Does partner change between pregnancies moderate the association between preferred and actual IBI?

Master's Degree Programme in Inequalities, Interventions and New Welfare State

Master's thesis

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Abstract

Several previous studies have showed that, compared to staying with one partner, changing partner increases IBIs. In the current study we investigated whether — partner change moderates the association between preferred and actual IBI. More specifically, we investigated: 1) whether the preferred length of IBI before having children is associated with the actual length of IBI and; 2) whether this association is weaker in women who change partner (i.e., a new father for their second child). We recruited 703 mothers between the ages of 18 and 60 with at least two biological children (excluding twins). The average length for preferred IBI was 32.71 months and 39.99 months for the actual IBI. The association between the preferred and actual IBI due to partner change was weaker for those females who change the partners and the actual IBI was also longer in these individuals. The actual IBI tended to increase by 4.36 months on average for each new year of the preferred IBI if a female did not change partners. However, if the partner changed, the actual IBI was increased by 9.76 months for each additional year of the preferred IBI. Keeping a steady partner, females are more likely to have less time between birth of second child and to better match actual IBI to the preferred IBI.

Key Words: actual IBI, motherhood, preferred IBI, partner change

1. Introduction

Inter-birth interval (IBI) is the interval of time that passes between a female giving birth following two consecutive pregnancies (Shachar & Lyell, 2012). Although the mother's preference to have a certain number of children in a given time frame likely predicts IBI, previous studies have found that the age of the mother, her occupational and educational status, her place of residence, along with the potential father's income, as well as his educational level and employment status affect the IBI (Hailu & Gulte, 2016). For example, females who have an occupation will have shorter IBIs than those who lack formal employment (Tandberg et al., 2015). Other factors that may influence the length of the IBI include the child's gender, contraception, maternal parity, continuity of breastfeeding, and a change of partner (Heller et al., 2016).

Short IBI Between Pregnancies

Short IBIs may be a risk factor for pregnancy interruption compared to somewhat longer IBIs. Shorter IBIs may be the result of nutritional deficits in the mother of the child as well as uterine environment that is not fully prepared to deliver a healthy baby during the next pregnancy. That is why there is an increased risk of interruption due to low iodine levels, specifically for pregnant women during the first trimester (Nilsen et al., 2008). Based on this, the ability of female to make choices about when to get pregnant helps to ensure spacing between pregnancies to benefit her health and well-being (Zee et al., 2013).

Whereas a relatively short IBI is in the mother's evolutionary interest, it is in the offspring's evolutionary interest to extend the IBI and thereby offset the competition with a new sibling over finite maternal resources (Haig, 2014). When a women has only one child, she can give all of her attention and nutritional resources to this child (Gunst et al., 2021). The mother, however, increases her reproductive output if IBIs are short, because then she can fit more children between menarche and menopause (Johnson, 2015).

Females with short IBI between pregnancies are more likely to have their next pregnancy end in preterm (before 37 gestational weeks) labor (DeFranco et al., 2014) and females are recommended to have IBIs that are at least 18 months or more. To better understand how a short IBI between pregnancies can affect pregnancy duration, DeFranco and colleagues (2014) compared mothers whose IBIs were less than 12 months to mothers whose IBIs were between 12 and 18 months. Thereafter, they compared the females to females who had more "optimal" IBI, that is, – 18 months or more. The results showed that the pregnancies of females whose IBIs were shorter than twelve months more often ended in preterm birth. More than half of the females in this cohort gave birth before 37 weeks of gestation, compared with 37.5% of the females in the cohort with optimal delivery spacing. Among females with short IBI, pregnancies longer than 40 weeks are less common (16.9%), while for females with more optimal IBI, pregnancies lasting more than 40 weeks are more common (23.1%; DeFranco et al., 2014).

Change Of Partners Between Pregnancies

The chances of pregnancy interruption rise for women who switch partners between pregnancies. When female change the sexual partners, her vaginal flora is altered and exposed to new paternal antigens. This, in turn, affects reproductive health. It is possible that the immunological adaption could provide valuable information in cases where the risk of abruption increases when one's partner changes between pregnancies. Having specialized immune cells and antibodies, the body can detect foreign invaders and mount an optimum immune response in the future in order to avoid disease in the future (Davis-Floyd, 1987). Research studying the association between perinatal consequences and partner change often fail to account for the association between partner change and IBI, whether the change of partner is increasing or decreasing the IBI (Basso et al., 2001).

