Criminality and Family Formation

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Chapter 4

TIMING OF CHANGE IN CRIMINAL OFFENDING AROUND THE TRANSITION TO PARENTHOOD: GENDER AND CROSS COUNTRY COMPARISONS FOR HIGH-RISK INDIVIDUALS

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Abstract

Objectives. *This article examines the timing of change in criminal offending relative to entrance into parenthood, in light of four competing theoretical frameworks (social control, routine activities, strain and cognitive transformation). Moreover, it analyzes whether criminal trends are gender or country specific.* ***Methods.*** *Using samples of high-risk men and women in The Netherlands and Norway, this study investigates monthly changes in offending probabilities around the time of first birth (5 years before, 5 years after). The smoothing splines technique implemented allowed for a flexible exploration of changes in offending probabilities for both pre-childbirth and post-childbirth periods.* ***Results.*** *Results show that the probabilities to offend decline ahead of childbirth for all individuals analyzed. The post-childbirth period is characterized by increases in offending probabilities. However, in these overall trends, the exact timing and magnitude of change differs by gender and country of residence.* ***Conclusions.*** *Results offer partial support for the cognitive transformation hypothesis as offending rates decline before childbirth. The post-childbirth period converges with assumptions of the strain theory (for males in particular), as offending probabilities increase in this period. Additional analysis investigating changes in property offending shows that economic strain does not fully explain the upward trend of the overall offending post-childbirth.*

1. INTRODUCTION

Highly influential theory of age-graded social control (Sampson and Laub, 1993: Laub and Sampson, 2003) suggests that adult transitions have the potential to modify a criminal trajectory towards desistance. Of the family-related transitions, marriage received most attention (to name some studies: Sampson et al. 2006; King et al., 2007; Bersani et al., 2009; Theobald and Farrington, 2009). Although less empirically studied, other transitions such as becoming a parent are reported as being potentially equally important (Laub and Sampson, 2003, pp. 135). However, only few empirical studies analyzed the transition to parenthood (Edin et al., 2004; Giordano et al., 2002; Savolainen, 2009; Monsbakken et al., 2013).

The effect of parenthood on crime is expected to work through similar mechanisms as for marriage since becoming a parent has broad consequences on family-life, leisure activities, and perception of self, leading towards a conventional life-style (Laub and Sampson, 2003). On the other hand, parenthood might also lead to increased economic responsibilities that can represent a source of stress that can stimulate engagement in crime (Broidy and Agnew, 1997). More specifically, increased economic responsibilities and needs could be seen as incentives for illegal earnings in the context of limited law-abiding alternatives.

Previous research has shown gender differences in the effects of family-related transitions on crime (Rhule-Louie and McMahon, 2007; Zoutewelle-Terovan et al., 2012). To a limited extent, existing literature suggests that gender differences apply to the parenthood-offending relationship as well (Graham and Bowling, 1995; Giordano et al., 2002). Although modern society is characterized by less gender inequality in the division of domestic labor (including child-rearing activities), a certain level of inequality continues to exist between sexes (Feeney, 2001). As such, parenthood might have a stronger influence on females who often remain the primary care-givers for children.

Existing theoretical frameworks explaining the effects of parenthood on crime also assumed context universality. However, inconsistent empirical results shown in various studies (Blokland and Nieuwbeerta, 2005; Giordano et al., 2002; Savolainen, 2009; Uggen and Kruttschnitt, 1998) raise two important questions: are there contextual differences, or, are the dissimilarities related to differences in samples and methods. In other words, it is important to understand whether theories apply differently in various social contexts or not. To properly answer such questions, one needs cross-national comparisons using similar designs and methods of investigation across countries.

For research on desistance it is reasonable to limit the study to high-risk samples who has reached a certain threshold of criminal offending (Laub and Sampson, 2003, pp. 22). Such individuals associated with troubled backgrounds, youth misconduct, and delinquency have been later registered as high-risk career criminals (Lynam, 1996) and serious offenders (van der Geest and Bijleveld, 2008), and represet a serious social and economic problem (Cohen and Piquero, 2009). As such, researchers should allocate particular attention to potential criminal path modifiers (such as parenthood) for these high-risk individuals.

In this study we analyze changes in criminal trajectories in relation to entrance into parenthood. Moreover, using data from the Netherlands and Norway, our comparative design address whether the conclusions hold in two different social contexts. The analytic approach

focuses on the timing of change around entrance into parenthood as it has previously been done for marriage (Laub et al., 1998; Duncan et al., 2006; Lyngstad and Skardhamar, 2013) and employment (Skardhamar and Savolainen, 2014). We aim to answer the following research questions:

RQ1: *How does the likelihood of offending change after the birth of the first child compared to the pre-birth period?*

RQ2: *Are the trends in offending around entrance into parenthood different for males and females?*

RQ3: *Do the trends for males and females differ across social contexts (in The Netherlands and Norway?*

2. THEORETICAL BACKGROUND

According to the age-graded theory of social control (Sampson and Laub, 1993, pp. 8; Laub and Sampson, 2003, pp. 135), becoming a parent represents a transformative event where social bonds discourage engagement in crime. Many of the same mechanisms that make other life-course transitions potential *turning points* might also apply to the transition to parenthood, effectively knifing off the past from the present. For example, the parental role is associated with a set of non-criminal expectations from the network (family, peers, social institutions), and, even stronger than for marriage, this social network might be more critical to offending. In addition, parenting offers an opportunity to transform one's identity and has the potential to promote a non-criminal life-style.

From the perspective of routine activities theory, a direct influence of parenthood on offending occurs given drastic *changes in the daily routines* associated with child-rearing activities and other parental responsibilities. As such, by increasing the amount of time spent within the family, previous life-styles and circumstances promoting offending diminish or disappear (Cohen and Felson, 1979; Horney et al., 1995). Regardless of whether parental roles lead to a change in one's sense of self or represent a matter of time budget, these changes have the potential to restrain individuals from crime (Osgood et al., 1996; Warr, 1998). Although the quantitative analysis of Sampson and Laub (2003) did not provide support for the effects of parenthood on offending, the narratives of the Glueck's men pointed to dire changes in criminal behavior as a result of becoming a parent. Since parental activities generally seem to be associated with drastic changes in the daily routines, especially within the first years of parenthood (Osgood and Lee, 1993), a more abrupt shift in offending after childbirth could be hypothesized.

The cognitive transformation theory (Giordano et al., 2002) highlights internal individual transformations occurring prior to the transition as determinants of the desistance path, and considers parenthood as a *hook for change* influencing a more abrupt transformation in an already existing desistance trend. For the cognitive transformation theorists, parenthood is seen as having the potential to activate change, but this is only the case if they are already motivated to adopt change in their life. As such, entering a pro-social pathway prior to becoming a parent produces in part a systematic selection into parenthood.

Although the majority of criminological theories explaining the influence of parenthood and offending highlight a negative association, *strain* theory (Agnew, 1992; 2006) hypothesizes an inverse relationship. More specifically, negative relations and situations constitute sources of strain, and individuals respond to this strain through criminal acts (Lilly et al., 2002). Furthermore, parenthood introduces a particular type of strain (economic strain) often associating crime with financial needs (Wakefield and Uggen, 2004; Shannon and Abrams, 2007). As financial hardship is common among disadvantaged groups (e.g. high-risk individuals), and children require additional resources, it could be that the increased need for necessities (food, housing, day care) stimulates involvement in crime and particularly property crime.

Each of the above mentioned theories suggests a negative relationship between parenthood and crime, with the exception of strain theory which opens the possibility of an opposite effect. However, they differ in defining the moment *when* the change occurs relative to the time of the transition. Deriving from these theories, we can suggest four different ideal-typical average trajectories of criminal behavior related to the transition to parenthood. These hypothetical and stylized trends are illustrated in Figure 1. First, according to the *turning point* hypothesis entrance into parenthood causes a direct change in offending leading towards cessation of crime. This change is gradual, but set in motion by the transition (Laub et al., 1998). Second, changes in *routine activities* define a major shift towards desistance immediately after childbirth. Third, the *hook for change* hypothesis suggests that the desistance process starts before the transition to parenthood, and we expect additional decline post-birth. Fourth, parental *strain* hypothesis describes a gradual increase in crime after childbirth. Describing the empirical patterns in the data is thus one basis for discussing to what extent each theory is consistent with the data. Thus, the trajectories in Figure 1 are theoretical hypothesis to be checked.

