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Effects of Oral Contraceptives on Daily Self-Ratings of Positive and Negative Affect

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Abstract

The present study examined whether duration of oral contraceptive (OC) use could account for the inconsistent findings of previous studies on the relationship between affect and OC use. This study was the first to examine positive affect variability and to directly compare early, late, and never users of OCs. The Positive and Negative Affect Schedule (PANAS) and the Menstrual Distress Questionnaire (MDQ) were filled out daily for 35 days by 96 female university students (17 first-time OC users, 34 long-time users, and 45 never-users). Despite predictions to the contrary, no group differences were found for negative affect, positive affect, or affect variability. However, exploratory analyses suggested that OC type (monophasic vs. triphasic) has a differential effect on positive affect variability across the menstrual cycle for first-time and long-time OC users. Neither somatic symptoms or somatic symptom variability could entirely account for these differences. The overall findings suggest that while no common change in affect or affect variability occurs in all women taking OCs, OC type (a pharmacological factor), duration of use, and individual difference variables may warrant further exploration as mediating variables in OC-related affect changes. Finally, while the main results found no support for the role of the "survivor effect" as an artifactual confound, the results of an exploratory comparison suggest that for specific groups of women, it may be a confound.

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Effects of Oral Contraceptives on Daily Self-Ratings of Positive and Negative Affect

The oral contraceptive (OC) pill is the most popular form of birth control in North America (Ortho, 1991) and has been used by an estimated 200 million women worldwide (Goldzieher, 1994). The popularity of this form of hormonal contraception among women necessitates an awareness of all side effects (positive and negative) and an awareness of the predisposing conditions that may make some women more prone to these side effects. Mood change remains one of the controversial side effects of OC use despite a great deal of research. Change in mood, specifically depression, is one of the most common reasons given for discontinuing OC use and there are, unquestionably, some women in whom OCs produce unacceptable changes in affect (Goldzieher, 1994). Research on mood side effects of "the pill" is important whether the mood change is positive or negative, and whether the cause is pharmacological or psychological. Women need scientific assessments of benefits and risks in order to make an informed choice about what type of contraceptive method or what type of OC pill is the best for them.

Biochemical Theories: Hormones and Mood

The exact mechanism for a pharmacological effect of OCs on mood is not yet known but there are a number of plausible hypotheses as to how the estrogen or progestogen in OCs could lead to positive or negative mood

change. As reviewed by Delgado, Price, Heninger, and Charney (1992), changes in the serotonergic system, noradrenaline system, and the dopaminergic system have all been associated with affective disorders and changes in mood. To simplify things, increases in serotonin, dopamine, and alpha$_1$-adrenoreceptor binding, and decreases in beta-adrenergic and alpha$_2$ receptor binding have been associated with mood improvements or manic symptoms. Decreases in both serotonin and dopamine have been associated with deterioration in mood or depressive symptoms. No clear consensus yet exists on which hormonal component of the OC acts on which neurotransmitter system or even whether increased or decreased levels of progesterone or estrogen are associated with mood improvement or deterioration. Researchers have, however, proposed a number of plausible mechanisms through which mood change associated with OC use could occur.

The majority of researchers in the area have hypothesized that changes in serotonin levels due to OCs result in mood change (e.g., Deijen, Duyn, Jansen, & Klitsie, 1992; Patten & Love, 1993; Sheehan & Sheehan, 1976; Sherwin, 1996; Slap, 1981; Special Advisory Committee on Reproductive Physiology, 1994). The estrogen component of the OC may lead to mood changes by acting on the serotonergic system (e.g., Deijen et al., 1992; Patten & Love, 1993; Sheehan & Sheehan, 1976; Sherwin, 1996; Slap, 1981; Special Advisory Committee on Reproductive Physiology, 1994). Mood improvements following

estrogen intake may occur through two pathways. First, an increased rate of monoamine oxidase degradation may lead to increased availability of tryptophan resulting in increases in serotonin (Sherwin, 1996). Second, estrogen's inhibition of the enzyme hydroxyindole-o-methyltransferase (HIOMT), which converts serotonin to melatonin in the pineal gland, may lead to increased serotonin levels (Slap, 1981). It has also been suggested that estrogen may lead to a deterioration in mood by causing a functional vitamin B_6 deficiency, which alters tryptophan metabolism and decreases serotonin (Deijen et al., 1992; Patten & Love, 1993; Sheehan & Sheehan, 1976; Special Advisory Committee on Reproductive Physiology, 1994).

Progesterone could also effect mood through the serotonergic system. One hypothesis is that progesterone leads to mood deterioration by increasing monoamine oxidase activity resulting in decreased concentrations of serotonin (Sheehan & Sheehan, 1976; Sherwin, 1996). Another possibility is that progesterone improves mood by increasing insulin levels resulting in a higher tryptophan to large neutral amino acid ratio, which leads to an increased concentration of serotonin (Tuiten et al., 1995).

The involvement of other neurotransmitters besides serotonin has been suggested. Moller (1981) hypothesized that mood deterioration in OC users is the result of a substrate-limited reduction in brain noradrenaline synthesis due to a decreased brain tyrosine concentration. Deijen et al. (1992) suggested

that the reduced concentration of noradrenalin in the hypothalamus following an OC induced vitamin B_6 deficiency may account for OC-related mood deterioration. Finally, based on animal research, Roy-Byrne, Rubinow, Gold, and Post (1984) hypothesized that estrogen may lead to mood improvements by decreasing the sensitivity of presynaptic dopamine autoreceptors. These hypotheses suggest that while the pharmacologic mechanism through which OCs act on mood is not known, plausible mechanisms exist by which both estrogen and progesterone can both lead to improvement and deterioration in mood.

Obviously increased doses of estrogen or progesterone cannot simultaneously cause negative and positive mood change in one women at one time. Other, as of yet unidentified, variables must mediate the direction of the mood change. Further research is needed to clarify the relationship between these two hormones and mood and to identify mediating variables.

Mood Versus Affect

Mood is a broad and complex area of research. The American Psychiatric Association (1994) compares mood and affect to climate and weather respectively. Mood is referred to as "a more pervasive and sustained emotional 'climate'" while affect involves "more fluctuating changes in emotional 'weather'" (p. 763). Early research on the relationship between mood and oral contraceptive use took a categorical approach by focusing on the presence or

absence of diagnosable mood disorders in women who use oral contraceptives (OC users). Most studies looked for increased incidence of clinical depression in OC users (e.g., Herzberg, Johnson, & Brown, 1970; Kutner & Brown, 1972; Vessey, McPhearson, & Yeates, 1985). Another approach involves viewing mood as a dimensional continuum and measuring the positive or negative mood change occurring during oral contraceptive use. The dimensional approach allows one to look at sub-clinical change and thus investigate changes in all women as opposed to only those who develop a mood disorder. It also allows for the measurement of both positive affect change and negative affect change. Positive affect reflects the extent to which a person avows a zest for life. Someone with high positive affect is characterized as attentive, interested, alert, and enthusiastic. Someone with low positive affect feels sleepy and tired. Negative affect reflects the extent to which a person conveys feeling distressed or unpleasantly aroused. A person with high negative affect feels downhearted, hostile, angry, fearful, and guilty, while someone with low negative affect is characterized as calm and content (Watson & Tellegen, 1985). The rationale for measuring negative and positive affect separately comes from recent studies, summarized by Watson and Tellegen, which have consistently found that positive and negative affect are the two dominant and relatively independent dimensions within affect (e.g., Diener & Emmons, 1985; Kercher, 1992).

Thus, a categorical approach to investigating mood change associated with OC use is concerned with the development of a diagnosable mood disorder while the dimensional approach looks at shorter-term changes in mood or levels of negative and/or positive affect.

Early Research: Oral Contraceptives and Mood

When looking at studies on the relationship between OC use and mood change, it is important to keep in mind that a major reduction of the estrogen dosage in oral contraceptives occurred in 1985. This means that most research done before 1985 is outdated since most studies involved oral contraceptives which contained higher dosages of estrogen than are used today.

The early research on mood change associated with oral contraceptive use has produced inconsistent findings. Most has involved cross-sectional, prospective, and randomized placebo designs which involve the assessment of mood one to three times over the course of several months. This differs from the more recent approach of using daily ratings of affect. Most early studies compared never-users, past-users, and present-users of oral contraceptives. The early studies usually either compared rates of depressive disorders between the two or three groups (e.g., Royal College of General Practitioners, 1974) or compared scores on mood rating scales designed to measure general or average mood (e.g., Herzberg, Johnson, & Brown, 1970). Some

researchers have found increased rates of depression in oral contraceptive users (e.g., Cullberg, 1972; Herzberg, Johnson, & Brown, 1970; Nilsson & Almgren, 1968). Others have found a decrease in depression rates (e.g., Deijen et al., 1992; Herzberg, Draper, Johnson, & Nicol, 1971), and some studies have not found any relationship between oral contraceptive use and incidence of depression (e.g., Fleming & Seager, 1978; Vessey et al., 1985). While many reviews of the early research in this area are incomplete, Cullberg (1972), Long and Kathol (1993), and Slap (1981) include most of the best-conducted studies.

A number of obvious methodological deficiencies may be responsible for the varied findings in the early studies. Many studies did not include an appropriate control group that would allow for a comparison of adverse mood changes between oral contraceptive users and non-users (e.g., Akerlund, Rode, & Westergaard, 1983; Murawski, Sapir, Shulman, Ryan, & Sturgis, 1968; Nilsson, Jacobson, & Ingemansson, 1967; Nilsson & Solvell, 1967; West, 1968). A number had a very small sample size (e.g., Glick, Hauptman, & Klein, 1970; Grounds, Davies, & Mowbray, 1970; Leeton, 1973; Marcotte, Kane, Obrist, & Lipton, 1970; Silbergeld, Brast, & Noble, 1971; Worsley & Chang, 1978). Lewis and Hoghughi (1969) included a biased sample since the OC users were preselected for depression. Finally, many of the reports were case studies (e.g., Kane, 1968; Kane, Daly, Ewing, & Keeler, 1967) or retrospective studies

(e.g., Moos, 1968a).

Another possible reason for the inconsistent results in the early literature may have involved the measurement methodology. Mood was usually measured or assessed one or two times over one to three months. Perhaps the mood changes associated with oral contraceptive use involve an increase or decrease in mood variability or changes at specific phases of the menstrual cycle. A sensitive measurement methodology may be needed to record subtle changes. Daily mood ratings, or more accurately, daily ratings of affect, may be a more sensitive indicator of differences between users and non-users of oral contraceptives.

The more recent shift has been to focus on differences in affect by having subjects fill out daily self-rating scales for 30 to 90 days (e.g. Almagor & Ben-Porath, 1991; Walker & Bancroft, 1990). Daily rating scales can be used to examine cyclical changes in affect across the menstrual cycle and general trends or differences in mood between the OC users and non-users. Thus, daily rating scales measure affect but the mean of 35 of these daily ratings of affect can give an indication of an individual's mood.

Recent Research: Oral Contraceptives and Affect

A review of the literature found 17 published studies whose methodology involved both OC users and non-users rating their affect daily. For some of the studies the focus was not on the differences in affect between OC users and

non-users (e.g., Sutker, Libet, Allain, & Randall, 1983). However, in the interests of comprehensiveness, all studies involving OC users and non-users filling out daily affect rating scales were reviewed if data were published. In the three studies where statistical analyses of between-group affect differences were not published, the findings discussed below were based on visual inspection of published data or graphs (Graham & Sherwin, 1992; 1993; Rouse, 1978; Sutker et al., 1983). Studies that did not publish a statistical analysis of the differences between the two groups or raw data, were not included (e.g., Gallant, Popiel, Hoffman, Chakraborty, & Hamilton, 1992). The studies by Alexander and Sherwin (1993), Forrest (1979), and Tuiten et al. (1995) were not included in the review as none of these studies included a control group of non-OC users and therefore did not allow for affect or mood comparisons between users and non-users. (Bancroft and Sartorius [1990] review a number of the studies covered in the present review and include an excellent broad review of methodological considerations and the effects of OCs on well-being and sexuality.)

Examination of the results of 17 studies indicates a great deal of inconsistency. Of the 17 studies reviewed, all but 1 study (Marriott & Faragher, 1986) found group differences in affect between OC users and non-users. However, the direction of the differences and the menstrual cycle phases in which the differences occur was not consistent across studies. The results of

the Bancroft, Sanders, Warner, and Loudon (1987) experiment and the Walker and Bancroft (1990) study suggest the existence of a pharmacological effect of OCs on mood since different types of OCs had different effects. In order to clarify the results of the 17 studies, they are summarized below. Since most researchers have divided the menstrual cycle into different phases, the four most frequently used phases were used for this review and study: all days of menstrual flow (menstrual phase), the seven days after menstruation (postmenstrual phase), the remaining days leading up to the seven days before menstruation (intermenstrual phase), and the seven days before menstruation (premenstrual phase). Three types of findings are summarized below: overall group effects, differences in variability of affect, and group differences during each of the four phases of the menstrual cycle. While most studies examined negative affect, a few studies that included positive affect were found.

The majority of the studies found no significant group differences in negative affect across the entire menstrual cycle (e.g., Almagor & Ben-Porath, 1991; Bancroft & Rennie, 1993; Marriott & Faragher, 1986; Paige, 1971; Wilcoxon, Schrader, & Sherif, 1976). While two studies did find that OC users feel less negative affect across the cycle (Boyle & Grant, 1992; Walker & Bancroft, 1990), no studies suggested that OC users were higher than non-users in negative affect throughout the cycle.

In terms of positive affect, Almagor and Ben-Porath's (1991) study

found group differences. OC users rated themselves higher on positive affect. Four other studies, however, did not find group differences in positive affect (Boyle and Grant, 1992; Marriott & Faragher, 1986; Moos, 1968; Silbergeld, Brast, & Noble, 1971). Perhaps the findings of Morris and Udry (1972) help explain this inconsistency for both negative and positive affect. Since one-half of the OC users who felt differently, felt "better than usual", and the other-half felt "worse", it may be that the scores of these two groups cancelled each other out to make it look as though there are no differences. Perhaps researchers should separate these two groups and look for distinguishing characteristics of each group as Bancroft et al. (1987) did when investigating premenstrual syndrome (PMS).

The ingestion of the hormones in OCs does seem to provide some sort of stabilizing effect of mood. Five studies found that OC users showed less variability than non-users in their ratings of affect (Paige, 1971; Rouse, 1978; Sutker et al., 1983; Walker & Bancroft, 1990; Warner & Bancroft, 1988). Only one study (McFarlane, Martin, & Williams, 1988) did not find any significant differences in variability of affect between the two groups. Other studies did not examine differences in variability.

The consensus finding during the menstruation phase seems to be that OC users experience less negative affect than non-users. Eight studies provide findings which support this statement (Boyle & Grant, 1992; Graham &

Sherwin, 1992, 1993; Moos, 1968a; Paige, 1971; Rouse, 1978; Sutker et al., 1983; Walker & Bancroft, 1990; Wilcoxon et al., 1972). In contrast, Bancroft and Rennie (1993) found that OC users experience a more prolonged pattern of negative affect. Three other studies did not find any differences in negative affect between the two groups during this phase (Alexander, Sherwin, Bancroft, & Davidson, 1990; Almagor & Ben-Porath, 1991; Marriott & Faragher, 1986).

There is no consensus of findings for positive affect during the menstrual phase. The authors of two studies reported that OC users experienced less positive affect (McFarlane et al., 1988; Warner & Bancroft, 1988), one study found that OC users feel more positive affect (Almagor & Ben-Porath, 1991), and three studies did not find any differences in positive affect between the two groups during menstruation (Boyle & Grant, 1992; Moos, 1968; Rouse, 1978).

For the week after menstruation (postmenstrual phase), the results of three studies suggest that OC users experience more negative affect than non-users (Alexander et al., 1990; Bancroft & Rennie, 1993; Graham & Sherwin, 1992, 1993), findings from one study suggest the opposite (Walker & Bancroft, 1990), and the results of three other studies found no differences between the two groups (Almagor & Ben-Porath, 1991; Marriott & Faragher, 1986; Rouse, 1978). Only two studies have concrete findings regarding differences in positive affect for the two groups during the post-menstrual week and they are

conflicting. Almagor and Ben-Porath (1991) found that OC users experience more positive affect than non-users during the week following menstruation while McFarlane et al. (1988) found non-users to experience more positive affect.

The findings of studies comparing the affect of OC users and non-users during the intermenstrual period are inconsistent. Three studies found that OC users experience higher negative affect than non-users (Morris & Udry, 1972; Paige, 1971; Sutker et al., 1983). The results of two other studies indicated that the OC group experiences less negative affect (Boyle & Grant, 1992; Walker & Bancroft, 1990) and four studies found no differences for negative affect during the intermenstrual phase (Almagor & Ben-Porath, 1991; Marriott & Faragher, 1986; Moos, 1968a; Wilcoxon et al., 1976). The findings for positive affect were almost as inconsistent. While Almagor and Ben-Porath found that OC users experience more positive affect during days 15 to 22, two other studies found no differences between OC users and non-users (Boyle & Grant, 1992; McFarlane et al., 1988).

