Europe's Journal of Psychology, 7(1), pp. 112-142
www.ejop.org

The relation of positive emotions to post partum depression

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Abstract
Positive emotions have been implicated in the development of coping resources and resilience for psychological health across various significant life events. Childbirth is often an event that incites positive emotions in a woman, and it may be that such emotions have an immobilizing effect on the onset of post natal depressive symptoms. In efforts to examine the influence of positive emotions on women during their transition into motherhood, the present study assessed 195 women across two stages: before and after childbirth. The aim of the study was to examine the variety of positive emotions that arise from childbirth, the relationship of positive emotions that arise from childbirth to maternity and other demographic variables and the relation between positive emotions that arise from childbirth and depressive post natal symptoms. Results revealed a significant manifestation of specific positive emotions such as joyfulness, pride, and interest after childbirth. Participants between the ages of 30 and 34 experienced a greater variety and intensity of positive emotions before and after. In turn, a negative relationship was found between the experience of positive emotion intensity and post natal depressive symptomatology. Factors such as education level, whether the birth was planned or not, and environmental and partner support were found to relate significantly to the manifestation of positive emotions.

Keywords: childbirth, positive emotions, post natal depression.

In 1998, the American researcher Barbara Fredrickson developed the "Broaden-and-Build Model of Positive Emotions", which offers the first complete account of the functional role of positive emotion. The fundamental preposition of the model is that the manifestation of certain emotions (namely joy, interest, contentment, pride and love) ultimately facilitate cognitive, emotional, psychological, and physiological growth, and build individuals' personal resources. In addition, it asserts that positive emotions enhance attention, cognitive functioning, emotional stability, and resilience from aggravating and threatening circumstances, broadening one's 'thought-action repertoire' (Fredrickson, 1998; Fredrickson & Branigan, 2001, 2005). Operationally, positive emotions enable the use of alternative means of conceptualising, conveying, and managing daily problems and challenges.

The "Broaden-and-Build Model of Positive Emotions" (Fredrickson, 1998, 2000) states that positive emotions play an adaptive role different to that of negative emotions. Specifically, Fredrickson (1998) differentiates the applicability of positive emotions with that of negative emotions, in that they are relevant to environments perceived as safe rather than threatening, and lead to deeper contemplations or the *broadening* of attention necessary for personal development. As such, when positive emotions are experienced one's thought and action repertoire grow, increasing the variability of ideas, solutions, and behaviours. Creativity, flexibility, openness and an action orientation are enhanced and become functional in secure and non-threatening environments (Fredrickson & Branigan, 2001; 2005).

Although the manifestation of any positive emotion is transient, the results of the broadening effect instil resources that are durable and can be transferred to other relevant situations threatening or not, contributing to a general feeling of well-being and resilience (Tugade & Fredrickson, 2002). In fact, the incremental and spiral effect of broadening means that the activation of positive emotions begets additional positive emotions which in turn lead to the building of additional personal resources.

Moreover, positive emotions defer or 'undo' the adverse physiological effects of negative emotions, such as increased heart rate and blood pressure resulting from fear or anger (Fredrickson, et al., 2000; Fredrickson & Levenson, 1998). Folkman and Moskowitz (2000) demonstrated that positive emotions experienced after negative emotional arousal leads to a faster recovery of cardiovascular activity. This effect overrides initial presumptions of a replacement effect of emotion, whereby the broadening and building effect of positive emotion predominates (Fredrickson, Mancuso, Branigan, & Tugade, 2000). The adverse consequences of stressful life events are relieved by positive emotions by way of their impact on physiological changes in parasympathetic cardiac control. However, the undoing effect of

positive emotions on cognitive and behavioural narrowing is unclear (Fredrickson, Mancuso, Branigan, & Tugade, 2000). It may be that positive emotions under stress (Galanakis et al, 2010), i.e. not only within safe and non-threatening environments, enable individuals to gather strength and capability to draw upon their resources, as well as reduce adverse physiological arousal.

As evident, the model proposed by Fredrickson (1998) offers a sound explanation for the adaptive effects of positive emotions on general human functioning both in stressful and non-stressful circumstances differentially, and enables practitioners in fields such as organizational, clinical/health, and counselling psychology to extend on their current research and practice into additional realms. Pregnancy, labour and delivery have received much interest from professionals throughout time, and are life events that may benefit from further research into positive emotions, especially where post natal depression is concerned.

Positive emotions and post natal depression

Post natal depression is a term used to describe a heterogeneous group of depressive symptoms that arise during the first four weeks after childbirth (Diagnostic and Statistical Manual of Mental Disorders, DSM-IV, American Psychiatric Association, 1994; Evins, Theofrastous, & Galvin, 2000). The presence of such symptoms is especially concerning due to the social role demanded of the new mother during this important time in her life along with the biological, hormonal and physiological changes that take place at the same time (O' Hara, Stuart, Gorman, & Wenzel, 2000).

Post natal depression was identified initially by Pitt (1968) in a London hospital. Pitt observed that 10% of new mothers within a maternity ward presented with depression without prior symptoms, i.e. during their pregnancy. Following Pitt's research came that of Dalton (1971) who referred to a 34% prevalence rate of mild or temporary depression lasting for a period of six weeks maximum after labour. In subsequent research, the frequency of the condition varies between 10% to 53% of new mothers (Drago-Carabotta, Panagopoulos, Laganara, Maggino & Alessi, 1997; Hobfoll, Ritter, Lavin, Hulsizer, & Cameron, 1995; Kitamura, Shima, Sugawara, & Toda, 1996; Moraitou, 2002). In most studies these rates are obtained using the Beck Depression Inventory (BDI; Beck, Ward, & Medelson, 1961) and the Edinburgh Postnatal Depression Scale (EPDS; Cox, Holden, & Sagovsky, 1980), with satisfactory congruent validity (Moraitou & Galanakis, 2006). It has been found that depression in general is found more often in western cultures rather than eastern ones, while even

though the same might be expected for post natal depression, no recent study has provided scientific data towards that direction (Bloomfield & Williams, 2001).