Logically, if it takes time to find another partner with whom one wants to have children, this will increase IBIs compared to if there is no change in partners. Furthermore, mothers that change partners between pregnancies differ from those who stay with the same partner in terms of sociodemographic and behavioural aspects, as well as lifestyle features which also can affect the duration of IBI (Fu & Goldman, 2000; Vatten & Skjærven, 2003).

A study by Myrskylä (2017) offered an explanation to this phenomenon-: Today, older mothers have higher educational levels and smaller families than they did 50 years ago. Historically, older mothers' children had worse outcomes than younger mothers' children (for example, worse health conditions), however recently the situation has reversed. After the postponement of childbearing, children can also benefit from secular changes in the macroenvironment (major uncontrollable factors including economic, demographic, technological, cultural, natural, and legal) if they are born later. Macroenvironmental trends can counteract the effects of reproductive ageing. Furthermore, existing research indicates that older mothers (the ones which are 35 and more) are happier when and after having a child, while young mothers (20 years old) are not or are short-lived (Myrskylä et al., 2017).

Changing partners leads to a longer IBI between pregnancies and births. In couples without partner change, there was a higher risk of infertility compared with the couple where partner was changed (Veltman-Verhulst, 2016). The physiological potential to reproduce is also likely to be diminished by uterine ageing (from prior pregnancy and longer IBIs between pregnancies) (Kong, 2012).

The Current Study

The aim of the current study was to investigate how the change of partner between pregnancies is moderating the association between preferred and actual length of IBI.

We designed a study to test whether the preferred length of IBI before having children relate to the actual length of IBI and; whether the association is moderated by partner change (a new father for the second child).

Based on the literature review, we expected that partner change between pregnancies would moderate the association between preferred and actual IBI; such that the association was weaker in the case of a partner change, due to increased IBI.

2. Data and Methods

Ethical Permission

The Board for Research Ethics at Åbo Akademi University granted ethical permission for the current study before data collection began.

Participants and Procedure

Data collection took place in April 2020. Our participants were females 18 to 60 years of age with a total of two biological children (excluding twins). A Facebook advertisement was created to target females living in Finland to recruit participants. A total of 738 females completed the survey. The completion rate was 64.0%. With respect to the questions used in the current study, 703 mothers (whose 1st and 2nd child were not conceived through in-vitro fertilization) had responded to all items. Their mean age was 41.2 years (*SD* = 9.3, range 22–60, age data was missing from 4 individuals).

Data were collected during five consecutive days. According to Facebook, the add reached 50,425 users. In the beginning of the survey, we told participants it was a voluntary survey and that they could terminate it at any time. Informed consent was obtained thereafter.

We directed survey participants to a separate questionnaire at the end of the survey so they could enter to win a 100€ gift card to an online shop by providing their e-mail address.

Measures

We first asked participants to report number of children. Based on this, participants were asked more detailed questions regarding the two (mothers with only two children) or three oldest children (all other mothers). All participants thus provided information regarding their two (oldest) children and the IBI between them.

Relationship Status. We asked the participants to report their current relationship status with the options being: "Married or co-habiting with at least one child's biological father"; "In a relationship with at least one child's biological father"; "Married or co-habiting with someone else"; or "Single".

Number of Children. We asked the participants to report how many children they have from the options 2; 3; 4; 5 or more.

Sex of the 1st and 2nd Child. Here we asked to indicate the sex of the children from the options female; male; or other.

Partner Change. We asked the participants to report whether their oldest and their second oldest child have the same biological father, giving the options yes; no.

Preferred IBI. We measured the preferred IBI with the following question: "Before you had your first child, what was your preferred time in between births if you were to have more than one child. Please answer in number of years."

Actual IBI. We measured the actual IBI as the number of months between the births of two consecutive children.