Finally, the results of daily rating studies of affect during the premenstrual week are just as inconsistent as during the postmenstrual week and intermenstrual phase. While the results of four studies found no significant differences in negative affect for the two groups during this phase (Alexander et al., 1990; Almagor & Ben-Porath, 1991; Graham & Sherwin, 1992; Marriott

& Faragher, 1986), the findings of four studies suggested that OC users have less negative affect (Boyle & Grant, 1992; Moos, 1968a; Paige, 1971; Rouse, 1978). Two other groups of researchers found more negative affect in OC users (Sutker et al., 1983; Wilcoxon et al., 1972). With regard to positive affect, the results of four studies suggest no differences between groups for the premenstrual week (Boyle & Grant, 1992; McFarlane et al., 1988; Moos, 1968; Rouse, 1978), and two studies suggested that OC users feel more positive affect than non-users (Walker & Bancroft, 1990; Warner & Bancroft, 1988). None of the studies suggest that OC users feel less positive affect than non-users during the premenstrual week.

Problems with Previous Studies

The above review suggests that there is a great deal of inconsistency in the research on differences in affect between OC users and non-users. It is unclear whether the inconsistency is due to small sample sizes, the "survivor effect" which is discussed below, lack of controls for duration of OC use, the lack of consistency among researchers in their choice of affect rating scales, a failure of all researchers to independently measure negative and positive affect, a failure to separately analyze OC users who experience an increase in negative affect and those who experience a decrease in negative affect, or the lack of controls for any of the three potentially important psychological or indirect pharmacological variables. It is also, of course, possible that there are no real

differences in affect between the two groups.

One of the main problems with the literature involves the "survivor effect" (Kutner & Brown, 1972). The survivor effect refers to the fact that women who experience problems while taking OCs stop taking them, which by definition leaves a group of women who are not experiencing adverse effects (mood or otherwise). Therefore, taking a sample of oral contraceptive users and comparing their mood states with never-users involves a huge self-selection bias since any women who experience moderate to severe negative mood effects would likely have discontinued use of OCs. Roughly 25% of women discontinue OC use within one year of use (Trussell & Kost, 1987) and depression is in fact one of the most common reasons given for discontinuing OC use (Kay, 1984). Therefore, the incidence rates of negative mood change associated with being on OCs are likely underestimations in studies using groups of women taking OCs for many years.

Three factors can contribute to the survivor effect: (a) the selection criteria for the OC user and non-user groups, (b) the length of time which the OC users have been taking the OC pill, and (c) the study's attrition rate. In order to minimize survivor effects, researchers should distinguish between women in the OC user groups who have been taking the same OC brand since the first time they began taking the pill and women who have switched brands. The non-user groups should include only women who have never taken OCs and

not previous users who are no longer taking OCs. The inclusion of "switchers" in the user group and of previous users in the non-user group would introduce a bias since it may have been negative mood effects which led to switching brands or discontinuing use. A study by Deijen, Duyn, Jansen, and Klitsie (1992) supports this reasoning. Switchers in this study experienced mood improvements on their new brand.

With regards to duration of pill use, it is important to distinguish between "early" and "late" use of OCs. While an early use group would still contain women who may discontinue OCs in the future due to negative effects, a late use OC group would have already lost the women experiencing negative mood side effects. Bancroft and Sartorius (1990) suggested the use of the terms "early use" and "late use" and discussed some of the important differences between the early and late use of OCs.

Finally, in prospective studies and controlled experiments comparing OC users and non-users, large attrition rates increase the size of the survivor effect. It seems logical that a woman just starting on the pill who drops out of an experiment would be more likely to do so as a result of negative than positive mood side effects. Losing this type of data would make the OC users groups appear to be experiencing less negative affect than they actually are.

Thus controlling for the survivor effect involves looking at strict definitions of OC users and non-users, duration of use, and attrition rates.

A second problem with the literature involves the failure to independently measure changes in both positive affect and negative affect. Some studies have found that women report mood-enhancing effects when taking oral contraceptives (e.g., Almagor & Ben-Porath, 1991; Kutner & Brown, 1972; Roy-Byrne et al., 1984; Worsley, 1980). When positive and negative affect are not measured separately, the positive affect changes in some women taking OCs and negative affect changes in others may cancel each other out if the overall mean score is compared with non-users. Furthermore, these mood improvements, combined with the attrition of most women with negative mood effects (the survivor effect), leaves a group of women who are taking oral contraceptives and potentially experiencing no mood effects, mild to extreme positive mood effects, or only mild negative effects on mood. For these reasons, a failure to specify the time span of OC use in the sample combined with the survivor effect likely underestimates the association between oral contraception and negative affect. This reasoning emphasizes the importance of independently measuring changes in positive and negative affect and of controlling for the survivor effect.

A third problem in the literature is the failure of most researchers to control for possible psychological and indirect pharmacological causes of mood change due to OC use. The psychological and indirect pharmacological causes of mood changes, should they in fact exist, are difficult to determine.

However, ruling them out would help to determine the direct role of pharmacology. Cullberg (1972) was one of the first to discuss and control for these alternative explanations of differences in negative affect between OC users and non-users. Analysis of the literature has revealed at least three possible explanations for mood change other than a direct pharmacological effect on mood:

1. Expectations of a mood change side effect can lead to mood change (or the placebo effect; e.g., Cullberg, Gelli, & Jonsson, 1969). Women who are aware of the possibility of mood changes with oral contraceptive use may be more likely to experience them. A "scapegoat effect" may result from this where unhappiness due to life circumstances or relationships is attributed to "the pill". Women may have expectations of negative or positive mood change.

2. The symbolic effect of the 'anti-baby pill' (Cullberg, 1972) may also lead to changes in mood. Some women may become depressed due to feelings of guilt over preventing the conception of a child. On the other hand, other women may experience mood improvements due to the increased reassurance they feel about not getting pregnant. This may also lead to increased sexual satisfaction.

3. Mood changes may also occur secondary to somatic side effects (an indirect pharmacological effect). Women experiencing weight gain, decreased libido, or nausea may become depressed or irritable as a result of this. Others

who experience a regulation of their menstrual cycle, a desired breast size increase or decrease, or a clear-up of acne may experience an improvement in mood.

Since two psychological factors and the indirect pharmacological factor could hypothetically lead to an improvement or deterioration in mood, pre-test measures of each should be included when attempting to determine the cause of a mood change associated with oral contraceptive use. Pre-test measures of expectations, symbolic effect attitudes, and the desirability of somatic changes should be predictive of the direction of mood change if these psychological or indirect pharmacological factors play a role in causation. However, it is important to realize that the correlation of any of the three factors with the predicted mood change does not rule out the possibility of a pharmacological effect. More than one factor could be responsible for the mood change. None of the studies reviewed above controlled for all three of these variables.

In order to control for the three non-pharmacological causes of mood change noted above, some controls can be used. The first two factors, expectations and the symbolic "anti-baby" factor, can be ruled out as entirely responsible for mood change if different hormone dosages are compared and found to result in different degrees of mood change. However, differential mood change based on hormone content would not rule out the possibility of

the mood changes occurring secondary to somatic side effects. Therefore other controls are needed. The best way to see how the psychological and indirect pharmacological factors affect mood would be to give three pre-test questionnaires to the subjects before their mood had been measured or assessed. The first questionnaire could assess women's schemas and expectations regarding OCs and side effects, including mood change. If high correlations exist between negative mood and expectations or awareness of this type of mood change, then expectations cannot be ruled out. The same reasoning applies to positive affect. The second questionnaire should ask about their feelings regarding the prevention of the possible conception of a child. It should assess guilt and/or reassurance and then see if the responses can predict negative or positive moods. A third questionnaire could assess the somatic side effects that a women may experience due to OC use and the desirability of these side effects. If negative mood is associated with undesirable somatic side effects and positive mood with desirable somatic side effects then this indirect pharmacological factor cannot be ruled out. Somatic side effects should then be monitored throughout a prospective study. The ability of these three pre-test questionnaires to predict negative or positive mood in OC users could give an indication of the effect of the two psychological and one indirect pharmacological factors on mood.

In summary, the early research on the relationship between OC use and

mood change suggests three guidelines for future research examining differences in mood between OC users and non-users. First, subjects taking OCs should be defined as long-time users or first-time users when investigating the effects of OCs on mood. Any long-time user studies may include an underestimation of negative mood side effects due to the survivor effect. Second, independent measures of positive and negative affect should be included as both types of mood change have been reported. Finally, psychological and indirect pharmacological factors that could affect mood should be assessed to determine the role which they may play.

The Present Study

The present study attempted to examine the relationship between OC use and affect and to determine whether controlling for the above confounds could account for the conflicting findings of previous researchers. Ninety-six undergraduates (17 first-time OC users, 34 long-time users, and 45 never-users) filled out the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) and the Menstrual Distress Questionnaire Form T (MDQ; Moos, 1968, 1989) daily for 35 days. The present study is the first to examine positive affect variability and to investigate the survivor effect by directly comparing early, late, and never users of OCs. This study also assesses the indirect pharmacological and psychological variables which could be affecting mood or affect.

A number of additional possible moderating variables were also included on an exploratory basis. These were presence/absence of: self-diagnosed premenstrual syndrome history (PMS), family history of mental illness, and personal history of mental illness. PMS was included due to the putative relationship between hormones and mood while family and personal psychiatric history were included as they could reflect possible vulnerability factors to mood change.

While the present study was mainly exploratory, the literature suggested two main hypotheses. Hypothesis 1: First-time OC users experience higher negative affect and lower positive affect than long-time users and never-users. This logically deduced prediction arises from three lines of reasoning. First, plausible pharmacological mechanisms have been hypothesized through which OCs could affect mood. Second, the lack of consistency between studies regarding subject's duration of OC use may account for inconsistent findings regarding mood differences between users and non-users. Third, using a first-time user group eliminates the survivor effect and means that women who may eventually stop using OCs due to negative changes in mood are included in the sample. The use of a never-user as opposed to a non-user group also eliminates those women who had negative mood experiences when taking OCs. Hypothesis 2: Long-time OC users experience more stability of negative affect and positive affect than never-users and first-time users. This hypothesis was

based on a review of previous studies which indicated that OC users experienced less variability in their ratings of affect than non-users. Finally, if either of the two hypotheses listed above were supported, a number of statistical tests would be conducted to rule out competing explanations for the differences (e.g., expectations of mood change, the symbolic effect of the pill, or mood change secondary to somatic side effects).

Method

Subjects

One-hundred and twenty-nine women (20 first-time OC users, 52 long-time users, and 57 never-users) were recruited to participate in this study. Recruitment was targeted at introductory psychology classes, upper-year psychology classes, any-year volunteers from other disciplines, clients seen at the university health clinic, clients seen at the Thunder Bay District Health Unit, clients seen at the Port Arthur Clinic, clients seen by area physicians, and women who responded to a radio interview or notices posted on bulletin boards around campus or in the city newspapers. However, 128 (99.22%) of the volunteers were university students. All women were 18 years or older. Introductory psychology student volunteers received three points towards their final course grade if they completed the entire study and one point if they only completed the initial questionnaire. All other participants received ten dollars at

the completion of all three stages of the study.

Six women (1 first-time user, 3 long-time users, and 2 never-users) did not complete the study (4.65 %), a very low attrition rate. Reasons for the loss of subjects included: (a) moving out of town during the course of the study (1 first-time user), (b) failure to complete the 35 daily rating questionnaires (3 long-time users), (c) illness following surgery (1 never-user), and (d) failure to complete stage 3 due to a busy schedule (1 never-user).

Subject data were excluded from analysis if the subject: (a) was a long-time user who had taken more than one brand of OC pill (i.e., "switchers" ; $\underline{n}$ = 15), (b) was a first-time user who had previously taken OCs and was starting again ($\underline{n}$ = 2), (c) had previously delivered a child ($\underline{n}$ = 4), (d) had a current and/or chronic medical disorder that could affect emotional states (e.g., hypothyroidism; $\underline{n}$ = 2) (e) was pregnant ($\underline{n}$ = 1), (f) was presently taking a medication that could effect emotional states (e.g., Anaprox or lithium carbonate; $\underline{n}$= 6), (g) did not menstruate during the 35 days of the study ($\underline{n}$ = 1) (h) was lactating ($\underline{n}$ = 0), or (i) was hysterectomized ($\underline{n}$ = 0). Four women were excluded based on two or more of the above criteria.

In total, 96 women (17 first-time OC users, 34 long-time users, and 45 never-users) completed the study and had usable data based on the exclusion criteria. The women ranged in age from 18 to 27 ($\underline{M}$ = 19.84) and their years of education ranged from 13 to 19 ($\underline{M}$ = 14.41). The majority of the women

were single as only 7.29% were married or cohabitating. Of the OC users, 54.90% were taking monophasic preparation OCs in which the dosage of estrogen and progestin remains constant for the entire 21 days, and 45.10% were taking triphasic preparation OCs in which the dosages of estrogen and/or progestin change three times over the 21 days (see Appendix A). The first-time user group consisted of women who had begun taking OCs for the first time within the previous 60 days. These women had been taking OCs for a mean of 1.00 months (SD = 0.79). The long-time user group included women who had taken one brand of OCs for more than two years. Their mean months of OC use was 36.71 (SD = 16.76). The never-user group consisted of women who had never taken OCs.

Measures

Three self-report instruments were used: an Initial General Information Questionnaire (IGIQ), the Daily Rating Questionnaire (DRQ), and a Final General Information Questionnaire (FGIQ).

Initial General Information Questionnaire. The IGIQ (Appendix B) consisted of seven sections: demographic information, medications and medical conditions, relationship information, personal and family psychiatric history, reproductive history, contraceptive information (including attitudes), and substance use. This questionnaire was developed by the author specifically for this study. The anxiety and depression subscales from the Symptom-Checklist-

90-Revised (Derogatis, 1994) were also included.

Daily Rating Questionnaire. The DRQ (see Appendix C) contained the Positive and Negative Affect Schedule (Watson, Clark, & Tellegen, 1988), the Menstrual Distress Questionnaire Form T (Moos, 1968, 1989), and four additional physical symptom items which were added by the author (i.e., weight loss, breast size increase, breast size decrease, and clearer complexion). These symptom items were added to both reflect somatic symptoms which could possibly lead to changes in positive affect and to counterbalance the many unpleasant somatic items.

The 20-item PANAS is designed to independently measure both positive affect (PA) and negative affect (NA). Subjects were instructed to rate each adjective on a five-point scale reflecting the extent to which they have experienced the emotion during the past 24 hours. The scale ranges from 1 (very slightly or not at all) to 5 (extremely). The two scales of the PANAS have been shown to have sound psychometric properties (Watson, Clark, Tellegen, 1988). Internal consistencies for the PA and NA scales respectively are .90 and .87. The PA-NA correlation is -.12, which means the two scales are reasonably uncorrelated. Test-retest reliability of daily ratings for PA and NA are .47 and .39. Finally, the correlations between PA and NA and the Hopkins Symptom Checklist overall score (-.29, .65) and the Beck Depression Inventory (-.35, .56) suggested adequate validity.

The MDQ includes 47 items which assess affective, somatic, and behavioural symptoms that might occur during the menstrual cycle. Eight scales are included: pain, water retention, autonomic reactions, concentration, behaviour change, negative affect, arousal, and control. Each symptom within each of these scales is rated on a five-point scale ranging from 0 (none) to 4 (severe). The subject is required to choose the category which best describes their experience for that day. A 48th item is also included to determine if the menstrual flow is occurring. The primary purpose of the MDQ in this study was to monitor somatic symptoms. Markum (1976) found the MDQ Form T to have high test-retest reliability for the overall score (from .80 to .88) when a 6-point rating scale was used. She also found that split-half reliabilities ranged from .82 during the menstrual phase to .98 during the premenstrual phase. Research by Busch, Costa, Whitehead, and Heller (1988) found that severity of MDQ perimenstrual symptoms was related to frequency of health care seeking and work absenteeism due to gynecological disorders. This study, as well as studies using the MDQ to measure premenstrual symptom reduction following placebo-controlled treatment (e.g., Dennerstein et al., 1985; Facchinetti et al., 1989), attest to the validity of this questionnaire.

Final General Information Questionnaire. The FGIQ (Appendix D) included the same seven sections as the IGIQ, with two additional parts. OC users were asked about the regularity and time of day of taking their pills, the number of

pills which they missed or took late, and about their reasons for taking OCs. All OC users were first asked whether they believed OCs affect mood in general and secondly, if they believed their mood had been negatively or positively affected.

Procedure

The study consisted of three stages. During Stage 1, the women met in mixed groups with the experimenter. They were told that the study was an examination of the psychological and emotional effects of contraception. It was emphasized that participation was voluntary, that subjects could withdraw at any time without penalty, and that all data were anonymous and confidential. All subjects read and signed the consent form (see Appendix E) and then completed the IGIQ. This took approximately 20 minutes. Each subject was then given a package containing instructions and 35 of the Daily Rating Questionnaires. The women were told that they would be required to fill out a questionnaire daily for 35 days (Stage 2) and then return to complete a final questionnaire (Stage 3). A date, time, and place was given for Stage 3 of the study. Each women was then given the opportunity to ask questions. At this point the volunteers from the first year psychology classes were given one point towards their final course mark for participating.

Stage 2 involved having the women fill out a DRQ each evening for 35 days beginning the same day that they completed the initial questionnaire.

Women in the first-time user group who had not yet started taking OCs filled out the DRQ on the first day of OC use. Each woman also received one phone call from the experimenter near the end of Stage 2 to confirm the final appointment time and to address any questions or concerns which the woman may have had.

