the effect size was small. While this is not unexpected given the myriad of other factors that contribute to following a specific life history strategy (i.e., as discussed in the Introduction, father absence is only one environmental cue that influences the development of life history strategies), it is possible that with a larger sample the effect size may be larger. Future research specifically targeting individuals who grew up in father absent homes, occurring at different times throughout development, is needed. That research could also further refine the question of the role of paternal investment (in relation to father absence/presence) on the reproductive outcomes of males and females. Although, we would argue, that there is no quantity or quality of paternal investment if fathers are completely absent, differential investment of fathers who are not completely absent could potentially influence their children's sexual maturation and/or behavior dependent on when in development that investment occurs (or not). Furthermore, given the pattern of results in the current study, future research may also want to examine potential nonlinear associations between the timing of father absence and life history strategies.

Another potential limitation or criticism of the current study could be that we did not control for genetic confounds of the effect of father absence on sexual behavior. Although recent work posits that genetic confounding explains the effects of father absence, this work was based on mathematical modeling and not actual genetic data (Barbaro et al. 2017). In a test of the genetic confounding hypothesis (i.e., gene-environment correlations cause spurious relationships between father absence and females' age at menarche and first birth), Gaydosh et al. (2017) used molecular genetic data and found that father absence and polygenic scores each independently predicted reproductive timing. That is, there was no evidence to support the genetic confounding hypothesis regarding the effect of father absence on females' sexual maturity and behavior. These findings suggest that (at least for females) father absence, as an index of stressful childhood environments, uniquely explains variance in sexual behaviors beyond genetic inheritance. Similar studies should be conducted to examine the genetic confounding hypothesis for males.

Finally, the current study focused exclusively on sexual behavior, not on maturation (i.e., pubertal timing). Therefore, more research is needed to investigate the effects of father absence (as a continuous variable; i.e., not limited to only the first 5–7 years of life) on the pubertal timing of males and females in order to determine whether there are sex-specific developmental effects on pubertal timing as well as sexual behavior. Previous research findings of delayed puberty for males whose fathers left when they were between the ages of 11 and 16 (Sheppard and Sear 2011) and no effect of father absence occurring between ages of 8 and 15 on females' pubertal timing (Sheppard et al. 2014) suggest such sex-specific developmental effects on sexual maturity may exist dependent on when during development father absence occurs. Therefore, future research is needed to investigate sex-

specific developmental effects of father absence on pubertal timing.

Conclusions

Effects of father absence on sexual maturity and behavior are often conceptualized as being specific to females. The findings of the current study, however, suggest that the effects are not only specific to females. Findings from the current study also provide clear evidence that the timing of when during development father absence occurs differentially affects the casual sexual behavior and life history strategies of males and females. When father absence occurred during middle childhood, females exhibited faster life history strategies whereas males exhibited slower life history strategies. However, when father absence occurred during adolescence, females exhibited slower life history strategies and males exhibited faster life history strategies. Therefore, not only does father absence influence the reproductive strategies of both males and females, depending on when in development it occurs, it has opposite effects.

Compliance with Ethical Standards

Conflict of Interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

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