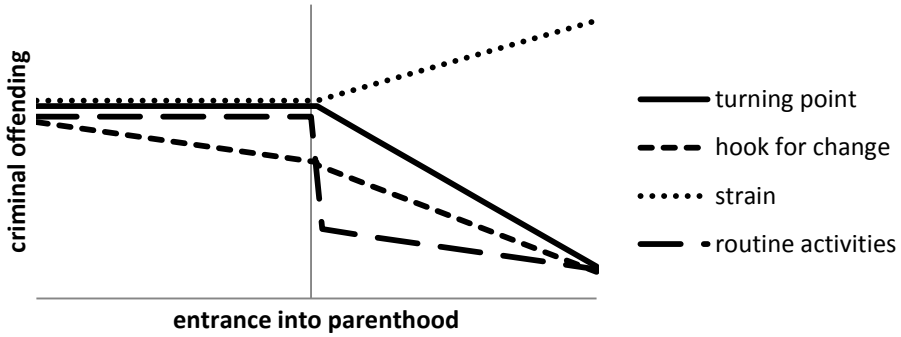

Figure 1. Theoretical trends for criminal offending

Although theories describing the linkage between parenthood and crime do not explicitly address the possibility of gender moderation, distinctive gender-based parental roles assumed might be considered as a prerequisite for differences in offending between males and females. The natural predestination of women for pregnancy, birth and breastfeeding offers them a central place in the early life of children. Despite fathers' increased involvement in child care over the past decades, women remain the primary caregivers (Zimmerman et al., 2001). As such, mothers, will encounter more drastic changes in the daily routines (Cowdery and Knudson-Martin, 2005; Kruttschnitt, 1996). Given that

the father tends to represent the main breadwinner, financial strain might be exacerbated for males and reflected in increases in offending that provide financial gains such as property offenses (Broidy and Agnew, 1997). All in all, theoretical criminal trajectories drawn in Figure 1 are expected to show a steeper decline for females when following the desistance hypotheses (*turning point*, *routine activities*, *hook for change)*, whereas the trajectory reflecting parental *strain* might be characteristic for males.

3. EMPIRICAL BACKGROUND

3.1. Parenthood and desistance: a controversial relationship

To a large extent, qualitative studies are abundant with stories evoking parenthood as a catalyst for change for both males (Laub and Sampson, 2003; Edin, 2004; Shannon and Abrams, 2007) and females (Giordano et al. 2002; Edin and Kefalas, 2005). Nevertheless, quantitative approaches of the interviewed respondents often did not confirm that parenthood actually leads to an embracement of conventional adult roles (Sampson and Laub, 1993; Giordano et al., 2011). To date it remains unclear whether quantitative and qualitative studies test different aspects of the parenthood-crime relationship, or whether they test similar aspects but qualitative approaches unsuitably make use of a retrospective view on motivations conducting towards changes in behavior (Kreager et al., 2010).

Several quantitative studies conclude that parenthood reduces offending. In a sample of Finish recidivist men, Savolainen (2009) found that becoming a father was associated with 15% reduction in (re)offending. Findings for high-risk men were confirmed by Zoutewelle-Terovan et al. (2012) in the Netherlands, where fatherhood reduced the rate of offending by 33%. For females, Kreager et al. (2010) found that both pregnancy and motherhood reduced overall delinquent behavior and stealing. Similarly, Uggen and Kruttschnitt (1998) concluded that mothers were less likely to engage in illegal earnings.

A different group of studies offered support for the hypothesis that time spent engaged in parental activities are directly linked to changes in offending. In a cross-sectional study, Graham and Bowling (1995) found that females spending most nights at home were three times more likely to desist compared to their counterparts developing evening activities outside the house. Moreover, for females desistance was abrupt and directly related to childbearing.

Other scholars invoked context effects when describing the parenthood-offending relationship. For males, fatherhood had stronger crime-inhibiting effects when their children were born within a marital relationship (Savolainen, 2009), they ensured high-quality relationships with their children (Ganem and Agnew, 2007), and were not affected by financial strain and lack of social capital (Giordano et al., 2011). For females, parenthood inhibited offending when they shared a common household with the biological father, displayed "wantedness" of the pregnancy (Giordano et al., 2011), did not suffer from disadvantageous socioeconomic conditions (Edin and Kefalas, 2005) and had high quality relationships with their children (Ganem and Agnew, 2007). Such context effects might sustain an ongoing desistance process or serve as an opportunity for change for those already motivated to do so (Giordano et al., 2011).

A different group of studies found no association between parenthood and offending (Wakefield and Uggen, 2004; Blokland and Nieuwbeerta, 2005). Such results were confirmed when analyzing both males (Sampson and Laub, 1993; Graham and Bowling, 1995) and females (Giordano et al., 2002; Zoutewelle-Terovan et al., 2012).

3.2. Parental strain and criminogenic choices

Scholars such as Ross and Huber (1985) argued that families with children show increased economic strain compared to childless families. A translation of parental strain into criminal activities might occur especially for disadvantaged individuals experiencing financial hardship (Daly, 1998; Giordano et al., 2011), difficult intimate relationships (Graham and Bowling, 1995), difficult children (Corman et al., 2011), or limited social support (Giordano et al., 2011). Importantly, high-risk samples are more likely to be exposed to such disadvantages.

Quantitative within-individual analyses showed that parenthood can lead to an increase in offending. When studying individuals with an arrest history, Wakefield and Uggen (2004) concluded that increases in illegal earnings are found only for mothers, regardless of whether the father was present or not. Another study concluded that parenthood increases illicit drug use within the next year for both males and females, nevertheless, the effects were stronger for males (Thompson and Petrovic, 2009). Additionally, between-individual analysis also found that parenthood increases offending. In the UK, Farrington and West (1995) showed that men with a biological child were more likely to be convicted compared to non-fathers. Also, men separated from their biological child or conceiving out-of-wedlock had an increased risk of offending. Similar conclusions were extracted when analyzing adolescent fathers (Thornberry et al., 2000). Although for females it was often the case that studies could not identify any relationship between parenthood and offending (Kreager et al., 2010; Zoutewelle-Terovan et al., 2012), the study of Giordano et al. (2002) found a positive relation between parenthood and economic crime.

3.3. Timing of change in criminal trajectories

Life-course research provides ambiguous interpretations of the exact timing of change in offending related to parenthood (before pregnancy, pregnancy related, birth related). One explanation is that the focus has been placed on modeling pregnancy and/or post birth causal effects (Kreager et al., 2010), and not specifically on changes in offending in the pre-pregnancy/birth periods. Since the theories (except strain theory) similarly predict decline in offending on average, it is primarily the timing of change which sets the predictions apart.

Analyzing changes in offending in the period surrounding the first childbirth, Monsbakken et al. (2013) concluded that for both males and females the strongest decline in crime occurs pre-birth, while the transition to parenthood offers the most beneficial long-term effects for men. As declines in the likelihood to offend occurred long before the pregnancy, the authors' conclusions provide stronger support for the hook for change hypothesis.

Moreover, for females inhibition of crime seems to be related to changes in the daily routines surrounding pregnancy and toddlerhood. Although their study offers a good starting point in describing the timing of change in criminal trajectories, the time-frame (events at yearly level) might have been slightly too limited to highlight mechanisms of change, especially around the pregnancy and childbirth.