Once a woman had completed all 35 DRQs she returned to the university at the meeting time given during Stage 1 in order to complete Stage 3. The women filled out the FGIQ and then received a Debriefing Form (Appendix F). At this time the women received either their $10 or their final 2 points towards their mark (first year psychology students) for participating. Those women who did not show up for their appointment were rescheduled until they completed the FGIQ or until they withdrew from the study.

Data Reduction and Analyses

The 35 DRQs were numbered based on each woman's menstrual cycle. For each woman, day 1 was the first day of menstruation and the last day used in the analysis was the last day before menstruation (e.g., most often between days 28 and 35). The number of data days used for each woman was dependent on either the length of the woman's cycle or where her menstrual period fell during the 35 days of the study.

For each subject, the menstrual cycle was partitioned into four menstrual cycle phases (MCPs): menstrual phase (all days of menstrual flow),

postmenstrual phase (the seven days after menstruation), intermenstrual phase (the remaining days leading up to the seven days before menstruation), and premenstrual phase (the seven days before menstruation). Two phases were of a fixed length and two phases of variable length. The exception was one subject in the first-time user group who had a menstrual cycle length of only 18 days. Her postmenstrual and premenstrual phases consisted of only five and four days respectively.

Daily positive affect, negative affect and four of the MDQ scale scores (pain, water retention, autonomic reactions, and control) were then calculated for each subject. In the rare instances where items were missed, the item's score was estimated by taking the item's scores from the preceding and following days and calculating the mean. In total approximately 225 of the 115,200 items (0.20%) were missed. From the daily scores, a mean and variability score for the six scales was calculated for each phase for each woman. The variability scores measured the variance of the daily scores within each phase. The above calculations resulted in four mean scores and four variability scores for each woman for positive affect, negative affect, pain, water retention, autonomic reactions, and control (48 scores in total).

The same basic design was used for the main and supplementary analyses: a 3 between (never-users, first-time users, long-time users) X 4 within (menstrual phase, postmenstrual phase, intermenstrual phase,

premenstrual phase) mixed MANOVA . The dependent variables used in the main analyses were mean positive and negative affect scores, or variability in positive and negative affect scores.

Results

Preliminary Analyses

Internal Consistency and Reliability of Measures

Cronbach's alpha coefficients were calculated for the two PANAS subscales and the four MDQ scales. Two days (days 10 and 15) were used in the calculations. The internal consistency of the positive affect, negative affect and total somatic symptom scales were quite good. For positive affect the alphas for days 10 and 15 were .93 and .94 with a mean of .93. The two daily and one mean alphas for the other scales were: negative affect (.82, .83, .83), pain, (.67, .69, .68), water retention (.35, .25, .30), autonomic reactions (.70, .35, .53), control (.79, .65, .72), and total somatic symptom (.86, .80, .83). The reliability of three additional independent variables were calculated using Pearson product-moment correlation coefficients. Correlations between IGIQ and FGIQ responses to questions assessing the presence of a diagnosed or suspected family history of mental illness, $r = .81$, $p < .001$; a diagnosed or suspected personal history of mental illness, $r = .80$, $p < .001$; and a diagnosed or suspected premenstrual syndrome history, $r = .70$, $p < .001$, suggest that test-retest reliability was adequate.

Data Screening

Prior to any analysis, the distributions of mean and variability scores for positive affect, negative affect, pain, water retention, autonomic reactions, and control for each group/phase combination were examined for the presence of univariate outliers. Any values which exceeded three standard deviations above or below the mean were replaced with this ($\underline{M} \pm 3\underline{SD}$) value. In total, twenty-six outliers were removed from the 48 affect cells while 63 outliers were removed from the 96 somatic cells. These outliers represented 1.7% and 2.1% of the data points. Appendices G and H list the cells which contained outliers for the affective and somatic MANOVAs respectively.

Assessing Multivariate Assumptions

Before undertaking analyses to test the main hypotheses, the data were examined to ensure that the assumptions of MANOVA were met. Graphical checks of linearity indicated that it was adequate for all dependent variables. Multivariate normality of the distributions was assessed using both statistical and graphical methods. Criteria for normality included passing a visual check of the distribution of scores as well as using the formula (skewness ÷ standard error of skewness) < 3 (Tabachnick & Fidell, 1996). The assumption of normality was judged satisfactory for the positive affect mean and variability score distributions while the ten other distributions were positively skewed. Box's M multivariate test for homogeneity of dispersion matrices found

adequate homogeneity of variance-covariance matrices for negative and positive affect mean scores $F(72, 8203) = 1.20$, $p > .05$. Univariate Box's M tests on negative and positive affect variability ranged from $F(2, 13117) = 12.75$, $p < .001$ to $F(2,13117) = 0.29$, $p > .05$ with a mean F value of 3.39. Univariate Box's M tests on the four somatic mean scores ranged from $F(2, 13117) = 21.91$, $p < .001$ to $F(2,13117) = 1.13$, $p > .05$ with a mean F of 7.95, $p < .05$. The Box's M tests on the variability scores ranged from $F(2, 13117) = 18.97$, $p < .001$ to $F(2,13117) = 0.43$, $p > .05$ with a mean F of 7.35, $p < .05$. Groups with smaller sample sizes also produced larger variance scores than the larger groups.

Multicollinearity was not a problem for the positive and negative affect mean scores since correlations within groups ranged from $r = .14$, $p > .05$ to $r = -.51$, $p < .05$ with a mean within-group correlation of .02, $p > .05$ and an overall (collapsed across groups) correlation of $r = -.07$, $p > .05$. Within-group correlations for positive and negative affect variability scores ranged from $r = .29$, $p > .05$ to $r = .16$, $p > .05$ with mean of $r = .26$, $p > .05$, and an overall (collapsed across groups) correlation of $r = .26$, $p < .05$. As reported in Appendix I, all but one of the four somatic scales mean and variability scores were significantly correlated with each other. The correlations between mean somatic symptom scale scores ranged from $r = .56$, $p < .001$ to $r = .82$, $p < .001$ with a mean of $r = .64$, $p < .001$. The correlations between

mean somatic symptom variability scale scores ranged from $r = .19$, $p > .05$ to $r = .57$, $p < .001$ with a mean of $r = 0.44$, $p < .001$.

As a result of the above tests of multivariate assumptions the following decisions regarding data analysis were made. First, a MANOVA was performed on both mean and variability affect scores using an alpha level of .05. Significant MANOVAs were followed up with univariate ANOVAs. A Bonferroni correction (.025) was used on the alpha levels within each ANOVA. Newman-Keuls post-hoc comparisons were done on significant effects and interactions with an alpha level of .025. Second, the unweighted-means approach was used in all MANOVAs and ANOVAs to control for increases in Type I error due to unequal sample sizes between groups (Tabachnick & Fidell, 1996, p. 48). Third, the conservative Pillai's criterion for evaluating multivariate significance was used in all analyses to compensate for heterogeneity of variance as suggested by Tabachnick and Fidell (1996, p. 382). Finally, the four somatic scales were combined into one to solve the multicollinearity problem. The four scale scores were summed and divided by the number of items to obtain a total somatic symptoms score. Mean and variability somatic scores were calculated for each woman for each phase of the cycle.

Assessing Group Equivalency

As shown in Table 1, the three groups of women were not significantly

Table 1

Means and Standard Deviations or Raw Frequency and Percentages for the Nine Variables Used to Assess Group Equivalency Across the Three Groups

Variable	Never Users N = 45	First Time Users N = 17	LongTime Users N = 34
	Means (Standard Deviations)		
Age (years)	19.62 (1.42)	19.76 (1.15)	20.18 (1.95)
Education (years)	14.22 (0.79)	14.47 (0.80)	14.62 (1.30)
Height (cm)	166.90 (5.74)	167.79 (8.10)	165.99 (6.30)
Weight (kg)	64.77 (12.80)	63.63 (10.57)	63.48 (9.70)
Alcohol Frequ. Score	1.29 (0.73)	1.24 (0.75)	1.55 (0.67)
Alcohol Concump. Score	1.56 (0.87)	1.29 (0.77)	1.58 (0.71)
Illegal Drug Use Score	0.16 (0.42)	0.12 (0.33)	0.18 (0.46)
	Raw Frequency (Percentage)		
Relationship Status			
partner	18 (40.00)	13 (76.50)	28 (82.40)
no partner	27 (60.00)	4 (23.50)	6 (17.60)
Sexual Status			
never had sex	27 (60.00)	2 (11.80)	1 (3.00)
no sex in 35 days	7 (15.60)	7 (41.20)	3 (9.10)
sex during study	11 (24.40)	8 (47.10)	29 (87.90)

different in terms of age, $F(2, 95) = 1.20$, $p > .05$; years of education, $F(2, 95) = 1.54$, $p > .05$; height, $F(2, 95) = 0.47$, $p > .05$; weight, $F(2, 95) = 0.14$, $p > .05$; frequency of alcohol consumption, $F(2, 94) = 1.60$, $p > .05$; amount of alcohol consumption, $F(2, 94) = 0.80$, $p > .05$; or frequency of illegal drug use, $F(2, 94) = 0.13$, $p > .05$. There were, however, significant relationships between group membership and whether or not one had a romantic partner, χ^2 $(2, N = 96) = 16.63$, $p < .01$, and one's level of sexual activity during the study, χ^2 $(4, N = 95) = 44.07$, $p < .01$. Since women who take oral contraceptives usually do so because they are in a relationship and sexually active, these group differences likely reflect true population differences. Fortunately sexual status does not affect positive or negative affect scores, Fs $(2, 118) = 2.18$ and 2.12, $p > .05$. However, while relationship status does not affect positive affect scores, t $(80.48) = 0.72$, $p > .05$, relationship status does seem related to negative affect scores, t $(118.96) = 2.74$, $p < .05$. The women in romantic relationships experienced more negative affect than women not in such relationships. There was no relationship between relationship status and positive or negative affect variability scores, ts$(94) = 0.79$ and 1.40, ps $> .05$.

Simple Descriptive Data

Tables 2 and 3 list the overall mean scores and mean variability scores for positive and negative affect for the three groups of women across the four

Table 2

Mean Negative and Positive Affect Scores for the Three Groups Across the Four Phases of the Menstrual Cycle

	Positive Affect					Negative Affect				
	Phase									
Group	1	2	3	4	(group mean)	1	2	3	4	(group mean)
Never Users	13.56 (7.72)	13.54 (7.15)	13.95 (6.93)	14.26 (7.31)	13.83 (6.77)	5.08 (5.03)	5.14 (5.32)	5.05 (5.09)	5.15 (4.67)	5.10 (4.51)
First Time Users	14.23 (7.10)	14.91 (7.40)	14.31 (8.77)	13.62 (7.37)	14.27 (6.89)	7.00 (6.64)	7.09 (6.56)	7.30 (6.36)	6.76 (5.69)	7.04 (5.91)
Long Time Users	12.42 (7.60)	12.38 (6.10)	12.80 (5.99)	13.06 (6.74)	12.66 (5.82)	5.59 (6.01)	5.40 (5.00)	5.73 (4.46)	5.05 (4.67)	5.44 (4.48)
Phase Means	13.28 (7.52)	13.37 (6.83)	13.61 (6.93)	13.72 (6.74)		5.60 (5.67)	5.57 (5.57)	5.69 (5.13)	5.40 (5.40)	

Note. Phase 1 = menstrual; Phase 2 = postmenstrual; Phase 3 = intermenstrual; Phase 4 = premenstrual.

Table 3

Mean Negative and Positive Affect Variability Scores for the Three Groups Across the Four Phases of the Menstrual Cycle

	Positive Affect					Negative Affect				
	Phase									
Group	1	2	3	4	(group mean)	1	2	3	4	(group mean)
Never Users	17.48 (20.15)	22.78 (16.72)	28.03 (6.93)	27.09 (22.54)	23.84 (15.59)	10.86 (17.94)	11.35 (12.74)	13.60 (18.12)	18.14 (29.61)	13.49 (15.66)
First Time Users	22.69 (25.02)	24.26 (20.46)	22.53 (25.38)	27.55 (22.48)	24.26 (17.60)	13.58 (17.98)	12.54 (16.05)	16.68 (15.27)	17.57 (18.50)	15.09 (10.34)
Long Time Users	11.71 (9.12)	21.66 (20.76)	26.57 (23.38)	24.36 (16.61)	21.08 (12.04)	9.00 (15.74)	13.47 (19.35)	17.74 (19.15)	14.44 (16.15)	13.66 (13.95)
Phase Means	16.36 (18.38)	22.64 (18.72)	26.54 (22.60)	26.20 (20.45)		10.68 (17.16)	12.31 (15.80)	15.61 (17.96)	16.73 (23.60)	

Note. Phase 1 = menstrual; Phase 2 = postmenstrual; Phase 3 = intermenstrual; Phase 4 = premenstrual.

phases of the cycle.

Main Analyses

Relationship Between OC Use and Positive and Negative Affect Means

A 3 (group) X 4 (menstrual cycle phase) mixed MANOVA was performed on mean daily positive affect scores and mean daily negative affect scores. There was no group effect for positive or negative affect, $F(4, 186) = 0.77$, $p > .05$. Similarly, there was no main effect for menstrual cycle phase, $F(6, 558) = 0.22$, $p > .05$, or the group X menstrual cycle phase interaction, $F(12, 558) = 0.34$, $p > .05$. The absence of a group effect did not support *hypothesis 1: First-time OC users experience higher negative affect and lower positive affect than long-time users and never users.*

Relationship Between OC Use and Positive and Negative Affect Variability

A 3 (group) X 4 (menstrual cycle phase) mixed MANOVA was performed to test *hypothesis 2: Long-time OC users experience more stability of negative affect and positive affect than never-users and first-time users.* While there was no significant group effect for positive or negative affect variability scores, $F(4, 186) = 0.25$, $p > .05$, there was a significant phase effect, $F(6, 558) = 3.55$, $p < .01$, but no group X phase interaction, $F(12, 558) = 0.75$, $p > .05$. Hypothesis 2 was not supported since no differences in affect variability scores were found between the never-user, first-time user, or long-time user groups. A follow-up 3 (group) X 4 (menstrual cycle phase) mixed ANOVA performed on

negative affect variability scores did not reveal an effect for group, $F(2, 93) = 0.08$, $p > .025$; phase, $F(3, 279) = 2.84$, $p > .025$; or for their interaction, $F(6, 279) = 0.66$, $p > .025$. The identical ANOVA performed on positive affect variability scores revealed a significant main effect for phase of the menstrual cycle, $F(3, 279) = 5.54$, $p < .01$. The main effects for group and the group X phase interaction were not significant, $F(2, 93) = 0.42$, $p > .025$; $F(6, 279) = 0.91$, $p > .025$.

As illustrated in Figure 1, Newman-Keuls Post Hoc tests revealed that the women experienced significantly less variability in positive affect during the menstrual phase than during the postmenstrual phase, $q(279) = 6.28$, $p < .01$; the intermenstrual phase, $q(279) = 10.18$, $p < .01$; and the premenstrual phase, $q(279) = 9.84$, $p < .01$. In other words, the womens day-to-day positive affect variability scores were more stable during menstruation than during any other phase of their cycle.

Supplementary Analyses

Exploration of Pill Type

The following analyses were undertaken in order to explore whether a failure to distinguish between OC type (monophasic versus triphasic) in the main analyses could be obfuscating any main effects. Four separate 2 (first-time users, long-time users) X 2 (monophasic users, triphasic users) X 4 (menstrual cycle phases) mixed ANOVAs were done on mean positive affect, mean

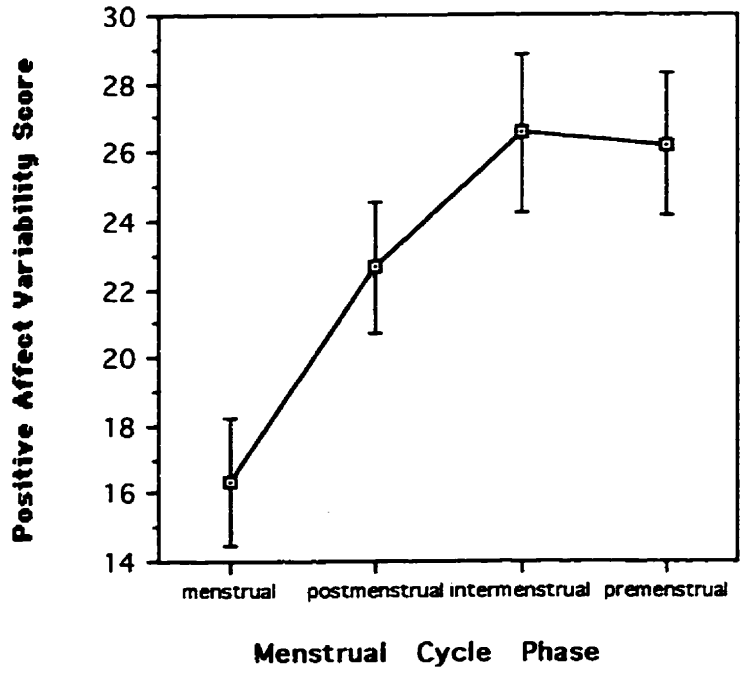

Figure 1. Mean positive affect variability scores for all women across the four menstrual cycle phases. The menstrual and intermenstrual phases differ significantly on positive affect variability. Vertical lines depict standard errors of the mean.

negative affect, mean positive affect variability, and mean negative affect variability. For positive affect variability, both the OC type X phase interaction and the pill user group X OC type X menstrual cycle phase interactions were significant, Fs (3, 141) = 4.55 and 3.56, p < .01 and .025, respectively (see Table 4 for the mean scores).