Our line of argument with regards to the relation between depressive symptoms and the experience of positive emotions is developed based on the notion of the broad thought-action repertoire and the development of interpersonal resources purported by Fredrickson (Fredrickson, 1998). When individuals experience a positive emotion the spread or broadening of this emotion is enabled, making it possible for individuals to produce new ideas, alternative solutions to problems, as well as a variety of responses. In this way new cognitive and emotional resources are accumulated for the purposes of adaptive functioning, and coping under conditions of context specific stress such as childbirth. This increase in available resources produces a positive self image, self-confidence, and a feeling of self-efficacy (Moraitou & Stalikas, 2004). In addition, the continuous upward spiral effect between positive emotions and broadening leads to greater intentions for a holistic feeling of psychological and spiritual well-being and resilience, whilst simultaneously suspending adverse consequences of negative emotions, and possibly depressive symptoms, in defence.

An essential pre-requisite for Fredrickson's broaden-and-build model is a secure and safe environment, for without this positive emotions cannot endure (Moraitou, Charizopoulou, Skiada, & Sourila, 2003). Likewise, a pre-requisite for a smooth delivery of a child is the same feeling of security, comfort, and acceptance (Moraitou, Bouroutzoglou, Chatzimichaloglou, & Kallia, 2003). Childbearing is considered a unique experience in a woman's life, and despite the stress of the moment, it is regarded by most as a positive one (Melissa-Chalikopoulou, 1996).

A range of demographic variables that are directly related to labour have been found to determine the degree of post natal depression experienced by new mothers. For instance, the risk of manifestation amongst first time primiparous mothers is approximately double that of mothers who have had multiple births (Harris, Deaty, Harris, Leew, & Wilson, 1996; Moraitou, Chatzitheodorou, Markou, Galanakis, 2009, Moraitou, & Lykeridou, 2007, Moraitou, & Stalikas, 2004). The reason for this is that post partum depression is mainly a psychological condition regarding the mother's agony of performing a new role successfully. Women who have already given birth in the past know that they can handle this new role and therefore are not as easily affected by the psychological factors that lead to post partum depression. In addition, the ease (O'Hara, 1985; 1986) and type of delivery (i.e. natural or caesarean; Cox, Connor, and Kentell, 1982) have been previously implicated in the development of depressive symptoms after child birth. In particular the more the

implications and problems during delivery the more the possibility of the new mother to experience high post partum depression levels. Other maternal variables whose precipitating roles have been found controversial include a planned/unplanned pregnancy (Warner et. al., 1996), and the gender of the newborn (Moraitou & Stalikas, 2004). Demographic variables external to the pregnancy may also contribute to post natal depression, and therefore be subject to moderation by the experience of positive emotions. For instance, a low family income, and living in remote urban areas, which both may be cause for a limited amount of communal support available, determine greater degrees of depressive symptoms amongst new mothers (Hobfoll et. al., 1995). Low socio-economic status, due to economic hardship or unemployment, is a cause for arduous life experiences, that coupled with pregnancy, exacerbate the manifestation of depression (Kitamura Shima, Sugawara &Toda 1996).

In recent years it is observed that interest in the study of positive emotions is increasing systematically. However, no previous research study has examined positive emotions amongst first time mothers, and in particular with relation to their pregnancy and delivery experience, let alone the extent to which they can safeguard a woman from the depressive symptoms that often proceed child birth. In fact, Fredrickson (1998) highlights that positive emotions are a separate cluster to other types of emotions, and are usually neglected in research. For this reason, the present study attempts to offer a starting point in which research on pregnancy and childbirth can begin to incorporate both the positive as well as the negative emotional implications. As such, the present research functions as an epidemiological study, tapping into the various demographic variables that may determine the experience of positive emotions amongst soon to be, and new mothers. The specific aims of the study are to examine:

- positive emotions that arise from childbirth,
- the relation of positive emotions that arise from childbirth to maternity and other demographic variables,
- the relation between positive emotions that arise from childbirth and depressive post natal symptoms.

Therefore, the present study hypothesises that first time mothers will experience more intense positive emotions after giving birth compared to their own baseline before giving birth, based on the fact that they are on a safe environment and that giving birth is a positive emotions provoking experience. Furthermore, the experience of positive emotions will be linked to the experience of less depressive symptoms. Additionally, maternal factors such as the number of previous births, the planning of

the pregnancy, the newborn's gender and the type of birth will determine the degree to which positive emotions are experienced before and after childbirth (Moraitou & Galanakis, 2006). Finally, other factors such as mother's education, occupation, monthly income, chronic health problems and psychopathology, partner support, and environmental support will also determine the extent to which positive emotions are experienced before and after child birth.

Method

Participants

The present study used a sample of 195 women, from all areas of Greece, who were assessed both before (35th week) and after giving birth (1st week).The mean age of the sample is 29.27 years (SD = 4.79). Of the 195 participants, 4.10% are primary school graduates, 46.70% are secondary school graduates, 41.00% have completed undergraduate university studies, whilst 8.20% have completed postgraduate university studies.