4. FAMILY FORMATION IN THE NETHERLANDS AND NORWAY

After the 1970s, in many Western societies (such as the Netherlands and Norway) family-life trends have become less standardized (Elzinga and Liefbroer, 2007) showing increases in unmarried cohabitation, postponement of marriage and parenthood, reductions in teenage pregnancies, and increases in births outside a marital union (Billari and Liefbroer, 2010). Although many of those demographic changes have become common, some changes occurred with different magnitudes in each of the countries analyzed. While the Netherlands follows average trends related to family-formation events in Europe, Norway is considered one of the frontrunners (Sobotka, 2008; Kiernan, 2004). Overall, in The Netherlands cohabitation and marriage among young adult couples is equally divided, whereas the Nordic countries show the highest incidence of cohabitation with more than 70% of the couples aged 25-34 registered as cohabiters (Kiernan, 2004). Differences between the two countries are highlighted also with respect to non-marital childbearing: while the Netherlands has moved from about 2% in 1970 to about 25% in 2000, Norway has moved from about 8% in 1970 to about 50% in 2000 (Kiernan 2004). Regarding the average age of mother's first birth, the two countries followed relatively similar developments: in the Netherlands the average age of female's first birth was 24.3 in 1970 and 29.4 in 2010; in Norway females entered parenthood on average at age 23.2 in 1970 and at age 28.2 in 2010.[9]

Although both modern European societies, The Netherlands and Norway provide different parental benefits within the social system (Thevenon, 2011), and these differences could shape distinct criminal trajectories for each country. For example, mothers in The Netherlands receive 46 weeks of paid maternal leave, whereas in Norway mothers are entitled to 16 paid weeks. For fathers the differences are also considerable. In The Netherlands a man may take two days of paternity leave when a child is born, whereas in Norway a father benefits of at least 12 weeks of fully paid leave. Moreover, unpaid leave for fathers in The Netherlands can be taken for 26 weeks, whereas in Norway fathers may request up to one year of unpaid leave. Considerable differences between the two social systems are observed also in the day care facilities for parents. In Norway, day care is heavily subsidized by the government, whereas in The Netherlands the costs for parents are relatively high. The more parental-friendly social policies in Norway (longer parental leave, childcare at highly subsidized rates, workplace flexibility etc.) could reduce parental strain, and thus lead to lower offending rates after childbirth. Conversely, the presence of good childcare facilities might diminish or discard the influence of parenthood on offending.

[9] Sources: Statistics Netherlands - www.cbs.nl; Statistics Norway - www.ssb.no.

5. METHOD

5.1. Sample

For this study two contemporary high-risk samples from The Netherlands and Norway were considered. We started with data from a longitudinal study carried out in The Netherlands, containing individuals institutionalized during adolescence in a juvenile treatment center. The 540 Dutch respondents (270 males, 270 females) were born between 1969 and 1977, and were treated in the residential care setting for behavioral or familial problems, often including delinquency. With the aim to analyze behavioral changes before and after the birth of the first child, from the 540 individuals we selected only the ones who became parents[10] (100 males and 191 females). Although for the Dutch study there is no direct comparable setting in Norway, the system of registry data containing the total Norwegian population (Lyngstad and Skardhamar 2011) allows great flexibility to select various samples based on specified criteria. To specify these criteria, we focused on two aspects: a) obtaining similar samples based on youth factors (criminal involvement, family background); b) obtaining similar samples based on characteristics related to entrance into parenthood (age and marital status when entering parenthood, criminal involvement).

The construction of the Norwegian high-risk sample proceeded as follows. First, from the total Norwegian population we retained only individuals who became parents up until age 33 (as this was the case in the Dutch sample) and were born between 1970 and 1990. Second, for both Dutch and Norwegian parents we constructed a set of variables to be further used in the matching procedure: *parents divorced* (dichotomous variable showing whether individuals experienced divorce of the biological parents in youth[11]); *youth offending* (dichotomous variable recording whether the individuals committed an offense before age 16); *offender 16 to 1st child* (dichotomous variable showing whether an individual committed an offense between age 16 and childbirth); *age of entering parenthood* (categorical variable recording the age range in which individuals entered parenthood using 3 years age ranges[12]; the variable contains six categories with the first category including ages 16-18, and the last category ages 31-33); *married at childbirth* (binary variable showing whether individuals were *married* when the first child was born); *gender* (binary variable showing whether a respondent is male or female). In the third step, we focused on the Dutch sample and constructed frequency distributions given all possible combinations of the previously defined variables. To offer an example, this six-way cross tabulation showed for one of its cases that,

[10] A question that rises with registered data is whether entrance into parenthood is properly adressed given that individuals (especially males) might have become parents earlier without an official parental registration. We could adress the issue on a subsample of Dutch respondents (n=139) who have been recently interviewed. With the exception of 5 males and 3 females, there was concordance between registered and self-reported information on all parenthood data. Thus, we do not consider unregistered parenthood a reason of concern.

[11] This variable was measured at institutionalization in adolescence for the Dutch respondents, and at age 18 for the Norwegian respondents.

[12] Although initially we focused on an exact age match, the procedure failed to identify a matching sample for the analysis given the low number of inhabitants in Norway (about 5 million individuals) and the conditioning on a relatively complex set of inclusion criteria. For the final selection we used 3 years age ranges.

from the total of 191 women, 4 of them had their first child between ages 25 and 27, did not experience parental divorce in youth, did not offend in youth or at any moment before entering parenthood, and were not married when the first child was born. In the fourth step, we randomly selected the same number of Norwegian persons, replicating exactly the contingency table of the Dutch sample on the specified criteria. Following the previous example, the Norwegian sample now also contains 4 individuals who became parents between ages 25 and 27, did not experience parental divorce in youth, did not offend in youth or before entering parenthood, and were unmarried when the first child was born.

The matching procedure implemented ensured the availability of two samples (Dutch and Norwegian), resembling on the exact combinations of the specified high-risk characteristics. After performing some additional exclusion criteria (availability of post-birth information, control for death and emigration), the high-risk groups for this study included 93 males and 186 females for the Dutch sample, and 100 males and 189 females for the Norwegian sample. In both samples, individual level information was used for a period of maximum 121 months, with a median observation period of 106 months for the Dutch data and 121 months for the Norwegian data.

5.2. Data and measures

Data sources

For the sample in The Netherlands, information on parenthood, marital status and other demographic variables was obtained from the *Municipal Population Register*, a centralized electronic registration system containing data on all registered inhabitants of The Netherlands. Information on criminal offending was obtained from *Judicial Documentation* abstracts of the Ministry of Justice (comparable with "rap sheets"). These files contain information on all cases registered by the police at the Public Prosecutor's Office, offenses committed and the corresponding verdicts. Offenses were recorded starting with age 12, the minimum age of criminal responsibility in The Netherlands. Further, offenses followed by acquittals or so-called technical dismissals were eliminated from the analysis. Information on parental divorce was obtained from *personal files* completed during institutionalization in the juvenile treatment centre (see van der Geest et al., 2009).

For the Norwegian sample we extracted information from the administrative records at Statistics Norway, where data from different databases can be linked at the individual level on personal identification numbers. For this study, the population registers provided information on family background, parental and marital status, and other demographic data. The criminal statistics register system (linked with police records) provided information on all solved cases associated with criminal offenses. For the current analysis, we used only cases for which a legal decision against the perpetrator was taken given that for a considerable number of offenses committed the prosecution is dropped although the perpetrator was found (e.g. mental health problems, case transferred for mediation). Furthermore, the solved cases included complete information on each offense and the exact date when the offense was committed. As such, offenses followed by criminal charges (and not convictions) were registered starting with age 10. This offered the possibility to extend

the observation period regarding criminal involvement as convictions would have been recorded only starting with age 15 (the minimum age of criminal responsibility in Norway).

Variables

Grouping variables. To ensure the grouping of all variables around entrance into parenthood, a time-varying ***time*** variable was constructed. The variable contained for each individual a maximum of 121 months (time points) around the birth of the first child, with values ranging from -60 to +60 (negative values for pre-birth months; positive values for post-birth months; 0 for the month of birth). Additionally, we constructed the binary variable ***period*** to separate observations into two periods: pre-birth months (value of 0), post-birth months – including the month of birth (value of 1).