Separate ANOVAs for the two OC types found a phase effect for the triphasic OC users, F (3, 63) = 4.86, p < .01, and a pill-user group X menstrual cycle phase interaction for the monophasic OC users, F (3, 78) = 5.09, p < .01. Post hoc analysis of these findings revealed that the triphasic OC users experienced more positive affect variability during the intermenstrual phase than the menstrual phase, q (78) = 16.19, p < .025, while no phase effect was found for the monophasic users, F (3, 78) = 2.37, p > .05, (see Figure 2). Separate examination of the first-time and long-time users revealed a phase effect for the long-time users, F (3, 96) = 5.31, p < .01, and an OC type X menstrual cycle phase interaction for the first-time users, F (3, 45) = 6.48, p < .01. The long-time user phase effect is similar to that depicted in Figure 1.

Examination of the menstrual phase found that: (a) first-time users had higher positive affect variability than the long-time users, F (1, 50) = 8.42, p < .01; (b) monophasic OC users had significantly higher positive affect variability than the triphasic users, F (1, 50) = 7.18, p < .025; and (c) there was a pill-user group X OC type interaction, F (1, 50) = 6.15, p < .025 (see Figure 3).

Table 4

Mean Positive Affect Variability Scores as a Function of OC-Type Group, Pill-Use Group, and Phase of the Menstrual Cycle

	Phase				
Group	1	2	3	4	(group mean)
First-Time Users					
monophasic (N=7)	36.44 (31.14)	28.05 (25.36)	11.51 (8.56)	39.81 (23.13)	28.95 (22.04)
triphasic (N=10)	13.06 (14.70)	21.61 (17.21)	30.25 (30.58)	18.96 (18.52)	20.97 (20.25)
Long-Time Users					
monophasic (N=34)	12.06 (9.47)	22.22 (20.65)	26.38 (27.35)	25.69 (14.67)	21.59 (18.04)
triphasic (N=21)	11.15 (8.89)	20.76 (21.77)	26.87 (16.01)	22.22 (19.81)	20.25 (16.62)
Phase Means	15.37 (16.81)	22.53 (20.49)	25.22 (23.88)	25.42 (18.61)	

Note. Phase 1 = menstrual; Phase 2 = postmenstrual; Phase 3 = intermenstrual; Phase 4 = premenstrual.

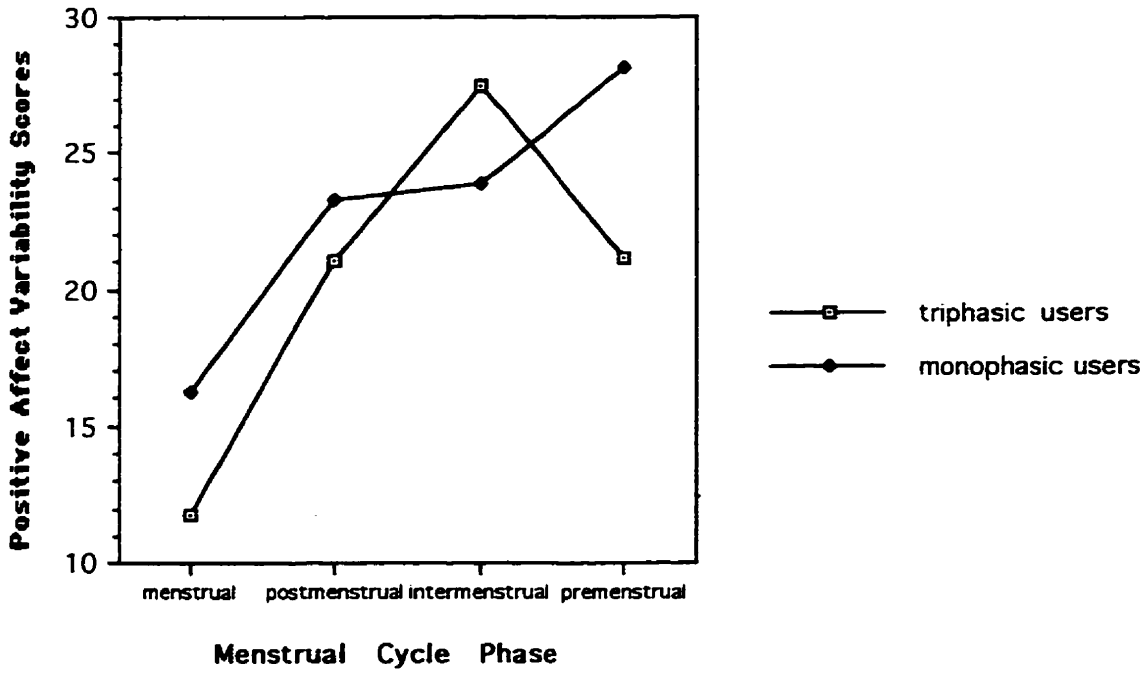

Figure 2. Mean positive affect variability scores across the menstrual cycle as a function of OC type. While the menstrual and intermenstrual phases differ significantly for the tripasic users, there are no significant between-phase differences for the monophasic users.

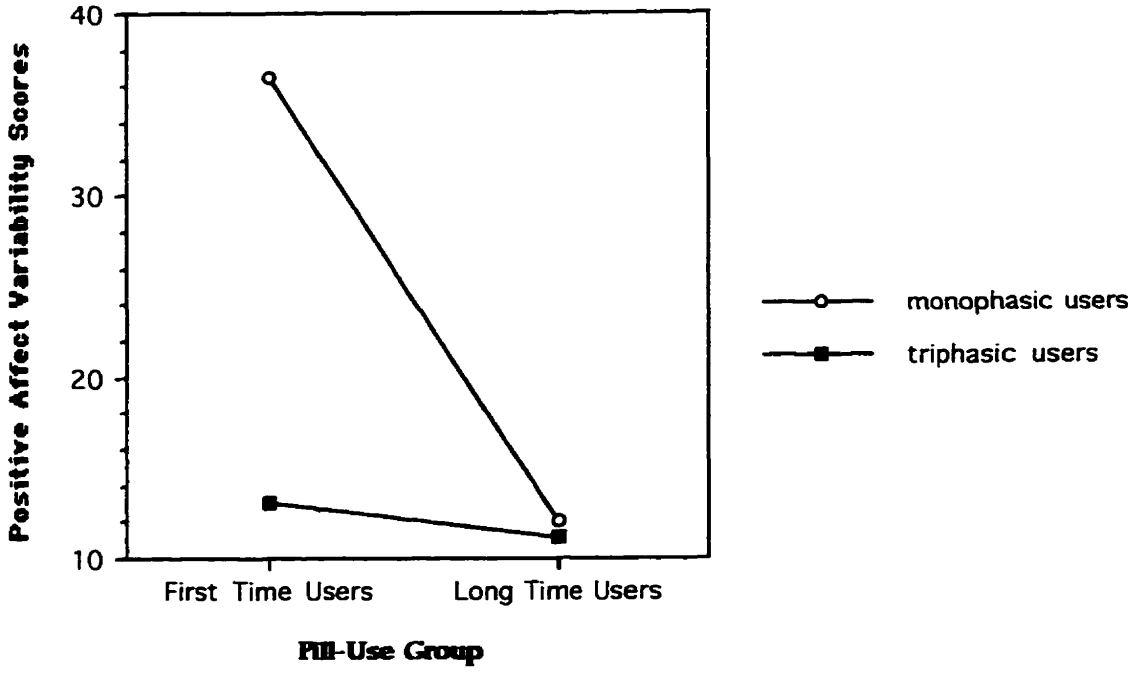

Figure 3. Mean positive affect variability scores during the menstrual phase as a function of pill-use group and the OC type. The first-time monophasic users had significantly higher positive affect variability than the other three groups.

First- time OC users taking monophasic preparations experienced significantly more positive affect variability during the menstrual phase than long-time monophasic users, g (50) = 24.38, $p < .01$, first-time triphasic users, g (50) = 23.38, $p < .01$, and long-time triphasic users, g (50) = 25.29, $p < .01$.

Exploration of Potentially Important Individual Difference Variables

As presented above, the main analyses did not find any group differences in positive or negative affect mean or variability scores. Data had been collected for three potentially important individual difference variables namely premenstrual syndrome history, family mental illness history, and personal mental illness history. Therefore, three MANOVAs were undertaken to explore whether the three OC user groups differed in positive or negative affect mean scores or variability scores when the groups were further divided based on these variables.

Premenstrual Syndrome. Self-diagnosis of premenstrual syndrome (PMS) (yes, no, or unsure) was the first variable explored in two 2 (never-user, long-time user) X 3 (no PMS, PMS, unsure of PMS) X 4 (menstrual cycle phase) mixed MANOVAs. The first-time user group was excluded since only one woman fell into the PMS cell. The mean scores for the 48 cells of the MANOVA on mean affect scores are listed in Appendix J. The results of the MANOVA on mean scores did not find any significant main effects or interactions (see Appendix K). However, analysis of the mean variability scores (see Table 5) found a

Table 5

Mean Positive and Negative Affect Variability Scores as a Function of Pill-Use Group, PMS Group, and Phase of the Menstrual Cycle

	Positive Affect					Negative Affect				
	Phase					Phase				
Group	1	2	3	4	(group mean)	1	2	3	4	(group mean)
Never Users										
no pms (N=18)	17.71 (22.45)	17.92 (11.42)	24.81 (19.66)	25.84 (16.61)	21.57 (13.23)	11.59 (17.09)	9.92 (11.00)	12.44 (19.91)	19.93 (35.59)	13.47 (17.25)
pms (N=16)	18.60 (18.00)	25.07 (17.32)	30.52 (17.56)	31.45 (30.42)	26.41 (17.26)	14.14 (23.45)	10.44 (11.94)	14.80 (13.97)	21.59 (31.31)	15.24 (17.32)
unsure (N=10)	16.69 (20.16)	27.54 (23.19)	28.36 (30.06)	24.56 (17.94)	24.29 (18.36)	3.43 (3.94)	15.22 (17.45)	13.59 (22.93)	10.84 (12.23)	10.77 (11.10)
Long-Time Users										
no pms (N=6)	13.61 (14.72)	28.25 (19.71)	20.34 (17.18)	30.01 (11.98)	23.05 (5.72)	3.11 (2.51)	19.92 (19.81)	15.13 (17.30)	27.24 (29.74)	16.35 (15.76)
pms (N=16)	11.77 (8.79)	24.57 (25.16)	29.23 (25.15)	24.03 (18.57)	22.40 (15.54)	12.26 (17.56)	13.15 (21.94)	21.05 (23.48)	11.18 (10.38)	14.41 (16.40)
unsure (N=12)	10.69 (6.54)	14.49 (12.71)	26.14 (24.73)	21.98 (16.40)	18.33 (8.83)	7.59 (17.39)	10.68 (16.05)	14.64 (13.49)	12.38 (11.16)	11.32 (9.68)
Phase Means	15.15 (16.56)	22.25 (18.57)	27.20 (22.12)	26.18 (20.12)		9.94 (17.10)	12.26 (15.95)	15.38 (18.68)	16.71 (24.78)	

Note. Phase 1 = menstrual; Phase 2 = postmenstrual; Phase 3 = intermenstrual; Phase 4 = premenstrual.

main effect for phase, $F(6, 432) = 5.36$, $p < .001$ (see Table 6). ANOVAs revealed a significant phase effect for both positive affect variability, $F(3, 216) = 8.44$, $p < .001$, and negative affect variability, $F(3, 216) = 4.49$, $p < .025$. The phase effect for positive affect variability proved to be almost identical to that illustrated in Figure 1 for mean positive affect variability using the three groups of women.

Family History of Mental Illness. The next analysis explored whether the inclusion of a diagnosed or suspected family history of mental illness variable would reveal group differences in two 3 (group) X 2 (presence, absence of family history) X 4 (menstrual cycle phase) mixed MANOVAs. Means are listed in Appendix L. The pill group by family history variable interaction was not significant, $F(4, 180) = 1.81$, $p > .05$, nor were any of the other main effect or interaction tests. F values are listed in Appendix M. The means for the MANOVA on variability scores are listed in Table 7. This MANOVA found only a main effect for menstrual cycle phase, $F(6, 540) = 3.31$, $p < .01$. As can be seen from the F values for positive affect and negative affect variability respectively (see Tables 8 and 9) there was a significant effect for phase for positive affect variability and a significant group X family history X phase interaction for negative affect variability. While the identical positive affect variability phase effect was reported in the main analyses (see Figure 1), two new differences were found for negative affect variability: (a) a significant

Table 6

Multivariate Analysis of Variance for PMS (Affect Variability Scores)

Source	df	Error	F
	Between Subjects		
PMS Group (PM)	4	144	0.33
Pill Group (PG)	2	71	0.43
PM X PG	4	144	1.19
	Within Subjects		
Cycle Phase (CP)	6	432	5.36 *
CP X PM	12	432	0.93
CP X PG	6	432	0.39
CP X PM X PG	12	432	1.08

Note. *$p < .05$. **$p < .01$.

Table 7

Mean Positive and Negative Affect Variability Scores as a Function of Pill-Use Group, Family Mental Illness History, and Menstrual Cycle Phase

	Positive Affect					Negative Affect				
	Phase									
Group	1	2	3	4	(group mean)	1	2	3	4	(group mean)
Never Users										
no history (N=26)	16.67 (18.66)	23.87 (17.47)	31.59 (23.49)	26.49 (24.48)	24.66 (15.50)	12.18 (19.09)	12.50 (14.81)	17.59 (21.69)	24.46 (36.77)	16.68 (18.66)
history (N=19)	18.60 (22.51)	21.28 (15.99)	23.16 (17.10)	27.91 (20.19)	22.74 (16.08)	9.06 (16.58)	9.78 (9.34)	8.13 (9.70)	9.50 (11.35)	9.15 (8.99)
First-Time Users										
no history (N=7)	31.72 (33.65)	24.88 (21.47)	25.10 (37.13)	24.67 (22.37)	26.60 (23.09)	20.65 (24.79)	6.41 (5.82)	13.95 (16.62)	25.23 (26.40)	16.56 (9.60)
history (N=10)	16.37 (15.82)	23.82 (20.89)	20.73 (14.72)	29.56 (23.53)	22.62 (13.71)	8.62 (9.95)	16.83 (19.64)	18.59 (14.85)	12.21 (8.13)	14.06 (11.21)
Long-Time Users										
no history (N=21)	11.94 (8.51)	23.59 (22.01)	28.12 (24.93)	23.16 (16.22)	21.70 (12.68)	11.86 (19.35)	16.15 (22.55)	18.53 (21.66)	12.06 (11.96)	14.65 (15.69)
history (N=13)	11.35 (10.38)	18.54 (19.01)	24.06 (21.36)	26.31 (17.71)	20.07 (11.35)	4.38 (6.08)	9.15 (12.23)	16.47 (14.96)	18.28 (21.29)	12.07 (10.98)
Phase Means	16.36 (18.38)	22.64 (18.72)	26.54 (22.60)	26.20 (20.45)		10.68 (17.16)	12.31 (15.80)	15.61 (17.96)	16.73 (23.60)	

Note. Phase 1 = menstrual; Phase 2 = postmenstrual; Phase 3 = intermenstrual; Phase 4 = premenstrual.

Table 8

Analysis of Variance for Family History of Mental Illness (Positive Affect Variability Scores)

Source	df	F
	Between Subjects	
Personal History Group (FH)	1	0.55
Pill Group (PG)	2	0.46
FH X PG	2	0.04
S within-group error	90	(902.66)
	Within Subjects	
Cycle Phase (CP)	3	4.66 **
CP X FH	3	1.21
CP X PG	6	0.93
CP X FH X PG	6	0.70
CP X S within-group error	270	(10.59)

Note. Values enclosed in parentheses represent mean square errors.

S = subjects.

*p < .025. **p < .01.

Table 9

Analysis of Variance for Family History of Mental Illness (Negative Affect Variability Scores)

Source	df	F
	Between Subjects	
Personal History Group (FH)	1	1.72
Pill Group (PG)	2	0.17
FH X PG	2	0.36
S within-group error	90	(809.70)
	Within Subjects	
Cycle Phase (CP)	3	3.11
CP X FH	3	1.41
CP X PG	6	0.66
CP X FH X PG	6	2.81 *
CP X S within-group error	270	(202.78)

Note. Values enclosed in parentheses represent mean square errors.

S = subjects.

*p < .025. **p < .01.

phase effect for women with a family history of mental illness, F (3, 117) = 3.77, $p < .025$, and (b) a significant phase effect for the long-term user group, F (3, 96) = 3.37, $p < .025$.