With regard to professional occupation (before giving birth), 17.70% occupy themselves with domestic duties, 7.80% are unemployed, 16.70% are self-employed, 3.60% are students, 21.90% work in the public service, and 32.30% work in the private sector. In terms of income, the majority of participants (64.50%) claimed a monthly income of €1350.

64.10% of the sample were first time mothers, whilst 27.70% were bearing their second, and 7.70% their third child. In addition, 38.90% of the sample declared that their pregnancy was planned, although 61.10% declared that their pregnancy was unplanned.

With regard to chronic health problems only 7.60% of participants indicated ailments such as diabetes, hypothyroidism, hypertension, and allergies. On the other hand, 10.10% indicated to occasionally experience psychopathological symptoms such as distress, grief, discontentment, and emotional confusion.

We estimated support from the partner and from family and friends based on the results of 2 single items ranging from 1= zero support to 5 = maximum support. We categorised participants based on their answers to those who received little support (M<2), those who received medium support (M=2.01-3.99) and those who received much support (M>4). 85.90% of the sample claimed to receive an *adequate* to *a lot of* support from their partner during pregnancy, and 88.00% from their environment

(friends and family). Of the participants, 62.90% had a natural delivery , and 35.10% with a caesarean section. In terms of the gender of the newborn, 56.50% of participants gave birth to a boy, whereas 43.50% gave birth to a girl.

Materials

Data was collected using the expanded version of the positive and negative affect scale (PANAS-X; Watson & Clark, 1984) and the Beck Depression Inventory (Beck, Ward, & Medelson, 1961). Further demographic data was collected, such as age, education level, occupation, monthly family income, whether the pregnancy was planned or unplanned, any chronic ailments, psychological complication during pregnancy, the degree of support from the partner and the environment, the type of birth, and the newborn's gender.

PANAS – X: This scale is the expanded version of the original PANAS scale, used to assess positive and negative affect. The scale has also been published in the Greek language, and consists of 60 adjectives that refer to emotions (positive and negative). Participants are required to rate each adjective on a 5 point likert scale in relation to the degree to which they have felt each emotion within the past 2 weeks (1 = very slightly or not at all, to 5 = extremely). The responses are scored along a positive affect scale and a negative affect scale, and yield two results per participant (PA and NA). Cronback's alpha coefficients indicate that the scale has satisfactory internal consistency, with a =0.77 for the PA scale, and a=0.83 for the NA scale.

Beck Depression Inventory (BDI): To examine depression one of the most renowned depression inventory was used (Evins, Theofrastous & Galvin, 2000; Hobfol, Ritter, Lavin, Hulsizer, & Cameron, 1995; Kitamura, Skima, Sugawara, & Toda, 1996, Moraitou, 2002). The BDI consists of 21 statements that refer to mood, pessimism, the feeling of failure, weight loss, guilt, and sleeplessness, to name a few. Within a clinical sample the scale's internal consistency ranges between 0.48 and 0.86, whereas in non-clinical samples reliability coefficients range between 0.60 and 0.90 (Beck, Steer, & Garbin, 1988).

The version used in the present study is a Greek translation, standardised by Donia and Demertzi (1983), and adjusted by Anagnostopoulou (2002). The Greek version yields satisfactory internal consistency, *a* =0,84. The statement pertaining to weight loss (statement 19) was removed in the present study due to the nature of the sample and the physiological fluctuation of weight after childbirth (Stalikas, Triliva, & Roussi, 2002).

Procedure

The call for participation was announced directly to the participants by the researchers and women who volunteered were included in the research design. Questionnaires were completed by the participants at two separate time periods. At Time 1 women were in their 35th week of pregnancy, when it was evident and recognizable by the social environment, and labour was approaching. At Time 2 women were in their 1st week after giving birth, and were at an early stage of having just experienced labour and motherhood as important life stages. The reason for selecting these particular time frames was decided upon the literature review. In particular Pitt (1968) suggests that post partum depression symptoms will manifest in about two weeks time from delivery and even though post partum can last up to 6 months after delivery if a woman does not manifest depression symptoms up until the second week it is highly improbable to experience this psychological condition. Moraitou (2002) suggests that the 35th week of pregnancy is the time frame right before delivery in which we can be sure that the woman has fully realised that she is going to give birth, plus this time is right before the delivery so we can examine the influence or presence of pre-existing psychopathology that will probably have a psychological effect after delivery.

Results

Descriptive statistics

The Statistical Package for the Social Sciences (SPSS, V. 14) was used to analyse the results. Initially the distribution of scores on the BDI and the PANAS were calculated, and means and standard deviations are presented in Table 3 and 4.

Table 3. Descriptive statistics of the scores on the PANAS before and after childbirth and the BDI.

		N	Mean	Standard Deviation
Positive Affect	Time 1	174	80.19	15.19
	Time 2	172	84.04	16.97
Negative Affect	Time 1	177	60.96	18.33
	Time 2	170	61.14	19.32
Post Natal Depression (BDI)		190	10.59	08.42

It is evident from Table 3 that there is a slight increase in positive affect from Time 1 to Time 2, i.e. before and after childbirth. Table 5 presents the positive emotions/adjectives with the greatest increase between the two times of testing.

Table 4. Distribution of scores on the Beck Depression Inventory.