Method

Method, we used was multiple regression method. Through multiple regression, it is possible to analyse relationships between two independent variables and a single dependent variable. In this method, a single independent variable whose value is known is used as a

predictor for the value of a single dependent variable. The weighed values correspond to how much each predictor contributes to the overall prediction (Wong et al., 2006).

Statistical Analyses

The statistical analyses were conducted using SPSS 28.0 for Mac. To conduct the multiple regression, we dummy coded partner change such that 1 signified that the two children had the same father and 0 that they had different fathers. We centered the preferred IBI by deducting the mean from each individual observation. Finally, we created a variable for the interaction by computing the product of the binary variable for partner change and the continuous variable for preferred IBI. These were then used as predictors in a regression with actual IBI as the outcome variable.

3. Results

Descriptive Results.

Below is the data on the preferred IBI (in month) and the actual IBI (in months).

Table 1. Preferred and Actual IBI (in months).

	N	Minimum	Maximum	Mean	Std. Deviation
Pref IBI	703	9	138	32.71	28.11
Actual IBI	703	11	222	39.99	29.32

Table 1 shows that the actual maximum IBI tends to be almost double than preferred maximum, and the average preferred IBI (32.71 months) is shorter than the average actual IBI (39.99 months).

Table 2. Regression Model Assessment Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.592a	.35	.347	23.691

a. Predictors : (Constant), interaction, ibi12_samedad_yes_dummy,Pref_IBI_cent

b. Dependent Variable: IBI1

We then conducted a multiple regression to investigate the association between partner change and preferred IBI (as well as their interaction term) and actual IBI. We found that almost 35% of the variance in actual IBI can be explained by the three predictors (F [3, 699] = 125.553, p < 001, adjusted R^2 = .35) (table 2).

The scatterplot on Figure 2 (see Appendix) the dependence of the residuals on the theoretical values of the effective trait demonstrated the presence of visually recognizable heteroscedasticity. The deviation of the frequency of the variance of random errors in the range from 0 to -1 from the normal distribution was noticeable (Appendix Figure 1). Most of the frequencies of possible random errors are within the expected zone. It manifested itself as some heterogeneity in the variance of the random deviations of the regression model.

The scatterplot (Appendix Figure 2) more visually represents the distribution of the Predicted Value in the Regression. In Appendix Figure 2, one can note the anomalous concentration of dependent variable values at values of 0 and up to -1 at Regression Standardized Residual values from -1 to 2.5. The deviations of the variance values in this case were not significant, what followed from the concentration of points on the Appendix Figure 2, so it can be assumed that the model used did not need subsequent correction for the required level of accuracy.

Table 3. Predictors' Coefficients[a]

Model	Unstandardized B	Coefficients Std. Error	Standardized Coefficients Beta	t	Sig	95.0 % Confidence Interval for B Lower Bound	Upper Bound
1 (Constant)	80.465	2.685		29.963	<.001	75.192	85.737
ibi12_samedad_yes_dummy	-45.642	2.851	-0.508	-16.01	<.001	-51.24	-40.045
Pref_IBI_cent	4.361	1.677	0.134	2.601	0.009	1.07	7.653
Interaction	5.399	2.105	0.129	2.564	0.011	1.266	9.533

All predictors were statistically significant at a significance level of p <.05.

The duration of the IBI (table 3) in the event of partner change, based on the average preferred IBI, was 80.465 months. If a female changed partners, this lengthened the actual IBI for the average preferred IBI and it was 45.64 months. While keeping the same partner as the father of the second child, the length of the IBI for the average preferred IBI was 34.823 months.

The actual IBI tended to increase by 4.36 months on average for each new year of the preferred IBI term if a female changed partners before the birth of her second child. Especially females preferring relatively short IBI were unable to actualize this preference if they changed partner. However, if the partner was not changed, the actual IBI was increased by 9.76 months for each additional year of the preferred IBI term.