Dependent variables. The overall criminal ***offending*** of the individuals was recorded as a binary time-varying indicator distributed around entrance into parenthood to fit the format of the *time* variable. The variable takes a value of 1 in each month a person committed at least one offense (0 otherwise). For the second step of the analysis focusing on changes in offending possibly associated with economic needs we constructed a dichotomous time-varying variable reflecting respondents' involvement in ***property*** offending for each month under observation (1=committing at least one property offense). By using dichotomous dependent variables we classify individuals into offenders and non-offenders therefore focus on the analysis of cessation of crime rather than reduction/increase in crime.

Covariates. To isolate the effects of parenthood from ageing effects, we constructed a time-varying ***age*** variable recording the exact age of the individual (in years) at the beginning of each observed month. Since previous literature suggested that the relationship between parenthood and offending is moderated by marriage, we constructed a time-varying dichotomous variable showing the ***marital status*** of the person in each specific month under observation (1=married). Further, to account for ***youth offending***, a time-invariant binary variable was constructed (1=committing at least one offense before age 16). Last but not least, the variable ***additional children*** was constructed as a dichotomous time-varying variable controlling for the presence of additional children born within the observation period (1=one or more other children).

5.3. Analytic strategy

The chronological occurrence of events was accounted for by variables grouping information around the birth of the first child in a person-month file. As such, we recorded information starting with the 60th month before the birth of the first child, up until the 60th month after childbirth. The pattern of change over time in criminal trajectories related to the entrance into parenthood was modeled using *generalized additive models* (GAMs), also known as nonparametric *smoothing splines*. GAMs are derived from the more familiar generalized linear models, with the specification that the linear predictor represents a sum of smooth functions of some determined covariates (Wood, 2006). By specifying models in terms of smooth functions rather than parametric relations, GAMs offer high flexibility in the contour of the trends, without pre-imposing an overall specific shape (e.g. linear or curvilinear).

A general structure of a smoothing spline containing a smooth function of a single covariate is defined as it follows:

(1) $$y_i = f(z_i) + \varepsilon_i$$

where *y* represents the outcome variable, f is a smoothing function of the covariate *z*, and ε is the error term (Wood, 2003). As the use of smoothing splines is less common in criminology, we provide a more detailed explanation of the technique. The principles behind this method are maybe best understood when using the most basic specification of the smooth function which is to define it as a cubic spline. Wood (2006) offers a visual representation of a cubic spline which is replicated in Figure 2. For this spline, f is separated into chunks of cubic polynomials joined to become continuous up to the second derivatives. The points where the sections of cubic polynomial are united are called knots, and are spread evenly through the covariate values.

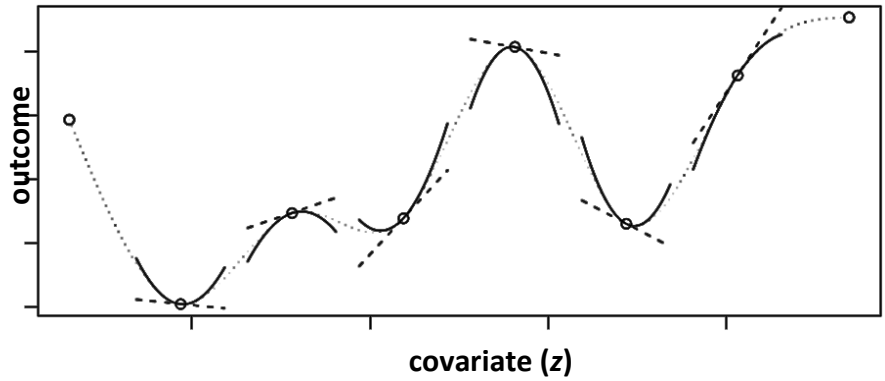

Figure 2. Example of a cubic spline presented by Wood (2006, pp. 124)

A limitation of the cubic spline (and in general polynomial splines) is that it makes arbitrary choices about the smooth basis, knots locations, and the number of knots (see also Skardhamar and Savolainen, 2014). With the aim to provide regression splines following as close as possible the natural development of the data, we chose to fit *thin plate regression splines* (TPRS). The TPRS as defined by Wood (2003; 2006) have the advantage of balancing between under-smoothing and over-smoothing, and do not force one to make choices about basis functions or knots as the parameters to be estimated result directly from the data[13].

The general structure of the GAM containing a smooth function of a single covariate (in our case *time*) defines the expected outcome for person *i* at time point *t* as:

(2) $$g(\mu_{it}) = \beta_0 + f(time_{it}) + X_{it}\theta$$

where g is a specific link-function, β_0 represents the overall intercept, f is a smoothing function of the *time* covariate, and X_{it} contains the vector of parametric terms (explanatory

[13] As detailed explanations of the TPRS go beyond the purpose of this study, we recommend interested readers to consult Wood (2003; 2006).

variables) with the corresponding estimated coefficients θ. However, as we wanted to estimate the amount of change in offending at the transition point (birth of the first child), the use of a single smoothing term (equation 2) would have been unable to capture any shifts in offending occurring at the month of birth. We addressed this by introducing a discontinuity in the pattern, and fitting the spline function separately for the pre-birth and post-birth periods as it follows:

(3) $$g(\mu_{it}) = \beta_0 + k_{it}\beta_1 + f_1(time_{it}) + f_2(time_{it}) \times k_{it} + X_{it}\theta$$

In this third equation, the β_1 coefficient is capturing the difference in offending at the moment of birth, whereas *k* represents the *period* variable separating pre-birth and post-birth periods.

Following the binomial distribution of the dependent variable (offending), we specified models as logistic regressions, controlling for a set of explanatory variables (youth offending, marital status, additional children). In addition, to capture the curvilinear relationship between ageing and offending we controlled for linear and quadratic *age* variables. Given our focus on gender and cross-national differences, separate models were estimated for each gender within each country. It is important to note that results of the smoothing splines have a less straight-forward interpretation given that the non-parametric does not provide conventional regression parameters (as multiple coefficients are estimated for each chunk of data). Therefore, the final results are reported as predicted probabilities at the sample mean for the covariates. In addition, as the models allow inclusion of parametric terms, the estimated coefficients for the control variables will be reported in the customary format. The analyses were performed by use of R software and the mgcv package for GAMs.

6. RESULTS

6.1. Descriptive statistics

Parenthood

Both similarities and differences are observed between countries and across gender. On average, high-risk males had their first child at age 27 in The Netherlands and age 26 in Norway. In both countries, high-risk females gave birth to their first child on average at age 21. Further, both Dutch and Norwegian high-risk females entered parenthood earlier compared to the males: before 20 years of age, 48.9% of the Dutch females and 43.9% of the Norwegian females became mothers (compared to 6.5% Dutch males and 7.0% of the Norwegian males). In within the five years observed after childbirth, 37.6% of the Dutch males and 42.5% of the Dutch females became parents again, while in Norway 33.0% of the males and 40.1% of the females had additional children. Important to note is that none of the individuals in our samples had a child before age 16.

To better understand characteristics of the high-risk groups in relation with population patterns, we compared our high-risk persons with comparison groups[14] extracted from the general population. Figure 3 (A and B) offers a country specific overview of the entrance into parenthood patterns for both high-risk and control groups. With no outstanding country differences observed for males, the graphs show that both high-risk and control males develop relatively similar trends (with high-risk males entering parenthood slightly earlier). For females, although the trends for high-risk groups are almost identical across countries, visible differences are observed when comparing them to their control groups. In The Netherlands, about 62.4% of the high-risk females had their first child before age 21, compared to only 4.6% in the control group (who reached the same percentage only around age 29). In Norway, the differences between high-risk and control females are smaller: by age 21 about 60.3% of the high-risk females gave birth to their first child compared to the 33.3% in the control group (the control group reached the same percentage around age 24).