		Frequency	Percent	Valid percent	Cumulative percent
	No depression	107	54,0	56,3	56,3
	Some depressive symptoms	57	28,8	30,0	86,3
	Moderate depressive symptoms	17	8,6	8,9	95,3
	Severe depressive symptoms	9	4,5	4,7	100,0
	Total	190	96,0	100,0	
Missing		8	4,0		
Total		198	100,0		

The table above indicates that the majority of women in the sample expressed no signs of depression (56.3%), whilst approximately a third indicated some depressive symptoms (30.0%). Fewer were the women that expressed the presence of moderate or severe symptoms (13.6%).

Table 5. Differences in the Mean Level of Affect Experienced Across Each Positive Emotion During Pregnancy (Time 1) and After Childbirth (Time 2).

		N	Mean	Standard Deviation
Cheerful	During Pregnancy	191	3.51	0.99
	After Childbirth	190	3.67	1.08
	Difference		0.16	0.08
Surprised	During Pregnancy	187	2.21	1.09
	After Childbirth	187	2.58	1.32
	Difference		0.37	0.23
Strong	During Pregnancy	190	3.78	1.02
	After Childbirth	187	3.91	1.13
	Difference		0.13	0.10

Relaxed	During Pregnancy	191	3.08	1.06
	After Childbirth	189	2.86	1.15
	Difference		-0.22	0.09
Delighted	During Pregnancy	187	3.58	1.19
	After Childbirth	188	3.94	1.15
	Difference		0.36	-0.04
Inspired	During Pregnancy	187	3.15	1.13
	After Childbirth	190	3.37	1.38
	Difference		0.22	0.25
Fearless	During Pregnancy	189	2.42	1.08
	After Childbirth	188	2.48	1.16
	Difference		0.06	0.08
Calm	During Pregnancy	191	3.26	0.95
	After Childbirth	189	3.22	1.10
	Difference		-0.04	0.14
Amazed	During Pregnancy	185	2.19	1.09
	After Childbirth	185	2.54	1.29
	Difference		0.35	0.19
Happy	During Pregnancy	185	4.12	0.90
	After Childbirth	187	4.20	1.07
	Difference		0.08	0.17
Alert	During Pregnancy	188	2.93	1.11
	After Childbirth	188	3.19	1.08
	Difference		0.26	-0.02
Daring	During Pregnancy	189	2.78	1.11
	After Childbirth	188	2.95	1.15

	Difference		0.17	0.03
Active	During Pregnancy	189	3.25	0.98
	After Childbirth	189	2.98	0.99
	Difference		-0.27	0.01
Joyful	During Pregnancy	189	3,98	0.97
	After Childbirth	189	4.14	1.10
	Difference		0.16	0.12
Proud	During Pregnancy	190	3.89	1.24
	After Childbirth	188	4.26	1.16
	Difference		0.37	-0.07
Lively	During Pregnancy	188	3.25	0.99
	After Childbirth	187	3.24	1.14
	Difference		-0.01	0.15
At Ease	During Pregnancy	188	3.07	1.09
	After Childbirth	188	3.19	1.04
	Difference		0.12	-0.05
Enthusiastic	During Pregnancy	188	3.65	1.04
	After Childbirth	188	3.76	1.16
	Difference		0.11	0.12
Determined	During Pregnancy	188	3.85	1.06
	After Childbirth	187	4.02	1.04
	Difference		0.17	-0.02
Interested	During Pregnancy	191	3.55	1.12
	After Childbirth	188	3.99	1.02
	Difference		0.44	-0.09
Confident	During Pregnancy	189	3.64	1.04

	After Childbirth	185	3.76	1.09
	Difference		0.12	0.04
Energised	During Pregnancy	189	3.25	0.99
	After Childbirth	188	3.19	0.97
	Difference		-0.06	-0.02
Concentrating	During Pregnancy	189	3.16	0.95
	After Childbirth	188	3.20	1.06
	Difference		0.04	0.10

The positive emotions displayed in the table above reveal that participants felt the greatest increase in joyfulness, pride, and interest after childbirth. In fact, these three positive adjectives play an especially important role in Fredrickson's model of positive emotions. Furthermore, there are positive emotions that decreased, even slightly, after childbirth, such as calmness and energy.

Inferential statistics with maternal and demographic factors

A series of ANOVAS were conducted to reveal differences in the experience of positive emotions amongst demographic groups before and after giving birth.

Table 6. Descriptive statistics of positive emotions during pregnancy and after childbirth across three age groups.

Age		N	Mean	Standard Deviation
18-29yrs	During Pregnancy	98	78.45	15.58
	After Childbirth	101	84.28	16.60
30-34yrs	During Pregnancy	61	83.80	13.32
	After Childbirth	57	83.87	17.78
35+ yrs	During Pregnancy	14	78.57	17.27
	After Childbirth	13	81.53	17.36
Total	During Pregnancy	173	80.35	15.09
	After Childbirth	171	83.94	16.97

The table above reveals the greatest change in mean scores of positive emotions to occur within the youngest age group (18-29yrs). In addition, women between the ages of 30 and 34 yrs display elevated mean scores of positive emotions compared to their younger and older counterparts. These differences are analysed and presented in Table 7 below.

Table 7. Analysis of variance of the degree of positive emotions during pregnancy and after childbirth across three age groups.

		Sum of Squares	df	Mean Square	F	Sig.
Positive emotions during pregnancy*age	Between groups	1122.08	2	561,04	2.50	0.08
	Within groups	38081.40	170	224.00		
	Total	39203.49	172			
Positive emotions after childbirth*age	Between groups	87.37	2	43.68	0.15	0.86
	Within groups		168	290.97		
	Total		170			

The results of Table 7 show that age differences for the experience of positive emotions both before and after childbirth are not significant.