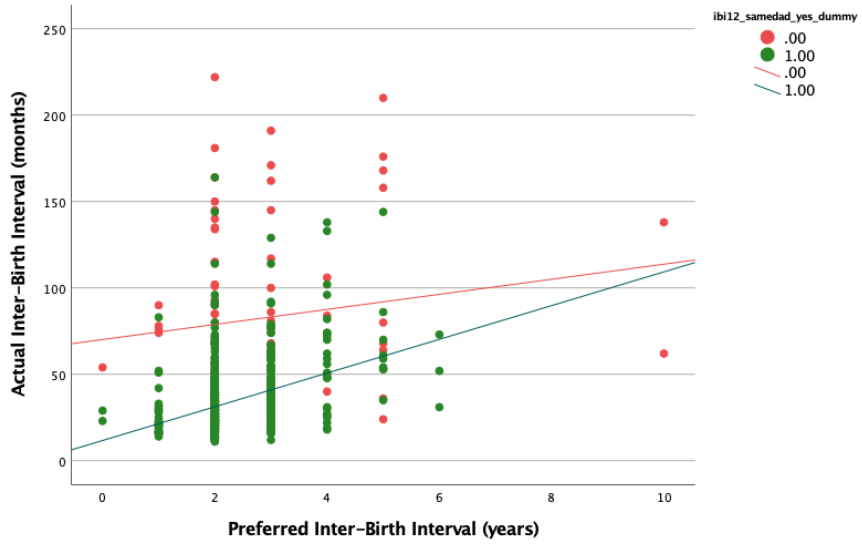

Figure 1. Relation of Actual and Preferred IBI for Women who have Changed Partners and keep a Partner before having a Second Child.

Green dots and line on Figure 1 reflect the relation of preferred and current IBI for women who retain one partner, red dots and line - for women who have changed partners for the birth of a second child. The lines represent trendlines calculated using quadratic averages. Numerical values .00 and 1.00 were assigned to the specified groups of women for further statistical processing and graphical presentation of data.

The preferred IBI and the actual IBI for both groups of females (with a change of partner and with the same partner) tended to compensate with an increase in the preferred IBI. This can be explained by the general reasons for a female's choice of a longer IBI of children, which lie outside the factor of choosing a partner (health status, social status, work status, etc.). On the other hand, the scatterplot above demonstrated a stronger dispersion in the relationship between the actual IBI and the preferred IBI in females who changed partners between the birth of first and second child. It was this group that demonstrated the most extreme values for both parameters.

4. Discussion

Preferred and Actual IBI Correlation

The aim of the current study was to investigate how the change of partner between pregnancies is moderating the association between preferred and actual length of IBI. A heterosexual couple compared to homosexual is more likely to experience lengthening of IBI among females, as demonstrated by previous research (Smith, 2017). This applies to couples in which partners have previously changed, and not couples that have been together for a long time and have several children. A woman's choice is reflected in her actions despite the circumstances, so preferred and actual IBI has a correlation.

This trend is exacerbated with age, which can be explained by a decrease in fertility and a gradual deterioration in the health of females about 40 years old (Basso et al., 2001; Tandberg et al., 2015). The present study investigated two research questions : 1) whether the preferred length of IBI before having children relates to the actual length of IBI and 2) whether it is moderated by partner change (a new father for the second child). Basically, we found support for first and second hypothesis where partner change between pregnancies moderates the association between preferred and actual IBI. The association was weaker in women who changed partners.

Change of Partners: Risks and Causes

With a change of partner, as shown by other studies (Basso et al., 2001; Vatten & Skjærven, 2003), the IBI lengthens, but the female's fertility remains higher and the rate of lengthening of the preferred IBI increases more slowly. Changing partners is a form of risk for a mother and the baby, both social, psychological, and biological. It is related to the risks that researchers confirm for cases of decreased IBI. This is a broad group of risks for new-born weight loss, preterm birth and possibly higher mortality among children (DeFranco et al., 2015; McKinney et al., 2017; Janša et al., 2018). DeFranco, Ehrlich and Muglia (2014) showed that a reduced IBI leads to a greater number of births in the first 39 weeks of pregnancy and fewer births in the 40 weeks and a shorter pregnancy as a result. Fear of perceived risks, according to these researchers, may be reflected in a woman's preference to give birth later from a new partner, which echoes the results of this study.

Change of partner can be caused by numerous factors, most of which correspond to the socio-demographic characteristics of females (Vatten & Skjærven, 2003). Women's social status and assessment of their own experience and health play a vital role in planning the birth of their next child (Zee et al., 2013). It should also be borne in mind that the adequacy of such an assessment also changes under the influence of numerous factors, such as age, increased

experience, education, or access to reliable information about pregnancy and female's health, among others. The correlation between the lengthening of the preferred and actual IBI with age is obviously related to the both groups of women who changed and who did not change partners.