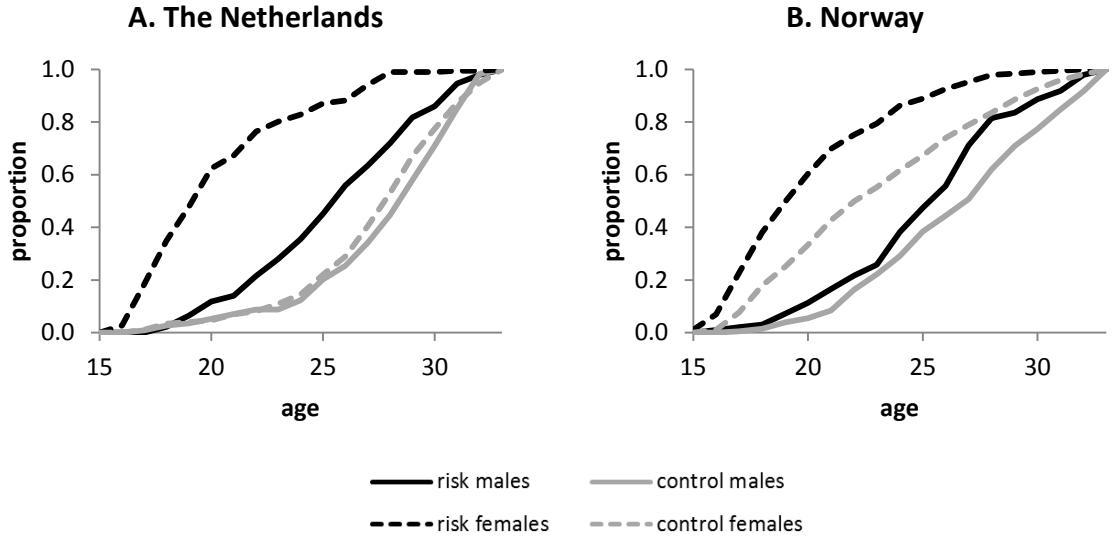

Figure 3. Cumulative distribution of the age of entering parenthood

Criminal offending

A considerable number of individuals in our high-risk samples engaged in criminal behavior at early ages. Due to the matching procedure, engagement in criminal behavior in youth was similar for The Netherlands and Norway (69.0% of the high-risk males and 42.9% of the high-risk females committed at least one offense before age 16).

For a better understanding of the development of criminal behavior of our high-risk individuals we provided age-crime curves for a complete criminal follow-up and compared them with the corresponding crime trends of the control groups extracted from the general

[14] For the Netherlands the comparisons group contained individuals in the total population matched one-by-one with the initial 540 risk individuals based on date of birth, gender (and name initials in case of multiple matches). Further, only individuals becoming parents were retained in the control groups. For Norway, conditioned that the individuals entered parenthood until age 33, an exact match on gender and date of birth were performed (followed by a random selection of individuals in the few cases where multiple matches were still retained after the first two selection criteria).

population. Figure 4 (A and B) presents the prevalence of offending at every specific age observed. For Dutch males, high discrepancies in offending are recorded between the high-risk and control groups. While for the controls the highest value registered was 5.7%, for the high-risk group 12.9% was the lowest value recorded (with peaks observed at ages 15-16 when 52.7% of the males offend at least once). Dutch high-risk females show lower offending proportions compared to the males, but their criminal conduct remains elevated compared to the female control group. Whereas for the control Dutch females the trend is almost leveled at 0, most high-risk females commit offenses in youth (highest peak observed at age 14 when 22.6% of the females offend at least once). Although overall the Norwegian high-risk groups show lower proportions of offending across time, the general trends of the high-risk and control groups are similar to the ones described above for the Dutch groups. High-risk Norwegian males record the highest prevalence at age 15 when 35.2% of the individuals commit at least one offense, whereas the values for control males do not go above 4.6% in any of the observed ages. High-risk Norwegian females register their peak in offending at age when 12.9% of the females commit a criminogenic act at least once, whereas for the control females proportions are almost leveled-off at 0 (peak registered at age 30 when only 1.2% of them were involved in crime). For all high-risk groups under observation a general decreasing trend is observed while ageing.

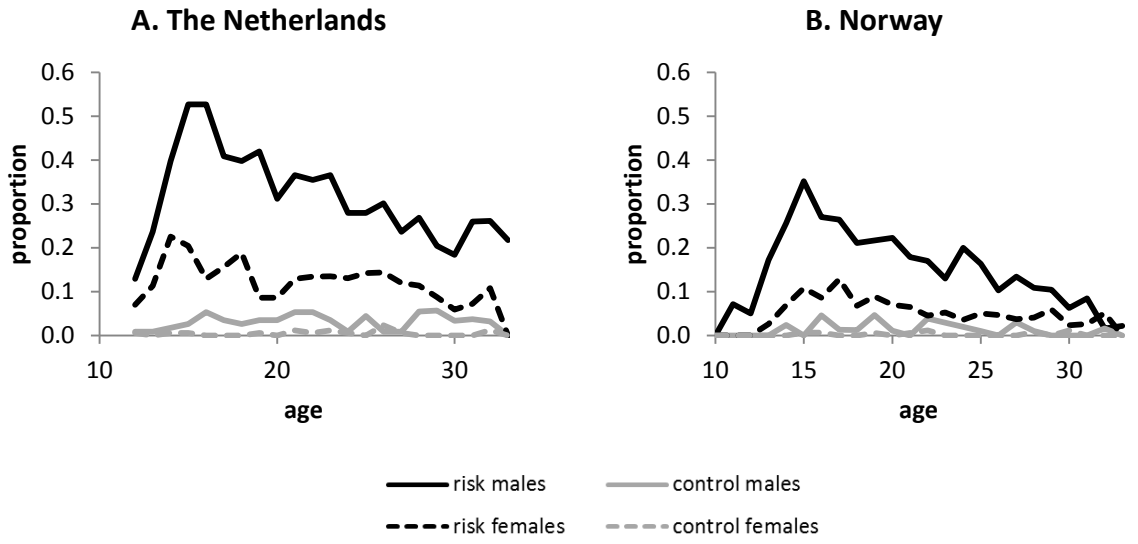

Figure 4. Proportions of offenders by age

Other descriptives

Given the matching procedure, in both The Netherlands and Norway the groups are very similar with regard to their marital status at birth (about three in 10 males, and one in 10 females were married when the first child was born). Nevertheless, some differences appear when analyzing the marital status during the entire 10 year observation period for the high-risk respondents: in The Netherlands 38.6% of the males and 20.4% of the females were married at least once, while in Norway 50.0% of the males and 23.8% of the females were observed as married.

The matching procedure also ensured very similar groups with respect to parental divorce in the family of origin. In both the Dutch and Norwegian high-risk samples, about 57.0% of the males and 67.0% of the females experienced parental divorce at early ages.

6.2. Changes in offending trends around the entrance into parenthood

Models for overall offending

Figure 5 (A and B) presents the results of the smoothing splines (and corresponding confidence intervals) for the high-risk males and females in The Netherlands. For males, there is a slight gradual decline in the probabilities to offend prior to the month of birth. At birth a shift in offending is observed, and the lowest probabilities to offend are shown. Post-birth we found a rebound effect, in which increases in the probabilities of offending are observed. At the end of the tracking period the highest probabilities to offend were registered. In fitting the models overall approximate significance tests of smooth terms are provided. These tests are shown in Table 1. However, as Clark (2012) notes, they should be interpreted with caution. For males, the overall test shows a non-significant decline in offending probabilities pre-birth, whereas post-birth we found a significant increase in offending (Table 1).