Table 8. Descriptive statistics of positive emotions during pregnancy and after childbirth across four level of education received.

Education Received		N	Mean	Standard Deviation
Primary Level	During Pregnancy	8	65.12	21.80
	After Childbirth	8	83.37	26.34
Secondary Level	During Pregnancy	79	78.13	14.73
	After Childbirth	79	81.74	17.97
Undergraduate Level	During Pregnancy	73	82.12	14.68
	After Childbirth	72	84.95	15.56
Postgraduate Level	During Pregnancy	14	90.35	04.68
	After Childbirth	13	93.38	05.90

Total	During Pregnancy	174	80.19	15.19
	After Childbirth	172	84.04	16.97

Table 8 above illustrates the greatest changes in mean scores of positive emotions of before and after labour within the group with the lowest level of education received (primary level). In contrast, participants who have received a postgraduate level of education appear to experience higher means of positive emotions and less deviation from these both before and after giving birth, compared to their less educated counterparts. These differences are analysed and presented in Table 9 below.

Table 9. Analysis of variance of the degree of positive emotions during pregnancy and after childbirth across four levels of education received.

		Sum of Squares	df	Mean Square	F	Sig.
Positive emotions during pregnancy* education received	Between groups	3867.90	3	1289.30	6.07	.00
	Within groups		170	212.23		
	Total		173			
Positive emotions after childbirth* education received	Between groups	1614.86	3	538.28	1.89	.13
	Within groups		168	283.81		
	Total		171			

The ANOVA results reveal a significant difference in the experience of positive emotions as a function of the level of education received by the participants during their pregnancy. Specifically, this difference has a positive direction as higher levels of positive emotion are consistently experienced by those with higher education. It is interesting to see that these differences are not significant after the event of child birth.

Table 10. Descriptive statistics of positive emotions during pregnancy and after childbirth across six categories of participant occupation.

Occupation		N	Mean	Standard Deviation
Domestic	During Pregnancy	32	72.06	16.61
	After Childbirth	31	83.51	16.19
Unemployed	During Pregnancy	13	74.69	18.15
	After Childbirth	12	73.25	22.63
Self-employed	During Pregnancy	30	81.76	11.58
	After Childbirth	27	82.18	14.74
Student	During Pregnancy	6	68.33	21.63
	After Childbirth	6	78.83	21.70
Private Sector	During Pregnancy	36	84.66	10.58
	After Childbirth	38	87.42	14.68
Public Sector	During Pregnancy	54	84.20	14.53
	After Childbirth	56	86.12	17.58
Total	During Pregnancy	171	80.32	15.12
	After Childbirth	170	84.14	16.99

With regard to the table above it appears that participants working in either the public or private sector have higher mean scores of positive emotions before and after labour. These differences are analysed and presented in Table 11 below.

Table 11. Analysis of variance of the degree of positive emotions during pregnancy and after childbirth across six categories of participant occupation.

		Sum of Squares	df	Mean Square	F	Sig.
Positive emotions during pregnancy*	Between groups	5013.20	5	1002.64	4.88	0.00
	Within groups	33862.10	165	205.22		

occupation						
	Total	38875.31	170			
Positive emotions after childbirth* occupation	Between groups	2337.03	5	467.40	1.64	0.15
	Within groups	46498.28	164	283.52		
	Total	48835.32	169			

Once again, ANOVA results reveal a significant difference in the experience of positive emotions as a function of the occupation of participants during their pregnancy, i.e. before giving labour, and a lack of significance after child birth.

Table 12. Descriptive statistics of positive emotions during pregnancy and after childbirth across six categories of participants' monthly family income.

Monthly Family Income		N	Mean	Standard Deviation
0-450 €	During Pregnancy	1	51.00	
	After Childbirth	1	55.00	
450-900 €	During Pregnancy	15	75.86	14.08
	After Childbirth	15	75.93	23.63
900-1350 €	During Pregnancy	25	82.88	15.11
	After Childbirth	23	90.13	14.64
1350 – 1800 €	During Pregnancy	15	78.33	16.01
	After Childbirth	16	84.93	15.84
1800 – 2250 €	During Pregnancy	47	76.97	14.75
	After Childbirth	49	85.59	15.26
2250+ €	During Pregnancy	70	83.21	15.01
	After Childbirth	68	82.88	16.79
Total	During Pregnancy	173	80.22	15.23
	After Childbirth	172	84.04	16.97

An additional demographic factor studied in the present research is the participant's monthly family income. As expected, participants with a lower income display lower mean scores of positive emotions both before and after giving birth. Table 13 presents the ANOVA results for this variable.

Table 13. Analysis of variance of the degree of positive emotions during pregnancy and after childbirth across six categories of participants' monthly family income.

		Sum of Squares	df	Mean Square	F	Sig.
Positive emotions during pregnancy* monthly income	Between groups	2489.73	5	497.94	2.22	0.05**
	Within groups	37430.47	167	224.13	37430.47	
	Total	39920.20	172		39920.20	
Positive emotions after childbirth* monthly income	Between groups	2904.25	5	580.85	2.07	0.07
	Within groups	46391.37	166	279.46		
	Total	49295.62	171			

ANOVA results show a significant difference in the experience of positive emotions as a function of participants' monthly family income during pregnancy, i.e. before giving birth. Participants with a low monthly income (0-450€) experienced positive emotions with an average score of 51.00 on the PANAS-X when their higher income counterparts experienced an average minimum score of 75.

Table 14. Descriptive statistics of positive emotions during pregnancy and after childbirth as a function of rank from previous births.