Personal History of Mental Illness. The effects of a third factor, presence/absence of a suspected or diagnosed personal history of mental illness, was explored in two 3 (group) X 2 (presence, absence of personal history) X 4 (menstrual cycle phase) mixed MANOVAs. The mean affect scores are presented in Table 10. The only significant finding was a main effect for the personal history of mental illness variable, F (2, 89) = 3.58, $p < .05$ (see Appendix N for the MANOVA source table). There were no significant main effects or interactions for the mean positive affect scores (see Appendix O), but a significant main effect for the personal history variable for the negative affect scores, F (1, 90) = 7.22, $p < .025$, was revealed (see Table 11). The women with a suspected or diagnosed history of mental illness experienced more negative affect than women without a suspected or diagnosed history of mental illness.

The mean variability scores for the variances MANOVA are presented in Table 12. The results of the MANOVA found only a significant main effect for phase, F (6, 540) = 2.57, $p < .05$ (see Appendix P). A group X personal history of mental illness X phase interaction was revealed for negative affect variability scores, F (6, 270) = 2.86, $p < .025$ (see Table 13). Further analyses

Table 10

Mean Positive and Negative Affect Scores as a Function of Pill-Use Group, Personal Mental Illness History,and Menstrual Cycle Phase

	Positive Affect					Negative Affect				
					Phase					
Group	1	2	3	4	(group mean)	1	2	3	4	(group mean)
Never Users										
no history (N=34)	13.18 (8.31)	13.22 (7.62)	13.39 (7.38)	14.42 (7.73)	13.55 (7.27)	3.48 (3.49)	3.60 (3.33)	4.04 (4.13)	3.95 (3.67)	3.77 (3.09)
history (N=11)	14.73 (5.70)	14.55 (5.64)	15.69 (5.22)	13.74 (6.11)	14.68 (5.14)	10.01 (5.96)	9.86 (7.43)	8.18 (6.60)	8.86 (5.62)	9.23 (5.78)
First-Time Users										
no history (N=12)	13.43 (7.94)	14.22 (8.49)	14.00 (10.11)	12.60 (8.00)	13.56 (7.70)	6.63 (7.63)	6.08 (6.74)	6.60 (7.28)	6.46 (6.46)	6.44 (6.63)
history (N=5)	16.15 (4.68)	16.59 (3.99)	15.05 (5.10)	16.06 (5.55)	15.97 (4.65)	7.88 (3.87)	9.50 (6.08)	8.97 (3.35)	7.49 (3.75)	8.46 (3.89)
Long-Time Users										
no history (N=26)	13.52 (7.76)	13.31 (5.76)	13.78 (5.84)	13.91 (5.64)	13.63 (5.68)	5.49 (5.85)	5.08 (4.71)	5.00 (3.86)	4.62 (3.62)	5.05 (4.08)
history (N=8)	8.83 (6.19)	9.35 (6.60)	9.61 (5.66)	10.29 (5.23)	9.52 (5.47)	5.92 (6.93)	6.43 (6.06)	8.08 (5.67)	6.44 (5.40)	6.72 (5.69)
Phase Means	13.28 (7.53)	13.37 (6.83)	13.61 (6.93)	13.72 (6.74)		5.60 (5.67)	5.57 (5.43)	5.69 (5.13)	5.40 (4.67)	

Note. Phase 1 = menstrual; Phase 2 = postmenstrual; Phase 3 = intermenstrual; Phase 4 = premenstrual.

Table 11

Analysis of Variance for Personal History of Mental Illness (Mean Negative Affect Scores)

Source	df	F
	Between Subjects	
Personal History Group (PH)	1	7.22 **
Pill Group (PG)	2	0.54
PH X PG	2	1.47
S within-group error	90	(81.66)
	Within Subjects	
Cycle Phase (CP)	3	0.54
CP X PH	3	0.61
CP X PG	6	0.64
CP X PH X PG	6	1.56
CP X S within-group error	270	(6.32)

Note. Values enclosed in parentheses represent mean square errors.

S = subjects.

*p < .025. **p < .01.

Table 12

Mean Positive and Negative Affect Variability Scores as a Function of Pill-Use Group, Personal Mental Illness History, and Menstrual Cycle Phase

	Positive Affect					Negative Affect				
					Phase					
Group	1	2	3	4	(group mean)	1	2	3	4	(group mean)
Never Users										
no history (N=34)	16.98 (20.40)	22.02 (16.14)	28.92 (21.99)	27.41 (23.90)	23.83 (15.74)	7.01 (9.49)	8.92 (10.37)	14,27 (19.44)	15.55 (27.28)	11.44 (13.97)
history (N=11)	19.04 (20.25)	25.12 (19.04)	25.29 (19.42)	26.10 (18.65)	23.89 (15.90)	22.77 (30.21)	18.86 (16.63)	11.50 (13.84)	26.15 (36.17)	19.82 (19.41)
First-Time Users										
no history (N=12)	20.11 (18.97)	23.84 (17.97)	23.22 (28.04)	29.17 (23.40)	24.09 (16.18)	9.01 (7.63)	10.28 (13.72)	16.14 (16.34)	16.50 (21.00)	12.98 (9.61)
history (N=5)	28.88 (38.04)	25.26 (28.02)	20.89 (20.20)	23.65 (22.10)	24.67 (22.78)	24.55 (30.34)	17.97 (21.45)	17.97 (13.96)	20.15 (12.00)	20.16 (11.31)
Long-Time Users										
no history (N=26)	12.08 (9.11)	22.90 (20.16)	26.74 (26.28)	22.54 (16.69)	21.06 (13.04)	10.10 (18.06)	13.31 (20.68)	13.75 (16.19)	11.71 (10.90)	12.22 (14.02)
history (N=8)	10.54 (9.68)	17.64 (23.59)	26.01 (10.50)	30.28 (15.96)	21.12 (8.72)	5.43 (3.80)	14.01 (15.41)	30.71 (23.26)	23.30 (26.23)	18.36 (13.52)
Phase Means	136.36 (18.38)	122.64 (18.72)	26.54 (22.60)	26.20 (20.45)		10.68 (17.16)	12.31 (15.80)	15.61 (17.96)	16.73 (23.60)	

Note. Phase 1 = menstrual; Phase 2 = postmenstrual; Phase 3 = intermenstrual; Phase 4 = premenstrual.

Table 13

Analysis of Variance for Personal History of Mental Illness

(Mean Negative Affect Variability Scores)

Source	df	F
	Between Subjects	
Personal History Group (PH)	1	4.17
Pill Group (PG)	2	0.04
PH X PG	2	0.04
S within-group error	90	(796.86)
	Within Subjects	
Cycle Phase (CP)	3	2.38
CP X PH	3	0.25
CP X PG	6	1.92
CP X PH X PG	6	2.86 *
CP X S within-group error	270	(203.07)

Note. Values enclosed in parentheses represent mean square errors.

S = subjects.

*p < .025. **p < .01.

identified: (a) a phase effect for women without a personal history of mental illness, F (3, 207) = 3.26, $p < .025$; (b) a phase effect for the long-time user group, F (3, 96) = 6.31, $p < .01$; and (c) a personal history X phase interaction for the long-term user group, F (3, 96) = 4.11, $p < .01$ (see Appendix P).

Analysis of Somatic Subscales

Originally the total somatic symptom mean and variability scores were calculated for each phase to determine whether variance attributable to somatic effects could account for any group effects for the positive and negative affect MANOVAs. Despite there being no group differences found for positive or negative affect mean or variability scores across the cycle for the main analyses, a 3 (group) X 4 (menstrual cycle phase) mixed ANOVA was performed first, on mean somatic scores and second, on mean somatic variability scores. The mean somatic scale scores and mean variability somatic scale scores for each group and cycle phase are found in Table 14 While the ANOVA on mean scores did not find a significant main effect for group, F (2, 93) = 2.27, $p > .05$; there was a significant phase effect, F (3, 279) = 15.92, $p < .001$; and no group X phase interaction, F (6, 279) = 0.84, $p > .05$. The women experienced significantly more somatic symptoms during the menstrual phase than the other three phases, $qs(279) = 0.14, 0.14, 0.07$, $ps < .01$; and significantly more somatic symptoms in the premenstrual phase than the postmenstrual and intermenstrual phases, $qs(279) = 0.07, 0.07$,

Table 14

Mean Total Somatic Symptom Scores and Mean Total Somatic Symptom Variability Scores for the Three Groups Across the Four Phases of the Menstrual Cycle

	Mean Somatic Symptom Scores					Mean Somatic Symptom Variability Scores				
	Phase									
Group	1	2	3	4	(group mean)	1	2	3	4	(group mean)
Never Users	0.43 (0.35)	0.28 (0.31)	0.28 (0.28)	0.35 (0.35)	0.34 (0.32)	0.42 (0.42)	0.24 (0.26)	0.33 (0.36)	0.43 (0.63)	0.36 (0.42)
First Time Users	0.54 (0.39)	0.45 (0.45)	0.46 (0.42)	0.56 (0.45)	0.50 (0.43)	0.52 (0.48)	0.33 (0.34)	0.33 (0.27)	0.48 (0.40)	0.42 (0.37)
Long Time Users	0.45 (0.30)	0.29 (0.20)	0.31 (0.16)	0.35 (0.22)	0.35 (0.22)	0.28 (0.23)	0.27 (0.33)	0.40 (0.32)	0.40 (0.35)	0.34 (0.31)
Phase Means	0.46 (0.34)	0.32 (0.31)	0.32 (0.28)	0.39 (0.34)		0.39 (0.38)	0.27 (0.30)	0.35 (0.33)	0.43 (0.50)	

Note. Phase 1 = menstrual; Phase 2 = postmenstrual; Phase 3 = intermenstrual; Phase 4 = premenstrual.

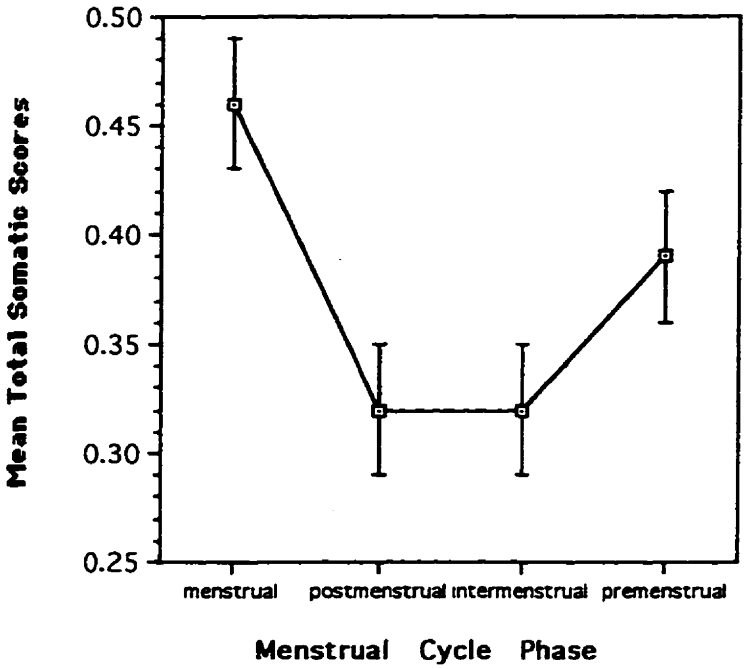

Figure 4. Mean total somatic symptom scores for all women across the menstrual cycle. The women reported significantly more somatic symptoms during the menstrual phase than during the other three phases and during the premenstrual phase than the postmenstrual and intermenstrual phases. Vertical lines depict standard errors of the mean.

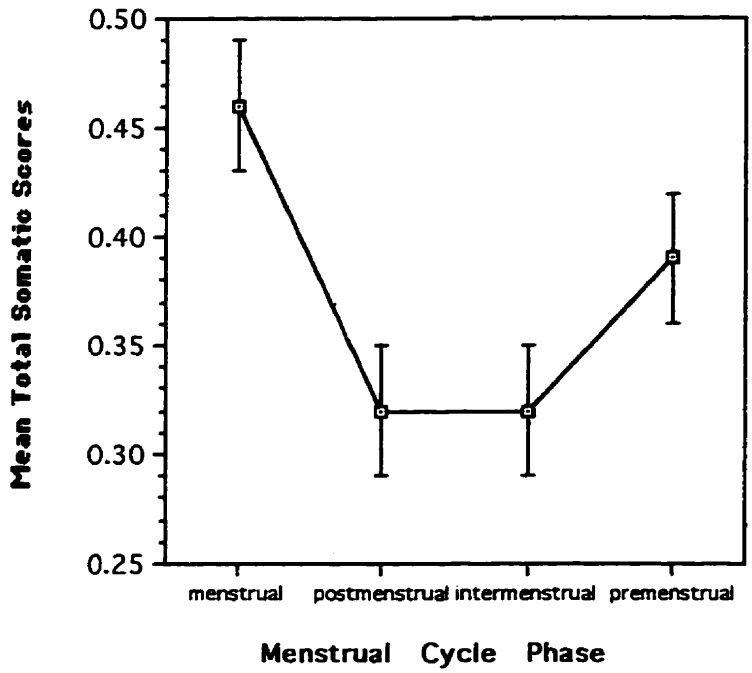

Figure 5. Mean total somatic symptom variability scores for all women across the menstrual cycle. The women reported significantly more variability in somatic symptoms during the premenstrual and menstrual phases than the postmenstrual phase. Vertical lines depict standard errors of the mean.

*p*s < .01. The phase effect is illustrated in Figure 4. The analysis of the somatic variability scores found results similar to those listed above: no group effect, *F* (2, 93) = 0.46, *p* > .05; a phase effect, *F* (3, 279) = 4.17, *p* < .01; and no group X phase interaction, *F* (6, 179) = 1.28, *p* > .05. Figure 5 shows that the women experienced more variability in somatic symptoms during the premenstrual and menstrual phases than they did during the postmenstrual phase, *q* (279) = 0.16 and 0.13, *p*s < .01 and .025 respectively.

Discussion

Summary of the Findings

Main Hypotheses. Neither of the main hypotheses were supported in the present study. No significant group differences were found between first-time, long-time, and never users of OCs on negative or positive affect mean or variability scores.

Exploration of Pill Type. Triphasic OC users had significantly more positive affect variability during the intermenstrual phase than the menstrual phase, the monophasic users did not. Furthermore, the first-time monophasic users experienced significantly less stability in positive affect during the menstrual phase than first-time triphasic users, long-time monophasic users, and long-time triphasic users.

Further Exploration of Group Differences. Further division of the three pill user groups by suspected or diagnosed PMS, family history of mental illness, or

personal history of mental illness suggested that neither OC use or duration of use affects one's experience of overall positive or negative affect. However, a suspected or diagnosed family or personal history of mental illness does seem to differentially affect the stability of negative affect across the three groups and across the cycle. This interaction was a weak one, however.

Phase Differences in Affect Scores. There were no differences in mean negative or positive affect scores across the phases of the menstrual cycle. However, the women did experience more stability in positive affect during the menstrual phase than during the other three phases.

Somatic Symptoms. None of the three groups differed significantly in their overall experience of mean somatic symptoms or variability of somatic symptoms. With regards to simple phase effects, women experienced more somatic symptoms during the menstrual phase than during the other three phases, and during the premenstrual phase than during the postmenstrual and intermenstrual phases. They also reported more somatic symptom variability during both the premenstrual and menstrual phases than during the postmenstrual phase.

Discussion of Results

No Group Differences in Affect

The present data were not congruent with the hypothesis that first-time OC users experience higher negative affect and lower positive affect than long-

time users and never-users. No differences in positive or negative affect were found between the three groups of women over the entire menstrual cycle or at any specific phase of the cycle. For positive affect, the lack of group differences between non-users and OC users is consistent with a majority of studies done (e.g., Boyle & Grant, 1992; Marriott & Faragher, 1968; Moos, 1968; Silbergeld, Brast, & Noble, 1971) yet inconsistent with a few others (e.g., Almagor & Ben-Porath, 1991; McFarlane, Martin, & Williams, 1988). For negative affect, the above findings were in line with some studies (Almagor & Ben-Porath, 1991; Marriott & Faragher, 1986; Paige, 1971) but not with others (Boyle & Grant, 1992; Moos, 1968; Walker & Bancroft, 1990; Wilcoxon et al., 1976). It is noteworthy that while previous studies have investigated either early, middle, or long-time use of OCs, the present study was the first to compare a group of first-time and long-time users. Obviously, the results of the present study alone cannot completely clear up controversy regarding the existence of group differences.

Three arguments could be made against the validity of the present findings. First, while the sample size is one of the largest in this area of research to date, a larger sample may be required to provide enough statistical power to detect group differences. This argument can be countered simply be looking at the means and the F values in the analysis. For positive affect, the means were not even in the predicted direction. However, for

negative affect, all F values were well below one which suggests that simply increasing the sample size will not lead to significant differences. Second, the ratings of positive and negative affect had large between-subject variation or variance. Third, as pointed out by Walker and Bancroft (1990), a failure to find group differences may be due to the failure to distinguish between monophasic and triphasic preparation users. However, when this distinction was made, admittedly with smaller numbers in each cell, no group differences were found. The above three arguments do not seem to pose a great threat to the validity of the present findings.

The results suggest three implications. First, it is difficult in the face of these findings to sustain the view that taking OCs leads to a common decrease or increase in positive or negative affect for all women. If some women do experience positive or negative affect change as a result of OC use, a third mediating or moderating variable must play a role. Second, the results do not suggest that the hormones in OCs lead to different psychoneuroendocrine actions on affect/mood during early or late use of OCs. Finally, no support was found for the role of the survivor effect as an artifactual confound. Since no group differences in affect were found between first-time and long-time users, this suggested that even if the survivor effect does exist for some groups of women, it is not large enough to explain the failure of late-use studies to find group differences in negative or positive affect.