Concerning the results received in our study the two predictors of partner change and preferred IBI explained about 35% of variance in actual IBI. Preferred IBI predicted the actual IBI. In case females decide to change a partner between the 1st and 2nd child it increased the length of IBI. The interaction showed that when females changed partner, the correlation between the actual IBI and preferred IBI was lower.

Limitations of the Study

One of the main limitations of this study was that we do not know whether partner change and preferred IBI relate. It is possible that females want to have short IBI. For example, one may want the difference between children to be three years. But what if the female would like to stay with the same partner? The problem is that we now asked them what their preferred IBI is after they already had children. The result could be different if we would ask before. Some children might not be planned at all, and thus there was no preferred IBI to begin with. Another limitation is that the deviations of the variance values were not significant, what followed from the concentration of points on the Appendix Figure 2, so it can be assumed that the model used did not need subsequent correction for the required level of accuracy.

Conclusion

We found a relationship between the lengthening of the preferred IBI, and the length of the actual IBI between the birth of the second child. This association is stronger for mothers who do not change partners. For the average values of the preferred IBI, a partner change is associated with longer actual IBI. It can be assumed that the change of partner increases the time to the birth of a second child, but this persistence of the effect of lengthening the IBI in

this group of women can be explained by the fact that the process can be somewhat objectively slowed down by the search for a new partner.