Rank of birth		N	Mean	Standard Deviation
First	During Pregnancy	109	79.44	15.19
	After Childbirth	111	82.37	18.37
Second	During Pregnancy	52	82.11	14.49
	After Childbirth	48	88.89	12.18
Third	During Pregnancy	13	78.76	18.31
	After Childbirth	12	79.25	17.43

Fifth	During Pregnancy			
	After Childbirth	1	94.00	
Total	During Pregnancy	174	80.19	15.19
	After Childbirth	172	84.04	16.97

Table 15. Analysis of variance of the degree of positive emotions during pregnancy and after childbirth as a function of rank from previous births.

		Sum of Squares	df	Mean Square	F	Sig.
Positive emotions during pregnancy* rank of birth	Between groups	278.76	2	139.38	.60	.55
	Within groups	39668.58	171	231.98		
	Total	39947.35	173			
Positive emotions after childbirth* rank of birth	Between groups	1812.79	3	604.26	2.13	.09
	Within groups	47482.83	168	282.63		
	Total	49295.62	171			

Although it was expected that primiparous mothers would experience more intense positive emotions compared to those who have given birth previously, based on the fact that it is their first time and emotions tend to be more intense when something is experienced for the first time, the results do not support this hypothesis. It appears rather that positive emotions arise irrespective of the number of times that child birth has occurred.

Table 16. Descriptive statistics of positive emotions during pregnancy and after childbirth as a function of whether the pregnancy was planned or unplanned.

Planning of Pregnancy		N	Mean	Standard Deviation
Planned	During Pregnancy	66	85.98	13.32
	After Childbirth	62	89.46	16.29
Unplanned	During Pregnancy	108	76.65	15.23
	After Childbirth	110	80.99	16.65

Total	During Pregnancy	174	80.19	15.19
	After Childbirth	172	84.04	16.97

Table 17. Analysis of variance of the degree of positive emotions during pregnancy and after childbirth as a function of whether the pregnancy was planned or unplanned.

		Sum of Squares	df	Mean Square	F	Sig.
Positive emotions during pregnancy* planning	Between groups	3564.04	1	3564.04	16.84	.000***
	Within groups	36383.30	172	211.53		
	Total	39947.35	173			
Positive emotions after childbirth* planning	Between groups	2849.20	1	2849.20	10.42	.001***
	Within groups	46446.42	170	273.21		
	Total	49295.62	171			

It appears that the experience of positive emotions differs significantly between the two groups; planned and unplanned pregnancy ($p<0.001$). The women in the present study who had planned their pregnancy had increased positive emotions manifest compared to their counterparts who had an unplanned pregnancy.

Table 18. Descriptive statistics of positive emotions during pregnancy and after childbirth as a function of partner support.

Partner Support		N	Mean	Standard Deviation
No support	During Pregnancy	8	62.87	22.95
	After Childbirth	8	69.87	23.93
Little support	During Pregnancy	7	59.71	14.22
	After Childbirth	7	69.57	22.88
Moderate support	During Pregnancy	11	71.90	22.07
	After Childbirth	12	76.66	22.31
Strong support	During	42	76.85	12.89

	Pregnancy			
	After Childbirth	41	80.24	16.11
Very strong support	During Pregnancy	104	85.62	10.93
	After Childbirth	102	88.89	13.60
Total	During Pregnancy	172	80.49	15.01
	After Childbirth	170	84.25	16.92

Glancing through the table above it is obvious that the mean scores for positive emotions measured by the PANAS-X differ between participants, who receive no support (M>2) from their partner and those who receive very strong support (M>4) (In addition, the standard deviations between these two groups differ, in that participants who receive no support have a greater spread of scores. The ANOVA results below confirm the difference evident above as significant.

Table 19. Analysis of variance of the degree of positive emotions during pregnancy and after childbirth as a function of partner support.

		Sum of Squares	df	Mean Square	F	Sig.
Positive emotions during pregnancy* partner support	Between groups	9610.26	4	2402.56	13.87	.000***
	Within groups	28916.73	167	173.15		
	Total	38526.99	171			
Positive emotions after childbirth* partner support	Between groups	6707.49	4	1676.87	6.63	.000***
	Within groups	41700.63	165	252.73		
	Total	48408.12	169			

One of the strongest determining variables for the experience of positive emotions during and after pregnancy appears to be the degree of partner support. The results of the ANOVA displayed in Table 19 show that there is a significant difference between groups both before and after childbirth. Post hoc tests showed that participants experienced less positive emotions when they received little or no partner support. As support increases, so do feelings of joy, pride, and interest of the new mother. However, the lack of partner support is not only linked to lower positive emotions but also an increase in negative emotions.

Table 20. Descriptive statistics of positive emotions during pregnancy and after childbirth as a function of environmental support.

Environmental Support		N	Mean	Standard Deviation
No support	During Pregnancy	2	62.00	2.82
	After Childbirth	2	55.50	2.12
Little support	During Pregnancy	5	72.00	18.00
	After Childbirth	5	90.60	15.04
Moderate support	During Pregnancy	16	69.18	14.69
	After Childbirth	15	80.73	17.16
Strong support	During Pregnancy	35	76.20	14.97
	After Childbirth	35	80.02	15.88
Very strong support	During Pregnancy	113	84.00	13.70
	After Childbirth	113	86.25	16.81
Total	During Pregnancy	171	80.40	15.01
	After Childbirth	170	84.25	16.92

Table 21. Analysis of variance of the degree of positive emotions during pregnancy and after childbirth as a function of environmental support.