No Group Differences in Affect Variability

The results of the present study did not support the hypothesis that long-time OC users experience more stability of negative affect and positive affect than never-users and first-time users. None of the three groups differed in their experience of positive or negative affect variability. No previous studies have compared positive affect variability in OC users and non-users. McFarlane et al. (1986) came the closest to examining positive affect variability by assessing "mood stability". They did not find any group differences. For negative affect variability, the present findings were not in line with previous studies comparing OC users and non-users (Paige, 1972; Rouse, 1978; Sutker et al., 1983; Warner & Bancroft, 1988). These studies indicated that OC users had more stable levels of negative affect either across the menstrual cycle or within certain phases. The findings of the present study were not in line with those of the majority of previous studies.

The same sample size and large between-subject variances arguments outlined earlier could be presented as threats to the validity of the affect variability findings. However, the very low F value suggests that no significant differences in affect variability exist between the three groups of women. Two implications come from this finding. The first is simply that all women who take OCs may not experience a uniform increase or decrease in the stability of day-to-day positive or negative affect compared to never-users. Secondly, women

just starting on OCs may not differ from long-time users as a whole on their mood lability or stability across the cycle or within certain phases. These findings are surprising in light of previous support for the OC mood-stabilizing hypothesis.

Pill Type: Monophasic and Triphasic Preparations

While triphasic OC users experienced more positive affect variability in the intermenstrual phase than in the menstrual phase, there were no significant phase differences for the monophasic users. This finding is similar to that of Warner and Bancroft (1988) yet contrary to Moos' (1968) finding. Warner and Bancroft found that monophasic users showed less variation in well-being than triphasic users overall and that triphasic users had more variation during the menstrual phase than monophasic users.

The above finding could be interpreted in one or more of three possible ways: (a) a methodological artifact due to unequal days in the menstrual cycle phases, (b) an indirect pharmacological effect on mood stability, or (c) a direct pharmacological effect on mood stability.

It seems plausible that for a sample with high between-subject and within-subject variability, cycle phases which contain more days (the intermenstrual phase) would have larger variances than phases which contain less days (the menstrual phase) since the longer phases contain more scores. Therefore the above finding could be an artifact of the length of the phase. This

interpretation is supported by significant correlations between the number of days in the menstrual and intermenstrual phases and the positive affect variability scores for these phases, r_s = .23 and .25, $p < .05$.

Four lines of evidence suggest that differences in phase length cannot entirely account for the finding. First, while the above correlations are significant, they are small and account for little variance (5.8%). Second, visual inspection of mean positive affect variability scores for the three groups also indicates that the first-time users menstrual and intermenstrual phase scores were almost identical. Third, the women in this study experienced more somatic symptom variability during the menstrual phase than the postmenstrual phase (which contains more days). Finally, it can be argued that if the number of days in the phase accounted entirely for this finding, then there would have been similar phase differences for the monophasic users here, and for both of these groups of women on negative affect variability. These differences were not found, which suggests that differences in phase length cannot entirely account for the positive affect stability differences between monophasic and triphasic users.

The likelihood that phase differences in positive affect variability for the triphasic users could be the result of different somatic side effects from the monophasic and triphasic preparations is low. A comparison of monophasic and triphasic users on both total mean somatic scores and total mean

variability somatic scores across the phases of the cycle did not find any group effects or interactions. Since an OC type by menstrual cycle phase interaction was found for positive affect variability, the women's overall experience of somatic symptoms cannot entirely explain the positive affect variability group differences. However, this does not rule out individual somatic symptoms as contributing to positive affect variability differences between the two pill-types.

The final interpretation of the differences is a pharmacological effect of the OCs on positive affect variability. While monophasic OCs contain consistent levels of estrogen and progestin across the 21 days, the triphasic OCs change the levels of progestin (and sometimes estrogen) three times during the 21 days. The simple act of switching dosages may increase positive affect variability across the cycle. However, for triphasic users the progestin dosage is usually one-half to two times higher during the intermenstrual phase than the menstrual phase. Increased positive affect variability may be related to increased progestin. However, future research is needed before an exact pharmacological mechanism could be proposed. Both the type and dosage of the progestin would need to be controlled in a comparison of the mono- and tri-phasic users.

While this finding must be replicated before any conclusions can be drawn, it does suggest the possibility of a pharmacological effect on positive affect variability. If the finding is replicated, a practical application might be

that triphasic OC users complaining of mood lability may experience more positive affect stability on a monophasic preparation.

The comparison of mono- and tri- phasic users resulted in a second finding. The first-time monophasic users experienced more positive affect variability than first-time triphasic users, long-time monophasic users, and long-time triphasic users during the menstrual phase. No previous studies have compared first-time and long-time users of OCs in general or with further separation by the type of pill.

Before any conclusions could be drawn about the above finding, it was necessary to ensure equivalency of the groups on five variables: personal history of mental illness, family history of mental illness, mean and variability of somatic symptoms during the menstrual phase, number of cycles of OC use, and proportion of specific OC types taken. Since no group differences were found, none of these variables could account for the observed difference.

Keeping in mind the small samples used in this analysis, the finding suggests that the early use of monophasic OCs is associated with higher variability in positive affect during the menstrual phase than the early use of triphasics. This increased variability disappears after at least two years of taking OCs suggesting that the increased variability may reflect a greater withdrawal effect during the pill-free week for the monophasic than triphasic users. The monophasic women take a constant hormone dosage for 21 days

which is then suddenly withdrawn while the triphasic users have had gradual changes in the dosage throughout the cycle. Perhaps adjustments occur over time to adapt to this sudden withdrawal of exogenous hormones. The underlying implication is that both differences in duration of OC use and OC type are associated with differences in positive affect variability. Furthermore, while the main analyses suggest that the survivor effect is not a valid explanation for the failure of "late use" studies to find differences between OC users and non-users, the above findings suggest that for certain groups of women, the survivor effect may play a role. High variability in positive affect may cause first-time users to discontinue OC use.

Premenstrual Syndrome History

Whether or not a woman believed that she experienced PMS did not differentiate never and long-time users on positive or negative affect or affect variability scores. This analysis was done since some of the previous research in the area looked at non-users and OC users who experienced PMS (e.g., Bancroft & Rennie, 1993; Bancroft, Sanders, Warner, & Loudon, 1987; Walker, 1994; Walker & Bancroft, 1990). However, nobody seems to have compared long-time and never-users based on their PMS history.

The most likely explanation for the lack of group differences in affect is that no differences exist. However, two possible threats to the validity of this conclusion must be mentioned. First this analysis had low statistical power as

the number of women in each cell of the design ranged from only 6 to 18. Second, while the measure of PMS had reliability, there was no evidence of validity. There was no indication from the affect phase means that those women who answered yes to the PMS question experienced more negative affect in the premenstrual phase or greater intermenstrual to premenstrual increases in negative affect than those who answered no. In light of the power and validity issues, PMS history cannot be completely excluded as a possible mediating or moderating variable in any effect of OCs on affect.

Family Mental Illness History

The addition of a suspected or diagnosed family history of mental illness variable did not reveal any differences in general positive or negative affect or affect variability. No other studies on positive or negative affect have investigated family history as a moderating variable. Some studies even excluded women who had a positive family history of mental illness (e.g., Silbergeld, Brast, & Noble, 1971). The only study to investigate the possible genetic influence of OC related changes in affect was a large scale twin study which concluded that OC-related depression (and irritability to a lesser extent) was clearly influenced by genetic factors and not by individual-specific environmental factors (Kendler, Martin, Heath, Handelsman, & Eaves, 1988).

Since the present analysis was exploratory, it seems important to mention that although post-hoc tests did not find differences between means, a

significant weak interaction between the family history variable, menstrual cycle phase, and pill-use group was found for negative affect variability. Considering the small ns in each cell, and the fact that this was the only variable to produce significant (although weak) group differences for negative affect variability, family history of mental illness merits further exploration.

Personal Mental Illness History

First-time, long-time, or never users of OCs with a suspected or diagnosed personal history of mental illness do not seem to have different experiences of negative or positive affect or affect stability. No previous studies have explored this relationship and it is not uncommon for studies to have excluded women with a personal mental illness history (e.g., Silbergeld, Brast, & Noble, 1971; Walker, 1994). However, some early studies examining diagnosable mood disorders as opposed to affect found that the relationship between OCs and depressive mood change was most strongly found in women who already had a predisposition to be depressed (e.g., Moller, 1981; Winston, 1973).

As with the family history variable, a weak interaction between personal history, pill-use group, and menstrual cycle phase was found for negative affect variability. This interaction is again only being mentioned as it deserves further consideration since this study was the first to explore it. Although the number of women per cell in the analysis ranges from 5 to 34, the reliability (given

earlier) of the personal history categorization seems quite good. There was no measure of validity for the categorization. This exploratory examination of personal mental illness history suggests that further exploration may be warranted.

Positive Affect Variability Phase Effect

Significant differences in positive affect variability were found between the phases of the menstrual cycle. The womens ratings of positive affect were more stable during the menstrual phase than during the other three phases. This study was the first to examine positive affect variability across the menstrual cycle. Other studies have found phase effects for negative affect or mood (Boyle & Grant, 1992; Silbergeld, Brast, & Noble, 1971; Walker & Bancroft, 1990). These studies found that negative affect was highest menstrually or premenstrually.

As was noted in the section on monophasic and triphasic preparation comparisons, the present phase effect could be interpreted in one or more of the following ways: (a) a methodological artifact of the number of days in the menstrual cycle phases, (b) a secondary effect of somatic symptoms on positive affect variability, or (c) a psychoneuroendocrine difference between phases of the cycle.

As outlined earlier, the number of days in each menstrual cycle phase cannot account for all of the variation in the positive affect variability scores

across phases. With regards to somatic symptoms during the menstrual phase, there is no relationship between positive affect variability and the experience of somatic symptoms ($r = -.05$, $p > .05$). However, there is a positive correlation between positive affect variability and somatic symptom variability ($r = .25$, $p < .05$). These two coefficients suggest that neither the experience of somatic symptoms or somatic variability can account for the phase effect. The nil and small contribution of the above two interpretations suggests that an internal psychoneuroendocrine mechanism may cause women to experience more stability of positive affect while they are menstruating. Since both progesterone and estrogen levels are low during this period for both OC users and non-users perhaps these hormones play some sort of inhibitory role in the regulation of positive affect stability.

While it is possible that all three of the above interpretations contributed to the observed phase effect, further research is required before the psychoneuroendocrine explanation can be considered.

Somatic Symptom Phase Effect

No group experienced a different intensity of somatic symptoms than any other. The women did, however, experience more intense somatic symptoms during the menstrual phase, followed by the premenstrual phase. More physical symptoms were experienced during these two phases than either of the other two. The lack of group differences is not congruent with previous

studies (e.g., Bancroft & Rennie, 1993; Moos, 1968). Hoewever, the phase effects are congruent with previous research (Boyle & Grant, 1992; Marriott & Faragher, 1986; Silbergeld, Brast, & Noble, 1971; Walker & Bancroft, 1990; Wilcoxon et al., 1976). These somatic symptom phase effects seem to be a reliable finding.

While the women did not experience group differences in somatic symptom variability, there was a phase effect for the women as a whole. Compared to the postmenstrual phase, there was greater day-to-day instability of somatic symptoms in the premenstrual and menstrual phases. This was the first study to specifically examine somatic symptom variability

The phase effect findings seem straightforward and likely reflect the increases in pain and water retention which women commonly report experiencing in the days leading up to and during menstruation. Failure to find group differences in somatic symptoms, especially between first-time users and the other groups, could again be a function of the large between subject variation. Since physical side effects are common in the early use of OCs, it seems suspect that no group differences were found.

Study Limitations and Future Research

Overall, the design of the present study was quite sound. One strength was the repeated-measure nature of the design, comparing each woman across the phases. This allows some confidence in the findings especially

considering the fact that each mean score for each woman was based on a mean of 7.68 observations.

Four aspects of the design could be improved upon. First, a larger sample would increase the statistical power of the design. Second, stricter subject selection criteria regarding relationship status would provide a more uniform sample and control for this possible confound. Third, the number of days in each menstrual phase should be equivalent in any study investigating affect variability. While some information will be lost by restricting the number of sampling days for some phases, the possibility of a methodological confound will be removed. Finally, the identification of a covariate for OC-related affect effects would help to reduce the high between-subject variation which could be obscuring any group differences. Other than larger sample sizes, these limitations of the design were not foreseen.

Future research should explore how OC type (monophasics and triphasics), family mental illness history, and personal mental illness history combine with duration of OC use or non-use to differentially effect positive and negative affect variability across the menstrual cycle phases. In particular, the monophasic/triphasic preparation user differences need to be replicated. An excellent experiment would involve a 2 (OC-type) X 2 (duration of OC use) X 4 (triphasic OC cycle phase) design with the inclusion of users of monophasic and triphasic preparations who differ only by the dosage of the progesterone

across the triphasic cycle. Two possible comparisons are: Cyclen versus Tri-Cyclen users; and Ortho 0.5/35, Ortho 1/35, Brevicon 0.5/35, and Brevicon 1/35 users versus Synphasic, Ortho 10/11, and Ortho 7/7/7 users. Min-Ovral could also be compared with Marvelon and Ortho-Cept to examine the effects of progestin type. The critical dependent variable would be positive affect variability. Salivary measures of estrogen and progesterone (e.g., Mead & Hampson, 1996) would be an excellent addition to any future study. Future studies could also include valid and reliable measures of PMS, family mental illness history, and personal mental illness history since the present study, which used only simple unvalidated measures, found that the main effects and interactions approached significance.

In summary, the present study did not find any group differences in positive or negative affect or affect variability between first-time, long-time, and never-users of OCs. This finding did not support the notion of the survivor effect as an artifactual confound. However, the results of the comparison of monophasic and triphasic first-time and long-time OC users suggested that the survivor effect may account for differences in positive affect variability between early and late users of OCs for certain groups of women. The exploratory comparison of monophasic and triphasic first-time and long-time users found that between menstrual cycle phases, triphasic users experienced more variability in positive affect than did monophasic users. Furthermore, during the

menstrual phase, the monophasic first-time users experienced more positive affect variability than the other three groups. Finally, while PMS history did not seem to differentially effect affect or affect variability for never, first-time, and long-time OC users, the presence /absence of family and personal mental illness history deserves further exploration.

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Appendix A

Raw Frequencies of Women in the Two Oral Contraceptive (OC) Groups taking Monophasic and Triphasic Combinations

OC Preparation	First-Time Users	Long-Time Users
Monophasics		
Minestrin	0	1
Marvelon	4	4
OrthoCept	1	4
MinOvral	1	3
Loestrin	0	2
Demulen30	0	2
Cyclen	1	4
Brevicon	0	1
Triphasics		
Synphasic	1	3
Ortho 7/7/7	0	1
Tri-Cyclen	5	1
Triphasil	4	5
Triquilar	0	3
Totals	17	34

Appendix B

Subject Number: _____

Initial General Information Questionnaire

Please answer the following questions as honestly as you can. All answers will be kept anonymous and confidential.

1) Age:_____

Years of Education (years from grade 1 to 13 + college + university):_____

Weight: _____(pounds) or _____ (kg)

Height:_____(feet & inches) or _____ (cm)

2) List the types and names (as best you can remember) of all medications that you are currently taking (including oral contraceptives) and the number of months that you have been taking them. Include any medications you will be starting soon.

Medication	Number of months of use
_____	_____
_____	_____
_____	_____
_____	_____

Please list any medical conditions which you have been diagnosed with (e.g., hypothyroidism, cancer, diabetes etc.).

_____
_____
_____

3) a) Check the box which best explains your current romantic situation:

[ ] married or living with partner
[ ] more than one steady partner
[ ] one steady partner but living apart
[ ] no steady partner
[ ] other (please specify):_____

b) If you are currently in a steady relationship, how long have you and your partner been together (in years and months)? _____years and _____months

c) Rate your happiness with the current romantic situation you are in, regardless of whether you have no partner, a number of different partners, or one steady partner:

extremely happy or satisfied				extremely unhappy or dissatisfied
0	1	2	3	4

4) Check the box of any disorder that you have been treated for, hospitalized for, or diagnosed with:

[ ] depression [ ] panic attacks [ ] other:_____
[ ] bipolar disorder [ ] eating disorder
[ ] anxiety disorder [ ] schizophrenia

Do you feel or think that you may have some type of problem with mood, anxiety, or something else that you have never been diagnosed with or received treatment for? Please describe briefly what you believe to be the problem and why you believe this:

_____
_____
_____
_____
_____

Check the box of any disorder that any family member has been treated for, hospitalized for, or diagnosed with and include the relationship of that family member to you on the line following the disorder (ie., mother, uncle, sister, grandfather):

[ ] depression_____ [ ] panic attacks_____ [ ] other:_____
[ ] bipolar disorder_____ [ ] eating disorder_____
[ ] anxiety disorder_____ [ ] schizophrenia_____

Do you think or feel that any of your family members may have some type of problem with mood, anxiety, or something else, that they have never been diagnosed with or received treatment for? Please describe briefly what you believe to be the problem, why you believe this, and the relationship of this person to you (ie., mother, uncle, sister, grandfather): _____
_____
_____
_____

5) Are you pregnant right now? [ ] yes [ ]no

Have you ever been pregnant before? [ ] yes [ ]no

If yes, how many times have you been pregnant?_____

If yes, how many children have you delivered?_____

Have you had a hysterectomy? [ ] yes [ ]no

At what age did you first start menstruating?_____

What is the average length of your menstrual cycle (in days)? _____

Do you think that you may suffer from Premenstrual Syndrome (PMS)?