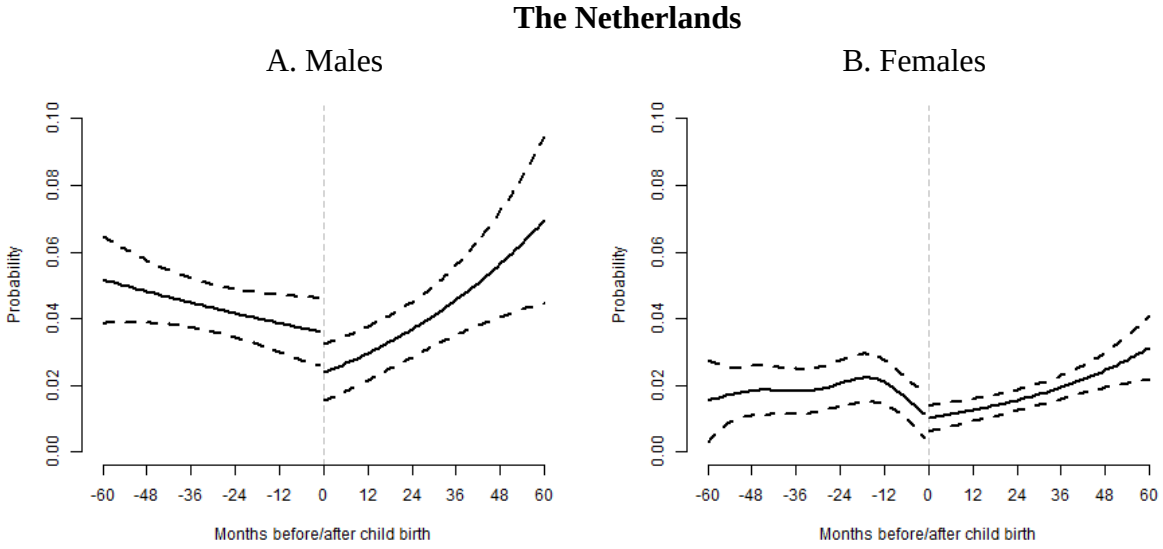

Figure 5. Smoothed splines for criminal offending – The Netherlands

For females, although the probabilities to offend remain low during the entire observation period (Figure 5 B), a specific pattern around birth can be observed. At the beginning of the pre-birth period (for about 3-4 years) the probabilities to offend show a flat pattern (see confidence intervals as well), followed by a decline about 1.5 years before birth. The pregnancy period is associated with the lowest probabilities to offend for females, and no noticeable shift is observed at birth. The post-birth period is characterized by increases in the probabilities to offend, and similar to the males, this increase was statistically significant (Table 1).

Table 1. Overall approximate significance of smooth terms

	THE NETHERLANDS				NORWAY			
	Males		**Females**		**Males**		**Females**	
SMOOTH TERMS	edf	*p*-value	edf	*p*-value	edf	*p*-value	edf	*p*-value
overall offending								
pre-birth	1.007	.103	3.322	.605	3.498	***.027***	4.392	***.002***
post-birth	1.003	***.000***	1.133	***.000***	1.595	.063	1.351	***.027***
property offending								
pre-birth	1.797	.134	1.018	.847	2.098	.055	3.751	.056
post-birth	1.001	.101	1.042	***.014***	1.001	***.005***	1.769	.293

In addition, our models for the Dutch individuals included a set of observable characteristics. The estimated parametric terms can be found Table 2. The coefficient for *period* shows a significant shift at *time*=0 for males and a non-significant one for females. Further, youth offending remains a significant predictor of later offending for both genders. In line with results from previous studies, marriage is significantly associated with declines in the probabilities to offend for males, and no significant effect is registered for females. Last but not least, having additional children significantly reduces the likelihood to offend for both males and females.

Table 2. Coefficients for the parametric predictors in GAMs (all offenses)

VARIABLES	**THE NETHERLANDS**		**NORWAY**	
	Males	**Females**	**Males**	**Females**
Intercept	-8.426***	-10.581***	-5.534**	-13.551***
age	0.429**	0.407*	0.227*	0.375**
age^2	-0.009**	-0.009	-0.008**	-0.009**
period (before/after birth)	-0.507*	1.156	0.394	2.891
youth offending	0.645***	0.503***	0.533***	1.739***
marital status	-0.586**	-0.457	-0.401*	0.663**
additional children	-0.597*	-0.651**	0.255*	0.021
Adjusted R^2	0.009	0.003	0.016	0.015

***= p<.001, **=p<.01, *=p<.05

For the Norwegian sample, Figure 6 (A and B) presents the probability trends for the high-risk respondents. For males, most of the pre-pregnancy period is characterized by increases in the probabilities to offend, with the steepest increase in the first 1.5 years of the observation period). A slight decline continues during the pregnancy, and no substantive shift is observed at birth. A rebound effect occurs post-birth, and a gradually increasing path of offending is observed for the remaining months. At the end of the observation period, males register the highest probabilities to offend. For the Norwegian females, the trend is very similar to the Dutch one: relatively flat line in the pre-birth period with a small dune about two years before birth (although overlapping confidence intervals), followed by a more steep decline during pregnancy. While there is no actual shift in the probability of offending at childbirth, the post-birth period provides slight increases in the probabilities of offending. The overall test of the smooth terms shows that for males the significant changes occur pre-birth, whereas for females statistical significance is recorded both pre-birth and post-birth

(Table 1). However, the statistical significance post-birth for females should be carefully interpreted.

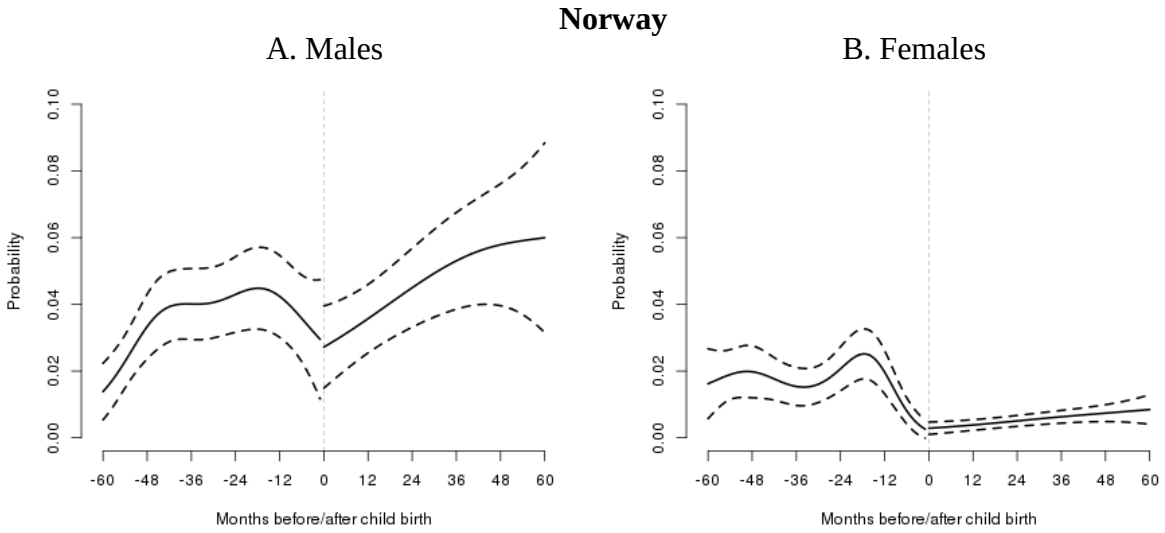

Figure 6. Smoothed splines for criminal offending – Norway

The estimated coefficients of the covariates introduced in our GAMs for the Norwegian respondents are presented in Table 2. For both Norwegian males and females no significant shift in the offending trend was recorded in the month of birth. Youth delinquency was significantly associated with higher likelihoods of offending in adulthood for both Norwegian males and females. Further, for both genders marriage was associated with significant changes in the likelihood of offending, nevertheless, the direction of the effects is opposite: males show lower probabilities to offend if married, while females show higher probabilities to offend when married. Last but not least, having additional children significantly increases the likelihood of offending for males.

It is important to note that an extended model specification for this study included additional control for incarceration periods. After concluding that incarceration does not represent a bias element in the relationship investigated, we allowed for a clear comparability of the models and presented results without controlling for incarceration[15].