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Appendix A

Figures

Figure 1. Regression Standardized Residual Histogram

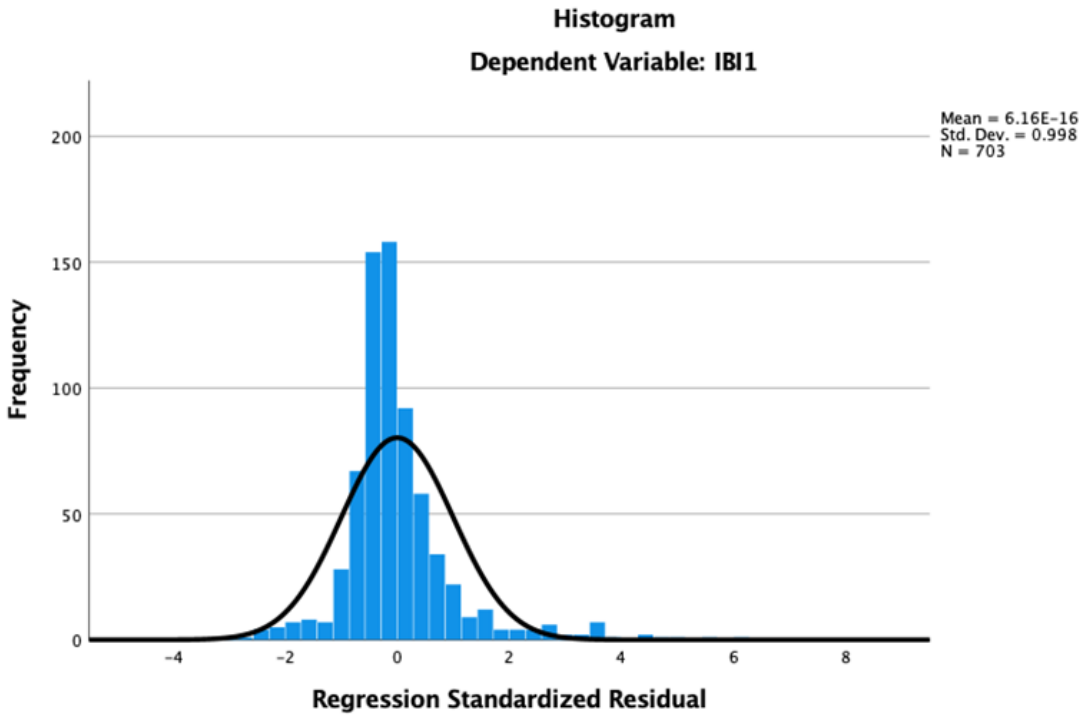
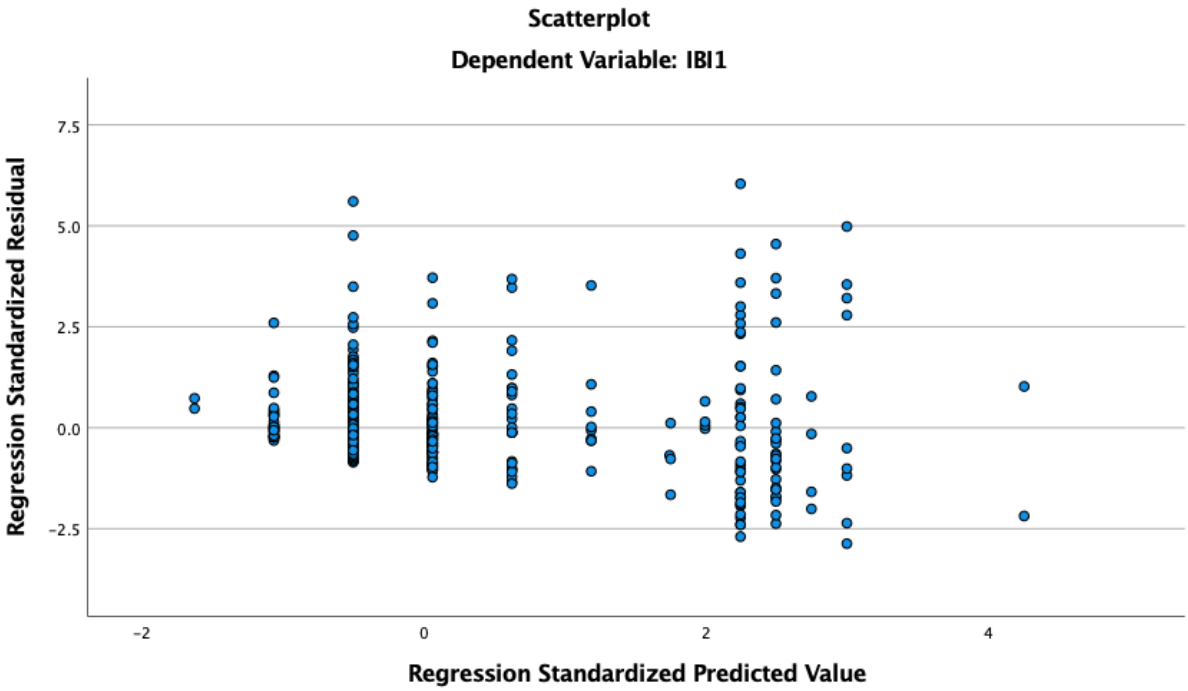


Figure 2. Regression Standardized Predicted Value Scatterplot



Appendix B

Data on Participants

Table 1. The Data on Participants by Age

	N	Minimum	Maximum	Mean	Std. Deviation
Age	699	22	60	41.24	9.292
Valid N	699				

Table 2. The Data on Participants on Marriage and Relationship

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Married/living together with (one of) my children's biological father	523	74.4	74.4	74.4
	In a relationship with (one of) my children's biological father	5	0.7	0.7	75.1
	Married/ living together with someone other than my children's biological father	39	5.5	5.5	80.7

	In a relationship with someone other than my children's biological father	47	6.7	6.7	87.3
	Single	89	12.7	12.7	100
	Total	703	100	100	

Table 3. Data on Partner Change

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	618	87.9	87.9	87.9
	No	85	12.1	12.1	100
	Total	703	100	100	

Table 4. Number of Children that Females have

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	415	59	59	59
	3	167	23.8	23.8	82.8
	4	71	10.1	10.1	92.9
	5	50	7.1	7.1	100
	Total	703	100	100	

Table 5. First Child Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	345	49.1	49.1	49.1
	Male	355	50.5	50.5	99.6
	Other	3	0.4	0.4	100
	total	703	100	100	

Table 6. Second Child Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	female	338	48.1	48.1	48.1
	Male	362	51.5	51.5	99.6
	Other	3	0.4	0.4	100
	total	703	100	100	