		Sum of Squares	Df	Mean Square	F	Sig.
Positive emotions during pregnancy* environment support	Between groups	5123.30	4	1280.82	6.40	.000***
	Within groups	33192.03	166	199.95		
	Total	38315.34	170			
Positive emotions after childbirth* environment support	Between groups	3118.96	4	779.74	2.84	.026*
	Within groups	45289.16	165	274.48		
	Total	48408.12	169			

It appears that as with partner support, support from the environment has a statistically significant impact on the experience of positive emotions. Compared to those with no support, participants with support from the environment experienced a greater degree of positive emotions, but only when this support was very strong. Moderate support does not differ statistically (significantly) from no support with regard to positive emotions.

An additional maternal factor examined against the experience of positive emotions is the type of birth, natural versus caesarean. The results revealed a lack of statistical significance between the two groups.

Table 22. Descriptive statistics of positive emotions during pregnancy and after childbirth as a function of the newborn's gender.

Gender of newborn		N	Mean	Standard Deviation
Boy	During Pregnancy	99	77.91	16.49
	After Childbirth	98	82.30	18.60
Girl	During Pregnancy	74	83.09	12.83
	After Childbirth	73	86.26	14.42
Total	During Pregnancy	173	80.13	15.21
	After Childbirth	171	83.99	17.01

Table 23. Analysis of variance of the degree of positive emotions during pregnancy and after childbirth as a function of the newborn's gender.

		Sum of Squares	Df	Mean Square	F	Sig.
Positive emotions during pregnancy* gender of newborn	Between groups	1134.25	1	1134.25	5.01	.026*
	Within groups	38695.69	171	226.29		
	Total	39829.94	172			
Positive emotions after childbirth* gender of newborn	Between groups	654.12	1	654.12	2.27	.133
	Within groups	48560.87	169	287.34		
	Total	49214.99	170			

Examining the role of the newborn's gender on positive emotions, an ANOVA analysis revealed that women who gave birth for the first time to a girl had more positive emotions than those who gave birth to a boy. This significant difference appeared with regard to positive emotions only during pregnancy.

The existence of mild chronic health ailments, such as allergies, does not cause differences in the experience of positive emotions amongst participants who were pregnant as shown by ANOVA analyses. Severe chronic ailments, however, negatively impact women who have given birth, although insignificantly. Similarly, after having given birth, participants who experienced depressive symptoms had a greater difference in means of positive emotions compared to those without any depressive symptoms.

In general, it appears from the results presented above that the experience of positive emotions varies not only before and after childbirth, but also in accordance with various factors such as educational background, type of occupation, whether the pregnancy was planned or not, the gender of the newborn, and the degree of support provided by the partner and the wider environment.

Inferential statistics for positive emotions and depression

The results of the study showed differences between the degrees of experienced positive emotions (low, moderate, high) and the varying levels of depression, according to the PANAS-X and the BDI. The low positive emotions group comprised of low average ratings of positive emotion, i.e. 1-2 (not at all or very slightly). The moderate positive emotion group comprised of moderate ratings, i.e. 3 (moderately), and the high positive emotion group comprised of high ratings of positive emotions experienced, i.e. 4-5 (very often and extremely). The means were statistically analysed to uncover significant differences. The following tables, Table 24, 25, 26, and 27, display the results.

Table 24. Means and Standard Deviations of BDI scores across the three groups of Low, Moderate, and High Positive Emotions (PE) experienced during pregnancy.

	N	Mean	Standard Deviation	Standard Error
Low degree of PE experienced	25	20.72	13.95	2.79
Moderate degree of PE experienced	93	9.40	5.67	0.58

High degree of PE experienced	52	8.50	6.70	0.92
Total	170	10.79	8.71	0.66

Table 25. Analysis of variance of mean scores of depression (BDI) against the level of positive emotions experienced during pregnancy.

		Sum of Squares	df	Mean Square	F	Sig.
Depression*positive emotions during pregnancy	Between groups	2915.28	2	1457.64	24.50	.000***
	Within groups	9932.51	167	59.47		
	Total	12847.79	169			

Table 26. Means and Standard Deviations of BDI scores across the three groups of Low, Moderate, and High Positive Emotions (PE) experienced after giving birth.

	N	Mean	Standard Deviation	Standard Error
Low degree of PE experienced	24	26.08	12.78	2.61
Moderate degree of PE experienced	70	10.10	4.45	0.53
High degree of PE experienced	74	6.77	3.55	0.41
Total	168	10.91	8.78	0.67

Table 27. Analysis of variance of mean scores of depression (BDI) against the level of positive emotions experienced after giving birth.

		Sum of Squares	df	Mean Square	F	Sig.
Depression*positive emotions after giving birth	Between groups	6839.60	2	3419.80	93.24	.000***
	Within groups	6051.22	165	36.67		
	Total	12890.83	167			

The results in the tables above indicate that women who had experienced high degrees of positive emotions had also experienced lower scores of depression on the BDI, compared to participants with moderate and low levels of positive emotions. These results apply to both before and after giving birth.

Discussion

The present study attempted to examine the development of positive emotions in alignment with Fredrickson's Positive Emotions theory, and the extent to which these protect women against post natal depressive symptoms after giving birth. The theory states that life experiences and events lead to the development of positive emotions, and in this case, the positive emotions aroused after childbirth were *joyfulness*, *pride*, and *interest*. Although ordinarily these feelings may be acute and context specific, the results of their activation involve the long term broadening of other abilities such as resilience, subjective well-being, and resource building (Tugade &Fredrickson, 2004). In addition, the adverse consequences of negative emotions are inhibited by resource building and the frequent experience of positive emotions (Fredrickson, et al., 2000; Fredrickson & Levenson, 1998).