Models for property offending

Although it was not the focus of the current study to analyze the timing of change in criminal offending for specific types of offenses, results from the main analysis recording overall offending showed increases in the probabilities to offend after entrance into

[15] For all males (Dutch and Norwegian) incarceration had no influence on the criminal trends. For the Norwegian females we found a very small number of incarcerations spells, therefore models including incarceration failed to converge, while for the Dutch females the incarceration only slightly reduced the peak in offending probabilities observed around 1.5 years before birth, nevertheless, it remained in the boundaries of the confidence interval and provided a minimum improvement to overall deviance explained.This result is not necessarily surprising as both countries provide non-punitive penal policies with low incarceration rates and short incarceration periods.

parenthood. As strain theory places an additional focus on increases in economic crime related to parental strain, we performed additional analyses for property offenses as outcome.

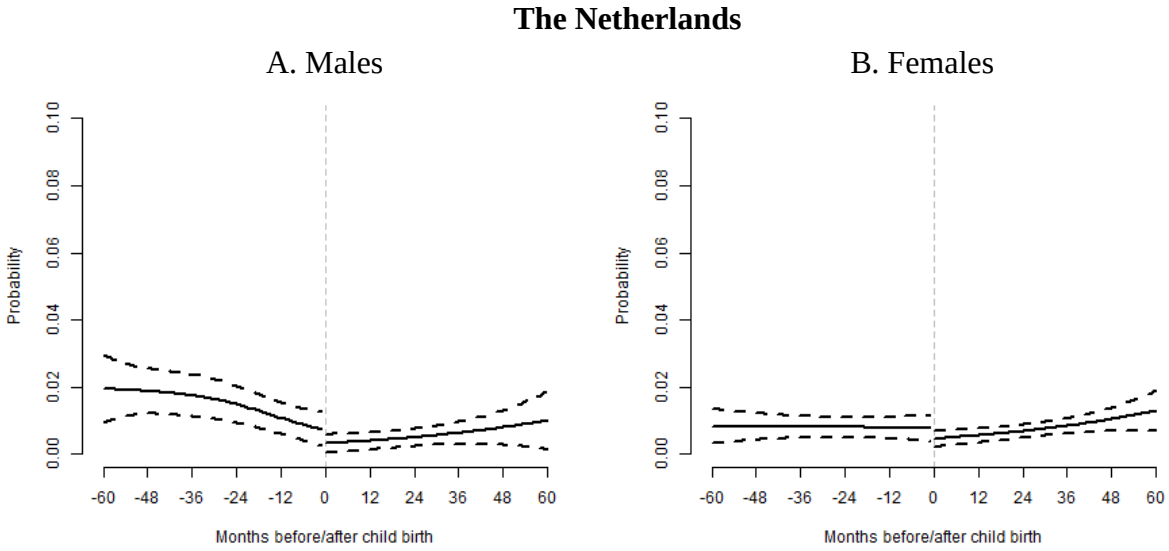

Figure 7. Smoothed splines for property offending – The Netherlands

For the Dutch males (Figure 7A), the property trend shows a systematic decline prior to entrance into parenthood. However, this decline remained non-significant (Table 1). With no significant shift in property offending at childbirth, the probabilities to offend almost stabilize post-birth. For females (Figure 7 B) the pre-birth period is characterized by a flat, low-leveled trend followed by slight increases post-birth. Although the post-birth increase has reached significance level (Table 1), the test should be considered marginal. Nevertheless, at the end of the observation period females register the highest probabilities to commit property offenses. The estimated coefficients of all covariates introduced in our regression models for property offending are listed in Table 3.

Table 3. Coefficients for the parametric predictors in GAMs (property offenses)

VARIABLES	**THE NETHERLANDS**		**NORWAY**	
	Males	**Females**	**Males**	**Females**
Intercept	-9.579**	-7.801*	-12.945***	-11.930***
age	0.354	0.260	0.877***	0.178
age^2	-0.007	-0.006	-0.023***	-0.005
period (before/after birth)	-0.851	-0.422	0.305	1.354
youth offending	0.994***	0.807***	0.326	2.308***
marital status	-0.325	-0.794	0.301	1.189***
additional children	-0.889	-0.541	-0.025	0.131
Adjusted R^2	0.007	0.002	0.011	0.012

***= p<.001, **=p<.01, *=p<.05

For the Norwegian sample the trends are slightly different. Males (Figure 8 A) show a slight increase in the probabilities to commit property offenses until about two years pre-birth followed by a relatively flat trend up to birth. Nevertheless, the post-birth period stands out as the probabilities to commit property offenses show a steep increase. The statistical test for the

post-birth smoothing function comes to confirm this as it reaches significance (Table 1). For the Norwegian females (Figure 8 B) property offending probabilities remain relatively low during the entire observation period (with post-birth probabilities never reaching pre-pregnancy levels). The estimated coefficients of all covariates included in the property offending models are presented in Table 3.

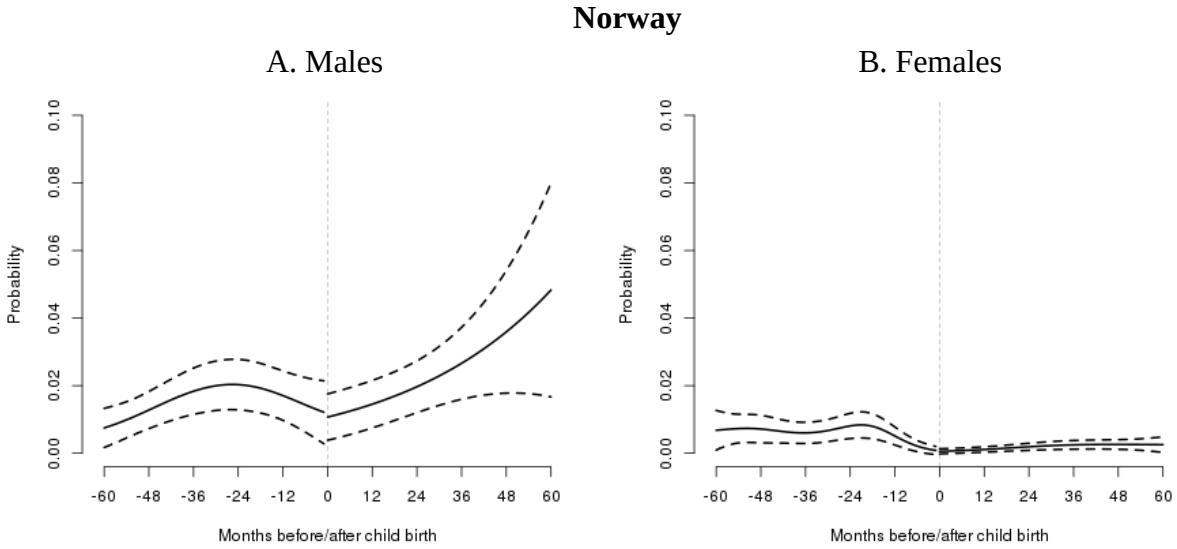

Figure 8. Smoothed splines for property offending - Norway

Overall, the post-transition probabilities show an almost indistinguishable increasing trend in property offending, with the exception of Norwegian males showing a systematic post-birth increase.

7. DISCUSSION

According to the age-graded theory of social control (Sampson and Laub, 1993; Laub and Sampson, 2003), becoming a parent holds the potential to be a turning point in one's criminal involvement, promoting desistance. The causal nature of the relationship described by Sampson and Laub implies that any decrease in offending should occur after the transition to parenthood. However, the theory of cognitive transformation suggests that life course events need to be preceded by an internalized commitment to change leading to desistance, with actual changes in offending visible prior to the transition (Giordano et al., 2002). These theories concur in the conclusion that parenthood is related to desistance, but not on defining the moment when change occurs. Thus, it is the timing that sets the theoretical predictions apart.