[ ]unsure [ ] yes [ ]no

6) a) Check the response that best describes your level of sexual activity:

[ ] I have never had sexual intercourse.

[ ] I have had sexual intercourse but am not presently sexually active.

[ ] I am presently sexually active.

b) Check the method(s) of birth control which you and your partner(s) are presently using or are about to start using within the next month:

[ ] condoms
[ ] intrauterine device (IUD)
[ ] sponge
[ ] diaphragm
[ ] oral contraceptives(the pill)
[ ] steroid implant (Norplant)
[ ] none
[ ] hysterectomy, tubal ligation, or vasectomy
[ ] spermicidal jelly, cream, foam, suppository
[ ] douche
[ ] rhythm method
[ ] withdrawal
[ ] injectable contraceptive (Depo-Provera)
[ ] other (please specify):_____

c) Check all methods of birth control which you have used in the past:

[ ] condoms
[ ] surgical operation (hysterectomy/vasectomy)
[ ] intrauterine device (IUD)
[ ] spermicidal jelly, cream, foam, suppository
[ ] sponge
[ ] douche
[ ] diaphragm
[ ] rhythm method
[ ] oral contraceptives(the pill)
[ ] withdrawal
[ ] steroid implant (Norplant)
[ ] injectable contraceptive (Depo-Provera)
[ ] none
[ ] other (please specify):_____

d) How do you feel about pregnancy right now? Circle one number from 0 to 4.

I would be happy if I got pregnant.		I dont have strong feelings about becoming pregnant.		I would be devastated if I became pregnant.
0	1	2	3	4

e) How often are you **worried** that your current or new method of birth control will fail and you will become pregnant? Circle one number from 0 to 4.

never		sometimes		always
0	1	2	3	4

f) How often you feel **guilty** or how often you think you would feel guilty about using birth control to prevent pregnancy? Circle one number from 0 to 4.

never		sometimes		always
0	1	2	3	4

g) Circle the number under the response that is most comparable to the idea of finding out that you are pregnant today :

worst nightmare		neutral		wonderful dream
4	3	2	1	0

h) How **reassured** do you feel that your method of birth control will prevent you from getting pregnant? Circle one number.

extremely		moderately		not at all
0	1	2	3	4

i) Does the use of birth control cause you anxiety or stress because it goes against your own moral standards (or those of someone close to you) since it can prevent the conception of a child? Circle one number from 0 to 4.

extremely		moderately		not at all
4	3	2	1	0

j) Check off all items below which you think could be a possible side effect of using oral contraceptives (the pill):

[ ] muscle stiffness	[ ] headache	[ ]numbness/tingling
[ ] painful or tender breasts	[ ] improved mood	[ ] confusion
[ ] skin blemish or disorder	[ ] weight gain	[ ] forgetfulness
[ ] swelling (breasts, abdomen)	[ ] dizziness, faintness	[ ] poor judgement
[ ] negative mood effects	[ ] cramps	[ ] insomnia
[ ] nausea, vomiting	[ ] feelings of suffocation	[ ] fatigue
[ ] difficulty concentrating	[ ] cold sweats	[ ] backache
[ ] minor accidents	[ ] chest pains	[ ] heart pounding
[ ] ringing in the ears	[ ] general aches and pains	[ ] distractable
[ ] blind spots, fuzzy vision	[ ] poor motor coordination	[ ] hot flashes
[ ] weight loss	[ ] breast size increase	[ ] less cramps
[ ] breast size decrease	[ ] clearer complexion (skin)	

k) Imagine that each of the following symptoms occurred in you when you were taking oral contraceptives (the pill). Please rate **how much distress** you would feel about each. Use the following scale:

0 -this would not bother me at all
1 -
2-this would be moderately bothersome
3 -
4 -this would bother me a great deal

Insert the number which best describes your distress level in the box beside each item

[ ] muscle stiffness	[ ] headache	[ ] numbness/tingling
[ ] painful or tender breasts	[ ] poor motor coordination	[ ] hot flashes
[ ] skin blemish or disorder	[ ] weight gain	[ ] chest pains
[ ] swelling (breasts, abdomen)	[ ] dizziness, faintness	[ ] heart pounding
[ ] nausea, vomiting	[ ] cramps	[ ] insomnia
[ ] blind spots, fuzzy vision	[ ] feelings of suffocation	[ ] fatigue
[ ] difficulty concentrating	[ ] cold sweats	[ ] backache
[ ] ringing in the ears	[ ] general aches and pains	[ ] less cramps
[ ] weight loss	[ ] breast size increase	
[ ] breast size decrease	[ ] clearer complexion (skin)	

7) a) How often do you normally consume alcohol? Circle one number from 0 to 4.

never	once or twice a month	once or twice a week	three to four times a week	almost every day
0	1	2	3	4

b) What is the average number of drinks you have when you drink? Circle one number.

none	one to three	four to seven	eight to twelve	more than 12
0	1	2	3	4

c) How often do you use illegal drugs such as marijuana, hash, cocaine, LSD etc.? Circle one number.

never	once or twice a month	once or twice a week	three to four times a week	almost every day
0	1	2	3	4

8) Below is a list of problems people sometimes have. Please read each one carefully, and check the box that best describes HOW MUCH THAT PROBLEM HAS DISTRESSED OR BOTHERED YOU DURING THE PAST 7 DAYS INCLUDING TODAY.

	not at all	a little bit	moderately	quite a bit	extremely
1. Loss of sexual interest or pleasure	[ ]	[ ]	[ ]	[ ]	[ ]
2. Nervousness or shakiness inside	[ ]	[ ]	[ ]	[ ]	[ ]
3. Feeling low in energy or slowed down	[ ]	[ ]	[ ]	[ ]	[ ]
4. Trembling	[ ]	[ ]	[ ]	[ ]	[ ]
5. Thoughts of ending your life	[ ]	[ ]	[ ]	[ ]	[ ]
6. Suddenly scared for no reason	[ ]	[ ]	[ ]	[ ]	[ ]
7. Crying easily	[ ]	[ ]	[ ]	[ ]	[ ]
8. Feeling fearful	[ ]	[ ]	[ ]	[ ]	[ ]
9. Feelings of being trapped or caught	[ ]	[ ]	[ ]	[ ]	[ ]
10. Heart pounding or racing	[ ]	[ ]	[ ]	[ ]	[ ]
11. Blaming yourself for things	[ ]	[ ]	[ ]	[ ]	[ ]
12. Feeling tense or keyed up	[ ]	[ ]	[ ]	[ ]	[ ]
13. Feeling lonely	[ ]	[ ]	[ ]	[ ]	[ ]

14. Spells of terror or panic.....	[ ]	[ ]	[ ]	[ ]	[ ]
15. Feeling blue.....	[ ]	[ ]	[ ]	[ ]	[ ]
16. Feeling so restless you couldnt sit still.....	[ ]	[ ]	[ ]	[ ]	[ ]
17. Worrying too much about things.....	[ ]	[ ]	[ ]	[ ]	[ ]
18. The feeling that something bad is going to happen to you.....	[ ]	[ ]	[ ]	[ ]	[ ]
19. Feeling no interest in things.....	[ ]	[ ]	[ ]	[ ]	[ ]
20. Thoughts and images of a frightening nature.....	[ ]	[ ]	[ ]	[ ]	[ ]
21. Feeling hopeless about the future.....	[ ]	[ ]	[ ]	[ ]	[ ]
22. Feeling everything is an effort.....	[ ]	[ ]	[ ]	[ ]	[ ]
23. Feelings of worthlessness.....	[ ]	[ ]	[ ]	[ ]	[ ]

Appendix C

Daily Rating Questionnaire

Subject Number:_____

List the types and names of all medications which you are currently taking (including oral contraceptives) and the number of months which you have been taking them. Please look at your prescription bottle or package to write down the exact name and brand of each type of medication.

Medication name (look at bottle or package)	Number of months of use
_____	_____
_____	_____
_____	_____
_____	_____

Attached to this sheet are a number of rating scales which you are to **fill out every evening at the same time for the next 35 days** starting today. Please place the date and your subject number at the top of each page and fill out each questionnaire on the day that it is meant to be filled out. If you forget to fill out the form for one day, then fill it out when you do remember but mark on the bottom that you filled it out on the next day. Dont forget to put your identification number on the top of each sheet. Once you have completed all 35 days of the study, come to the final session at which time you will fill out one more questionnaire and receive either your bonus points if you are a first year psychology student or $10 if you are another volunteer.

Your final session date and time is:_____
Where? _____

If for some reason you cannot make this final session then please call Kirsten Oinonen (**343-8186**) or Dr. Mazmanian (343-8257) to set up an alternate time. If you have any other questions about the study then do not hesitate to call. Just leave a message on the machine saying that you are a subject in her study and leave your phone number. Your call will be returned as soon as possible. Unless you object (and please make sure to tell the researcher today), the researcher will call you once in about two weeks to remind you to complete the daily rating forms. Remember that neither your name nor student number (if you are a first-year Psychology student) are connected with your subject number so your data will remain anonymous and confidential.

Date:_____

Subject Number: _____

Below is a list of a number of words that describe different feelings and emotions. Read each item and then check the appropriate box. Indicate to what extent you have felt this way **today**.

	very slightly or not at all	a little	moderately	quite a bit	extremely
1. Interested	[ ]	[ ]	[ ]	[ ]	[ ]
2. Distressed	[ ]	[ ]	[ ]	[ ]	[ ]
3. Excited	[ ]	[ ]	[ ]	[ ]	[ ]
4. Upset	[ ]	[ ]	[ ]	[ ]	[ ]
5. Strong	[ ]	[ ]	[ ]	[ ]	[ ]
6. Guilty	[ ]	[ ]	[ ]	[ ]	[ ]
7. Scared	[ ]	[ ]	[ ]	[ ]	[ ]
8. Hostile	[ ]	[ ]	[ ]	[ ]	[ ]
9. Enthusiastic	[ ]	[ ]	[ ]	[ ]	[ ]
10. Proud	[ ]	[ ]	[ ]	[ ]	[ ]
11. Irritable	[ ]	[ ]	[ ]	[ ]	[ ]
12. Alert	[ ]	[ ]	[ ]	[ ]	[ ]
13. Ashamed	[ ]	[ ]	[ ]	[ ]	[ ]
14. Inspired	[ ]	[ ]	[ ]	[ ]	[ ]
15. Nervous	[ ]	[ ]	[ ]	[ ]	[ ]
16. Determined	[ ]	[ ]	[ ]	[ ]	[ ]
17. Attentive	[ ]	[ ]	[ ]	[ ]	[ ]
18. Jittery	[ ]	[ ]	[ ]	[ ]	[ ]
19. Active	[ ]	[ ]	[ ]	[ ]	[ ]
20. Afraid	[ ]	[ ]	[ ]	[ ]	[ ]

The following is a list of common symptoms and feelings. For each item check the box for the category that best describes your experience **today**. Even if none of the categories is exactly correct, choose the one that best describes your experience. Please be sure to check one box for each item.

	None 0	Present Mild 1	Present Moderate 2	Present Strong 3	Present Severe 4
1. Muscle stiffness	[ ]	[ ]	[ ]	[ ]	[ ]

2. Weight gain	[ ]	[ ]	[ ]	[ ]	[ ]
3. Dizziness, faintness	[ ]	[ ]	[ ]	[ ]	[ ]
4. Loneliness	[ ]	[ ]	[ ]	[ ]	[ ]
5. Headache	[ ]	[ ]	[ ]	[ ]	[ ]
6. Skin blemish or disorder	[ ]	[ ]	[ ]	[ ]	[ ]
7. Cold sweats	[ ]	[ ]	[ ]	[ ]	[ ]
8. Anxiety	[ ]	[ ]	[ ]	[ ]	[ ]
9. Mood swings	[ ]	[ ]	[ ]	[ ]	[ ]
10. Cramps	[ ]	[ ]	[ ]	[ ]	[ ]
11. Painful or tender breasts	[ ]	[ ]	[ ]	[ ]	[ ]
12. Nausea, vomiting	[ ]	[ ]	[ ]	[ ]	[ ]
13. Crying	[ ]	[ ]	[ ]	[ ]	[ ]
14. Backache	[ ]	[ ]	[ ]	[ ]	[ ]
15. Swelling (breasts, abdomen)	[ ]	[ ]	[ ]	[ ]	[ ]
16. Hot flashes	[ ]	[ ]	[ ]	[ ]	[ ]
17. Irritability	[ ]	[ ]	[ ]	[ ]	[ ]
18. Tension	[ ]	[ ]	[ ]	[ ]	[ ]
19. Fatigue	[ ]	[ ]	[ ]	[ ]	[ ]
20. Feeling sad or blue	[ ]	[ ]	[ ]	[ ]	[ ]
21. General aches and pains	[ ]	[ ]	[ ]	[ ]	[ ]
22. Restlessness	[ ]	[ ]	[ ]	[ ]	[ ]
23. Insomnia	[ ]	[ ]	[ ]	[ ]	[ ]
24. Poor school or work performance	[ ]	[ ]	[ ]	[ ]	[ ]
25. Affectionate	[ ]	[ ]	[ ]	[ ]	[ ]
26. Feelings of suffocation	[ ]	[ ]	[ ]	[ ]	[ ]
27. Forgetfulness	[ ]	[ ]	[ ]	[ ]	[ ]
28. Take naps, stay in bed	[ ]	[ ]	[ ]	[ ]	[ ]
29. Orderliness	[ ]	[ ]	[ ]	[ ]	[ ]
30. Chest pains	[ ]	[ ]	[ ]	[ ]	[ ]
31. Confusion	[ ]	[ ]	[ ]	[ ]	[ ]

	None 0	Present Mild 1	Present Moderate 2	Present Strong 3	Present Severe 4
32. Poor judgment	[ ]	[ ]	[ ]	[ ]	[ ]
33. Stay at home	[ ]	[ ]	[ ]	[ ]	[ ]
34. Excitement	[ ]	[ ]	[ ]	[ ]	[ ]
35. Ringing in the ears	[ ]	[ ]	[ ]	[ ]	[ ]
36. Difficulty concentrating	[ ]	[ ]	[ ]	[ ]	[ ]
37. Avoid social activities	[ ]	[ ]	[ ]	[ ]	[ ]
38. Feelings of well-being	[ ]	[ ]	[ ]	[ ]	[ ]
39. Heart pounding	[ ]	[ ]	[ ]	[ ]	[ ]
40. Distractable	[ ]	[ ]	[ ]	[ ]	[ ]
41. Decreased efficiency	[ ]	[ ]	[ ]	[ ]	[ ]
42. Bursts of energy, activity	[ ]	[ ]	[ ]	[ ]	[ ]
43. Numbness, tingling	[ ]	[ ]	[ ]	[ ]	[ ]
44. Minor accidents	[ ]	[ ]	[ ]	[ ]	[ ]
45. Blind spots, fuzzy vision	[ ]	[ ]	[ ]	[ ]	[ ]
46. Poor motor coordination	[ ]	[ ]	[ ]	[ ]	[ ]
47. Increased appetite	[ ]	[ ]	[ ]	[ ]	[ ]

48. Do you have your period

(menstrual flow) today? ..... [ ] Yes [ ] No

The following is a list of physical changes you may have observed in your body. For each item check the category that best describes your experience today. Even if none of the categories is exactly correct, choose the one that best describes your experience. Please be sure to check one box for each item.

	None 0	Present Mild 1	Present Moderate 2	Present Strong 3	Present Severe 4
1. Weight loss	[ ]	[ ]	[ ]	[ ]	[ ]
2. Breast size increase	[ ]	[ ]	[ ]	[ ]	[ ]
3. Breast size decrease	[ ]	[ ]	[ ]	[ ]	[ ]
4. Clearer complexion (skin)	[ ]	[ ]	[ ]	[ ]	[ ]

Appendix D

Subject Number: _____

Final General Information Questionnaire

Please answer the following questions as honestly as you can. All answers will be kept anonymous and confidential.

1) Age:_____
Years of Education (years from grade 1 to 13 + college + university):_____
Weight: _____(pounds) or _____ (kg)
Height:_____(feet & inches) or _____ (cm)

2) List the types and names (as best you can remember) of all medications that you are currently taking (including oral contraceptives) and the number of months that you have been taking them. Include any medications which you have been taking during the 35 days of this study:

Medication	Number of months of use
_____	_____
_____	_____
_____	_____
_____	_____

Please list any medical conditions which you have been diagnosed with (e.g., hypothyroidism, cancer, diabetes etc.).