The results of the present study confirmed the first hypothesis and revealed that new mothers experience more intense positive emotions after childbirth compared to their baseline before giving birth. This result was represented by a 4 point increase in mean scores, according to the PANAS-X. The specific emotions that increased the most after childbirth were joyfulness, pride, and interest. These three emotions have been documented as the most indicative of resource building by Fredrickson's "Broaden-and-Build Model of Positive Emotions" (1998).

Certain positive emotions remained undifferentiated before and after childbirth, such as *liveliness*, *fearlessness*, and *concentration*. This persistence of scores before and after could be explained by the event-specific repercussions of the transition to motherhood, where the experience of novelty and stress of the event of labour remain constant for different reasons before and after.

Irrespective of age and type of birth, the majority of the new mothers in the present study experienced a boost of positive emotions 1 week post partum. (As such, joyfulness, pride and interest manifested regardless of whether it was a primiparous birth or not. However, the expectancy of a female child yielded significantly stronger positive emotions than did the expectancy of a male child. This result could be due to *birth related goals* of the mother, which may include a longing for a little girl. For

instance, it has been found that increased expectations surrounding the health of the newborn child decrease the presence of depressive symptoms post partum (Salmela-Aro, Nurmi, Saisto, & Halmesmaki, 2001). *Gender related goals* of the mother before giving birth may be studied further to accurately account for the outcome found in the present study.

Similarly, the level of education of the mother was found to impact significantly on the experience of positive emotions. As the level of education increases, the variety of positive emotions experienced also increases. It may be the case that education determines the quality of the woman's assessment of her pregnancy and childbirth experience, and the overall transition into motherhood. Educated women may be more independent and also more informed and prepared regarding their new role in comparison to women with lower education. In addition, education level may account for differences in positive emotions across monthly family income, and vice versa. Women with a higher income and who experienced more intense emotions, may incidentally have a higher education level.

Working women experienced significantly more positive emotions during pregnancy than women who were unemployed, or students. Potentially, a professional life, whether in the public or private sector contributes to an overall sense of self-efficacy, and in turn leads to overall life satisfaction and the frequent experience of positive emotions as a result (Lyubomirsky, King, & Diener, 2005). Similarly, employment may account for increases in family monthly income, and therefore increases in positive emotions. Women with a low family income may consider the addition of the newborn child into the family as a further demand on financial capabilities.

Furthermore, the present research showed that women who had a planned pregnancy as opposed to those that were unexpected, experience a greater degree of positive emotions both before and after giving birth. Planning usually involves a degree of preparation and a greater anticipation of the child. In addition, this anticipation may contribute to the increase in coping abilities and resources towards caring for the child once born. In other words, the conscious planning of the pregnancy may represent a couple's readiness for a child, and an acceptance of the anxiousness and at the same time eagerness that accompanies.

On a different note, as expected previous health and psychological problems were found to have a negative impact on the experience of positive emotions. In terms of post natal depression, the results showed that women who experienced positive emotions during pregnancy and after giving birth also experienced lower degrees of post natal depression in comparison to their less positive counterparts. The hypothesis

of the study is supported, and contributes to evidence of the resource building effect of positive emotions, in alignment with Fredrickson's model (1998), which minimizes the prevalence of negative or depressive symptoms.

Alternatively, the support provided by the partner is a significant contributor to the positive emotions felt throughout the transition into motherhood. Little partner support is inadequate, and does not shield the woman against negative and depressive emotions during this important time in her life. Similarly, support from the greater environment is linked to the experience of positive emotions during pregnancy, but not significantly after childbirth.

As a whole, the results of the present study indicate the importance of giving birth towards the experience of resources building and positive emotions. Specifically, joyfulness, pride, and interest manifest most commonly, and especially when; the woman obtains support from her partner and the environment, has planned her pregnancy, is educated, and has a professional life which affords a high monthly income.

Although age has not been found to statistically contribute to differences in positive emotions amongst the sample, it may be the case that the age category of 18 to 29 years assessed in the present study fails to capture differences *within* this range, which could be substantial considering the degree of mental, emotional and physical growth that occurs during this period in a woman's life. Furthermore, the differences found between education and occupation mentioned above may be directly influenced by differences in age between 18 and 29 years.

As far as the limitations of the study and future research directions are concerned we propose the following. First post partum depression is a variable often confused with baby blues, underactive thyroid and post partum psychosis. It was a risk in our study to examine postpartum depression during the first week after giving birth as these symptoms may be the results of baby blues syndrome or underactive thyroid. Therefore it will be useful in future research designs to clearly differentiate between post partum depression and baby blues or underactive thyroid symptoms. For that to happen a time three measurement of postpartum depression symptoms will be needed at a time approximately three weeks after delivery. Furthermore, the present research was limited to the experience of positive emotions amongst women and their transition into parenthood, across various demographic and contextual variables that have never before been combined. Much research is necessary to determine the dynamic links between these variables, and their interaction in terms of their effects on positive emotion manifestation. Additionally, it is of interest to

assess potential positive emotions experienced by the partner, or other parent during this significant life event. Results may contribute to knowledge concerning the quality of the relationship between couples, and the impact that each give to the other in terms of coping and adjustment throughout their transition into parenthood. Finally, although personality factors have been studied previously with regard to post natal depression and childbirth, it may be that personality differences moderate the degree to which positive emotions safeguard against post natal depressive symptoms.

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