With this study we provide an analysis of the timing of change in criminal trajectories around entrance into parenthood for high-risk men and women in The Netherlands and Norway. Results of the analysis showed that, for all samples in our study, the probabilities to offend decreased *prior* to becoming parent and even before pregnancy. Moreover, after the birth of the first child, we registered probability increases during the entire remaining period.

These findings point to more nuanced patterns of offending than what appears when we would only compare averages before and after the transition. Similar patterns were observed for involvement in property offending, however, the changes were less drastic compared to the overall offending measurement.

Our findings are the least in accordance with the *turning point* hypothesis (Sampson and Laub, 1993) as the changes occur before the transition, and do not continue to decrease afterwards. Regarding the pre-birth period, results from our study tend to be in line with assumptions of the *cognitive transformation theory* (Giordano et al., 2002) as the early changes might reflect ongoing processes and a readiness for change. Nevertheless, the readiness to adopt a non-criminal life style observed pre-birth (or pregnancy) is not sustained by a real commitment to change after-birth (with the exception of Norwegian females showing only a minimal increase post-birth). If the personal commitment to change occurred prior to entrance into parenthood, it was apparently not strong enough to resist negative after-transition transformations.

The increase in criminal offending rates post-birth offers support for the strain theory and we can hypothesize that entrance into parenthood might be associated with some sort of stress (Miller and Sollie, 1980). Furthermore, it was stated that choosing to resolve strain through crime might depend on the financial aspirations or difficulties of the individuals (Lilly et al., 2002). As such, a straightforward criminogenic reaction to economic strain would then be transposed into engagement in property offenses (Wakefield and Uggen, 2004; Broidy and Agnew, 1997). With the exception of Norwegian males, results show only minor increases in the probabilities to commit property offenses. Furthermore, when comparing trends for each individual subgroup analyzed, we observed that a considerable part of the increases in overall offending remains unexplained by involvement in property offending. However, before concluding that criminal conduct is not only the product of strain resulting in economic offenses, future research agenda should pay particular attention to employment participation, and how this diminishes the financial burden related to parenthood.

A specific focus for this study was to identify possible abrupt changes in the daily activities related to entrance into parenthood. As hypothesized by the routine activity theory (Cohen and Felson, 1979) a major shift in offending should occur immediately after childbirth and an overall declining path should follow afterwards. With the exception of high-risk Dutch males, we did not identify a significant shift in offending probabilities in the month of birth. Nevertheless, even for the Dutch males, the estimated coefficient for the shift was of significantly marginal magnitude. Moreover, for all groups analyzed, the post-birth period was characterized by increases in the probabilities to offend. Similar conclusions can be extracted when analyzing the splines for property offenses, with the note that in this case no marked shift was evidenced at birth for any of the groups.

Starting from the assumption that the experience of parenthood is different for men and women, we expected to see some gender differences in criminal trends. Whereas for Dutch males signs of change occurred long before entrance into parenthood (from five years before birth), the changes in offending for Dutch females seem to be directly associated with preparation for parenthood, as declines start about 1.5 years before birth. In Western societies, where pregnancy is often a planned event, preparing up to one year ahead of pregnancy is perhaps not unusual. The earlier change among men could also be related to the

Dutch criminal justice system which tends to provide a milder treatment for females (Wartna and Tollenaar, 2006). As such, Dutch males might be more aware of the long-term negative consequences of their criminal conduct. The post-birth period is characterized by gradual increases in the probabilities to offend for both males and females, and, although the magnitude of increase differs by gender, it is proportional with the overall involvement in crime for each group (lower for females). In the Norwegian sample, both genders display the strongest decline in offending trends about 1.5 years before birth. Similarities in the desistance process could be related to the fact that the Norwegian social system ensures stronger gender equality with respect to parenthood (e.g. parental leave obligatory for both males and females, stimulation of female employment through advantageous childcare services). The post-birth crime trends in the Norwegian sample show more visible gender differences. Whereas for males the analysis shows an increasing trend in crime, for females, the probabilities to offend show only a minor increase, and remain at a lower level compared to the pre-birth period. While for Norwegian females beneficial effects of motherhood are visible on long-term, for Norwegian males the motivation for change is only temporary.

With regard to country specificities some differences can be additionally noted. While for the Dutch males declines in the rates of offending occur at least five years before birth, for the Norwegian males changes appear only about 1.5 years before birth. With the awareness of a considerable state support (Norway provides one of the most advantageous parental packages in the world), high-risk males in Norway are less forced to adopt a non-criminal life-style in order to prepare themselves for parental responsibilities. Nevertheless, these male differences observed across countries might be the result of unobserved dissimilarities between groups. It could be the case that the institutionalized individuals in the Dutch sample might be a group of more frequent youth offenders, who reached their crime peak in adolescence, and further gradually move away from crime. The post-birth male trends show no differences across countries strengthening the evidence that fatherhood does not offer sufficient motivation for change on a long run. In the context of different social benefits across countries, the results for male property offending remain puzzling. As the Norwegian system is more generous regarding parental benefits, we would not expect increases in property offending rates to be stronger for Norwegian males. A possible explanation for this pattern is the fact that involvement in property crime is an individual aim for material success rather than a direct result of poverty. For females, while pre-birth trends are relatively similar across countries, a rebound in offending is observed only for Dutch females (similar pattern for property offenses). Whereas these differences might be due to unknown dissimilarities between Dutch and Norwegian groups, it could also be explained by dissimilarities in socio-economic benefits between countries.

8. CONCLUDING REMARKS AND LIMITATIONS

Although this study offers new insights on the relationship between parenthood and criminal offending, a number of discussion points and limitations should be addressed. First, critics might rightly argue that we do not provide evidence for causal effects. We argue in our favor that causal estimation was not what we aimed to do. A true causal estimation of the

effect of parenthood on criminal involvement remains a challenge for life-course criminological research. Without such pretentions of causality, we offer an analysis of specific timings of change in relation with entrance into parenthood and assess whether the theoretical predictions fit the observable patterns. The strength of our study is that it provides a nuanced picture of what is to be explained, and how well these patterns provide support for the dominant theoretical approaches in the literature.

Second, one of the difficulties encountered in testing theoretical hypotheses on the parenthood-crime relationship results from the fact that existing theories do not specifically define an exact moment for when the expected change should occur. As such, several possibilities can be considered: the birth, the moment of discovering the pregnancy, or even a prior planning stage of parenthood. For this study we appointed birth as a reference, however, we conducted some exploratory analysis and tried to detect whether an additional shift in offending occurs in the 7^{th} month before birth. Results did not add more to the interpretations already provided, but they made clear that the entire pregnancy period showed the lowest probabilities to offend for all the subgroups analyzed. In addition, as our exploratory analysis provided evidence for multiple rebounds (especially for females), future research should pay considerable attention to multiple aspects of parenthood causing changes in offending (e.g. the planning of pregnancy).

Third, although the matching samples procedure attempted to create very similar groups across countries, we could only match on a limited number of variables. The Dutch sample might contain a selective group of individuals given their institutionalization in youth, and differ in other respects from the Norwegian high-risk sample. Unfortunately the Norwegian data available could not provide information on youth rehabilitation programs. However, the fact that we have found reasonably similar patterns in two (potentially different) high-risk groups, in different contextual settings, indicate some sort of generality in the patterns.

Fourth, register data used for this study remained limited in terms of qualitative aspects of the parent-child relationship. As high quality parent-child relationships would reduce crime (Ganem and Agnew, 2007), the lack of appropriate information restricted our possibilities to explain processes and mechanisms of parenthood as an altering event for strained individuals.

Last but not least, in the context of Western societies where family relationships become less standardized (Elzinga and Liefbroer, 2007), the linkage between parenthood and crime might depend upon relationship configuration (e.g. married, cohabiting or dating the biological father or other etc.). Unfortunately for this study only information on marital status was available. Future research should consider a broad range of intimate configurations. Furthermore, the gender gap in crime should address elements of legal and social sanctioning such as loss of custody or parental rights, social assistance, housing, unemployment etc. to get a clearer understanding of the processes describing the effects of parenthood on crime.