_____
_____
_____

3) a) Check the box which best explains your current romantic situation:

[ ] married or living with partner
[ ] more than one steady partner
[ ] one steady partner but living apart
[ ] no steady partner
[ ] other (please specify):_____

b) If you are currently in a steady relationship, how long have you and your partner been together (in years and months)? _____ years and _____ months

c) Rate your happiness with the current situation you are in, regardless of whether you have no partner, a number of different partners, or one steady partner:

extremely happy or satisfied				extremely unhappy or dissatisfied
0	1	2	3	4

4) Check the box of any disorder that you have been treated for, hospitalized for, or diagnosed with:

[ ] depression [ ] panic attacks [ ] other:_____
[ ] bipolar disorder [ ] eating disorder
[ ] anxiety disorder [ ] schizophrenia

Do you feel or think that you may have some type of problem with mood, anxiety, or something else that you have never been diagnosed with or received treatment for? Please describe briefly what you believe to be the problem and why you believe this:
_____
_____
_____
_____
_____

Check the box of any disorder that any family member has been treated for, hospitalized for, or diagnosed with and include the relationship of that family member to you on the line following the disorder (ie., mother, uncle, sister, grandfather):

[ ] depression_____ [ ] panic attacks_____ [ ] other:_____
[ ] bipolar disorder_____ [ ] eating disorder_____
[ ] anxiety disorder_____ [ ] schizophrenia_____

Do you think or feel that any of your family members may have some type of problem with mood, anxiety, or something else, that they have never been diagnosed with or received treatment for? Please describe briefly what you believe to be the problem, why you believe this, and the relationship of this person to you (ie., mother, uncle, sister, grandfather): _____
_____
_____

5) Are you pregnant right now? [ ] yes [ ]no
Have you ever been pregnant before? [ ] yes [ ]no
If yes, how many times have you been pregnant?_____
If yes, how many children have you delivered?_____

Have you had a hysterectomy? [ ] yes [ ]no
At what age did you first start menstruating?_____
What is the average length of your menstrual cycle (in days)? _____
Do you think that you may suffer from Premenstrual Syndrome (PMS)?
[ ] yes [ ]no

6) a) Check the response that best describes your level of sexual activity:

[ ] I have never had sexual intercourse.

[ ] I have had sexual intercourse but not within the past 35 days.

[ ] I had sexual intercourse at least once during the past 35 days.

b) Check the method(s) of birth control which you and your partner(s) have been using during the 35 days of the study:

[ ] condoms
[ ] intrauterine device (IUD)
[ ] sponge
[ ] diaphragm
[ ] oral contraceptives(the pill)
[ ] steroid implant (Norplant)
[ ] none
[ ] hysterectomy, tubal ligation, or vasectomy
[ ] spermicidal jelly, cream, foam, suppository
[ ] douche
[ ] rhythm method
[ ] withdrawal
[ ] injectable contraceptive (Depo-Provera)
[ ] other (please specify):_____

c) Check all methods of birth control which you have used in the past:

[ ] condoms
[ ] intrauterine device (IUD)
[ ] sponge
[ ] diaphragm
[ ] oral contraceptives(the pill)
[ ] steroid implant (Norplant)
[ ] none
[ ] surgical operation(hysterectomy/vasectomy)
[ ] spermicidal jelly, cream, foam, suppository
[ ] douche
[ ] rhythm method
[ ] withdrawal
[ ] injectable contraceptive (Depo-Provera)
[ ] other (please specify):_____

d) How do you feel about pregnancy right now? Circle one number from 0 to 4.

I would be happy if I got pregnant.		I dont have strong feelings about becoming pregnant.		I would be devastated if I became pregnant.
0	1	2	3	4

e) How often are you **worried** that your current or new method of birth control will fail and you will become pregnant? Circle one number from 0 to 4.

never		sometimes		always
0	1	2	3	4

f) How often do you feel **guilty** or how often do you think you would feel guilty about using birth control to prevent pregnancy? Circle one number from 0 to 4.

never		sometimes		always
0	1	2	3	4

g) Circle the number under the response that is most comparable to the idea of finding out that you are pregnant today :

worst nightmare		neutral		a wonderful dream
4	3	2	1	0

h) How **reassured** do you feel that your current or new method of birth control will prevent you from getting pregnant? Circle one number.

extremely		moderately		not at all
0	1	2	3	4

i) Does the use of birth control cause you anxiety or stress because it goes against your own moral standards (or those of someone close to you) since it can prevent the conception of a child? Circle one number from 0 to 4.

extremely		moderately		not at all
4	3	2	1	0

7) a) How often did you consume alcohol during the 35 days of this study? Circle one number from 0 to 4.

never	once or twice a month	once or twice a week	three to four times a week	almost every day
0	1	2	3	4

b) What is the average number of drinks you had when you drank? Circle one number.

none	one to three	four to seven	eight to twelve	more than 12
0	1	2	3	4

c) How often did you use illegal drugs such as marijuana, hash, cocaine, LSD etc. during the 35 days of this study. Circle on number.

never	once or twice a month	once or twice a week	three to four times a week	almost every day
0	1	2	3	4

THE REST OF THE QUESTIONS ARE FOR ORAL CONTRACEPTIVE USERS ONLY:

8) a) During the past 35 days, at what time of day did you most often take your pill:

no fixed time	early morning	late morning	early afternoon	late afternoon	early evening	late evening
0	1	2	3	4	5	6

b) Which statement best describes the way you took your pill during the past 35 days:

[ ] at pretty much the exact same time everyday

[ ] within 1 to 2 hours of the same time each day

[ ] within 3 to 4 hours of the same time each day

[ ] within 5 to 6 hours of the same time each day

[ ] I took the pill at any time of the day - whenever i remembered

c) During the past 35 days, how many times did you forget to take your pill and then take it the following day:

[ ] never [ ] two times [ ] other (specify):_____

[ ] one time [ ] three times

9) I believe that oral contraceptives affected my mood:

very negatively	slightly negatively	in no way at all	slightly positively	very positively
0	1	2	3	4

10) a) Check off all items below which you found to be a side effect of using oral contraceptives (the pill):

[ ] muscle stiffness	[ ] headache	[ ]numbness/tingling
[ ] painful or tender breasts	[ ] improved mood	[ ] confusion
[ ] skin blemish or disorder	[ ] weight gain	[ ] forgetfulness
[ ] swelling (breasts, abdomen)	[ ] dizziness, faintness	[ ] poor judgement
[ ] negative mood effects	[ ] cramps	[ ] insomnia
[ ] nausea, vomiting	[ ] feelings of suffocation	[ ] fatigue
[ ] difficulty concentrating	[ ] cold sweats	[ ] backache
[ ] minor accidents	[ ] chest pains	[ ] heart pounding
[ ] ringing in the ears	[ ] general aches and pains	[ ] distractable
[ ] blind spots, fuzzy vision	[ ] poor motor coordination	[ ] hot flashes
[ ] weight loss	[ ] breast size increase	[ ] less cramps
[ ] breast size decrease	[ ] clearer complexion (skin)	

b) If any of the following symptoms occurred in you when you were taking oral contraceptives (the pill) please rate **how much distress** you felt about each. Use the following scale:

0 -this would not bother me at all
1 -
2-this would be moderately bothersome
3 -
4 -this would bother me a great deal

Insert the number which best describes your distress level in the box beside each-item

[ ] muscle stiffness	[ ] headache	[ ] numbness/tingling
[ ] painful or tender breasts	[ ] poor motor coordination	[ ] hot flashes
[ ] skin blemish or disorder	[ ] weight gain	[ ] chest pains
[ ] swelling (breasts, abdomen)	[ ] dizziness, faintness	[ ] heart pounding
[ ] nausea, vomiting	[ ] cramps	[ ] insomnia
[ ] blind spots, fuzzy vision	[ ] feelings of suffocation	[ ] fatigue
[ ] difficulty concentrating	[ ] cold sweats	[ ] backache
[ ] ringing in the ears	[ ] general aches and pains	[ ] less cramps
[ ] weight loss	[ ] breast size increase	
[ ] breast size decrease	[ ] clearer complexion (skin)	

11) What is the main reason that you **started** taking the oral contraceptive pill?

[ ] for birth control reasons (to prevent pregnancy)
[ ] medical reasons (please specify:_____)
[ ] other (please specify:_____)

12) What is the main reason why you are **presently** taking the oral contraceptive pill?

[ ] for birth control reasons (to prevent pregnancy)
[ ] medical reasons (please specify:_____)
[ ] other (please specify:_____)

13) How many different types/brands of oral contraceptives have you taken? _____

14) Please list the names of all the oral contraceptive pills you have taken starting with the most recent type:

Name of Pill	Months on Pill (presently taking)

15) If you have taken more than one brand of oral contraceptives, why did you switch pills? Please describe in detail.

_____

_____

_____

Appendix E

CONSENT FORM

This study is being conducted by Kirsten Oinonen and Dr. D. Mazmanian of the Department of Psychology at Lakehead University. The purpose of this study is to monitor daily changes in physical, psychological, and emotional variables in first-time-users, long-time-users, and never-users of oral contraceptives.

This study consists of three stages. In Stage 1 you will be asked to fill out a questionnaire at Lakehead University which will take approximately 20 minutes. Stage 2 involves completing a short questionnaire each day for 35 days. Stage 3 involves the completion of another questionnaire at Lakehead University following the completion of Stage 2. Following stage 3, all introductory students will receive three points toward their final mark and the other participants will receive ten dollars. The questionnaires include personal questions about topics such as menstrual history, physical and psychological complaints, drug and alcohol use, attitudes, and present romantic relationships.

Participation in this experiment is voluntary and you may withdraw at any time without explanation and without penalty. All records of your participation will be kept in strict confidence and any reports of the study will not identify you as a participant. As per university requirements, all data will be stored for seven years by Dr. D. Mazmanian at Lakehead University and remain anonymous and confidential. There are no known physical or psychological risks associated with participating in this study.

I have read and understood the consent form, and I agree to participate in this study under these conditions.

Signed: _____

Date: _____

If you have any questions or concerns regarding this study please contact Kirsten Oinonen (345-5396) or Dr. D. Mazmanian (343-8257).

Appendix F

DEBRIEFING FORM

The data you have contributed will be used to investigate the psychological effects of oral contraceptive use. Portions of this research constitute a Masters Thesis by Kirsten Oinonen. We are particularly interested in determining the relationship, if any, between mood and oral contraceptive use in women. The popularity of oral contraceptive use among women necessitates an awareness of all risks and benefits and an awareness of the predisposing conditions that may make some women more prone to these side effects. Research on side effects of the pill is important whether they are positive or negative and whether the cause is pharmacological or psychological. Women need scientific assessments of benefits and risks in order to make an informed choice about what type of contraceptive method or what type of pill is the best for them.

Please be assured that all of your responses are coded to conceal your identity on the questionnaires and that all data will remain anonymous. Below are listed some related references which might be of interest to those who would like further information on how oral contraceptives may affect mood. If you have any questions or concerns regarding this study, you may contact Kirsten Oinonen (345-5396) or Dr. Mazmanian (343-8257). If you would like information on the results of this study then please fill in your address on the attached mailing label and a summary will be sent to you at the end of this study.

If you are experiencing any difficulties with your mood for any reason, and if you would like to discuss these concerns with someone, the following community resources are suggested: your family physician, Lakehead University Psychology Clinic (343-8441), Canadian Mental Health Association (345-5564), or the Lakehead University Student Health Services (343-8361) if you are a student.

Almagor, M., & Ben-Porath, Y. (1991). Mood changes during the menstrual cycle and their relation to the use of oral contraceptives. Journal of Psychosomatic Research, 35, 721-728.

Bancroft, J., & Sartorius, N. (1990). The effects of oral contraceptives on well-being and sexuality. Oxford reviews of reproductive biology, 12, 57-92.

Appendix G

Number of Univariate Outliers Corrected for in each Cell of the Positive and Negative Affect MANOVAs

	Positive Affect				Negative Affect			
	Phase							
Group	1	2	3	4	1	2	3	4
	Mean Scores							
1	1	1	0	0	1	1	0	1
2	0	0	0	0	1	0	0	0
3	0	0	0	0	0	0	1	1
	Variability Scores							
1	1	1	1	0	2	1	1	2
2	0	0	1	0	1	0	0	1
3	1	0	1	0	1	1	1	1

Appendix H

Number of Univariate Outliers Corrected for in the MANOVAs Involving the Four Somatic Scales

	Pain				Water Retention				Autonomic Arousal				Control			
	Phase															
Group	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
	Mean Scores															
1	0	0	0	0	1	1	1	1	1	2	2	2	1	2	2	3
2	0	0	0	0	0	0	0	0	1	1	1	0	1	0	1	1
3	1	0	1	0	1	0	1	0	1	1	0	1	0	0	0	1
	Variability Scores															
1	0	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1
2	0	0	0	0	0	0	1	1	1	1	0	0	0	1	0	1
3	0	1	1	0	1	0	1	0	1	1	0	1	0	1	1	1

Appendix I

Pearson Product-Moment Correlation Coefficients for the Four Somatic Variables

	Mean Scores				Variability Scores			
	pain	water retention	autonomic arousal	control	pain	water retention	autonomic arousal	control
p	———	.6250 p<.001	.5585 p<.001	.5949 p<.001				
wr		———	.6498 p<.001	.6090 p<.001				
aa			———	.8245 p<.001				
c				———				
v.p					———	.4457 p<.001	.4860 p<.001	.4709 p<.001
v.wr						———	.1886 p >.05	.4958 p<.001
v.aa							———	.5741 p<.001
v.c								———

Note. p = mean pain, w = mean water, aa = mean autonomic arousal, c = mean control, v.p = mean pain variability, v.w = mean water variability, v.aa = mean autonomic arousal variability, v.c = mean control variability.

Appendix J

Mean Positive and Negative Affect Scores as a Function of Pill-Use Group, PMS Group and Phase of the Menstrual Cycle

	Positive Affect					Negative Affect				
	Phase									
Group	1	2	3	4	(group mean)	1	2	3	4	(group mean)
Never Users										
no pms (N=18)	13.16 (8.81)	13.08 (8.13)	12.90 (7.06)	15.10 (7.30)	13.56 (7.19)	3.79 (3.86)	3.86 (3.42)	3.67 (4.15)	4.07 (3.95)	3.85 (3.26)
pms (N=16)	12.06 (6.30)	12.58 (6.42)	13.10 (6.93)	12.18 (6.13)	12.48 (6.07)	5.51 (6.01)	5.07 (5.00)	5.95 (4.46)	6.19 (4.67)	5.68 (4.48)
unsure (N=10)	16.31 (8.04)	15.84 (6.94)	17.16 (6.76)	16.55 (8.95)	16.47 (7.37)	6.32 (6.44)	7.11 (7.42)	5.92 (5.81)	5.75 (5.89)	6.28 (5.94)
Long-Time Users										
no pms (N=6)	10.58 (3.72)	10.41 (4.30)	9.78 (3.63)	11.82 (3.76)	10.65 (3.11)	6.28 (8.09)	7.05 (6.61)	6.40 (7.50)	6.10 (6.58)	6.46 (7.09)
pms (N=16)	15.02 (8.05)	14.53 (6.05)	13.87 (6.51)	14.79 (5.84)	14.55 (6.08)	6.09 (5.55)	5.26 (4.88)	5.72 (4.06)	4.91 (3.88)	5.50 (4.10)
unsure (N=12)	9.87 (7.74)	10.48 (6.38)	12.87 (6.09)	11.37 (5.98)	11.15 (6.08)	4.58 (5.90)	4.76 (4.53)	5.40 (3.33)	4.70 (3.04)	4.86 (3.65)
Phase Means	13.02 (7.68)	13.03 (6.74)	13.44 (6.57)	13.80 (6.67)		5.25 (5.46)	5.20 (5.16)	5.32 (4.84)	5.14 (4.42)	

Note. Phase 1 = menstrual; Phase 2 = postmenstrual; Phase 3 = intermenstrual; Phase 4 = premenstrual.

Appendix K

Multivariate Analysis of Variance for PMS (Mean Affect Scores)

Source	df	Error	F
	Between Subjects		
PMS Group (PM)	4	144	0.22
Pill Group (PG)	2	71	0.94
PM X PG	4	144	1.66
	Within Subjects		
Cycle Phase (CP)	6	432	0.60
CP X PM	12	432	0.90
CP X PG	6	432	0.14
CP X PM X PG	12	432	0.62

Note. *$p < .05$. **$p < .01$.

Appendix L

Mean Positive and Negative Affect Scores as a Function of Pill-Use Group, Family Mental Illness History, and Menstrual Cycle Phase

	Positive Affect					Negative Affect				
Phase Group	1	2	3	4	(group mean)	1	2	3	4	(group mean)
Never Users										
no history (N=26)	11.76 (8.06)	12.81 (7.52)	12.50 (7.34)	12.79 (8.04)	12.29 (7.27)	5.05 (4.95)	4.71 (5.05)	5.28 (4.44)	5.24 (4.21)	5.07 (3.88)
history (N=19)	16.03 (6.67)	15.50 (6.26)	15.95 (5.94)	16.27 (5.79)	15.93 (5.53)	5.12 (5.27)	5.72 (5.74)	4.74 (5.98)	5.02 (5.36)	5.15 (5.38)
First-Time Users										
no history (N=7)	11.73 (5.55)	15.36 (7.51)	12.93 (9.83)	19.92 (8.32)	13.24 (6.70)	5.11 (2.93)	5.07 (5.02)	6.18 (4.82)	7.18 (6.19)	5.88 (4.19)
history (N=10)	15.98 (7.80)	14.60 (7.71)	15.27 (8.36)	14.10 (7.06)	14.99 (7.29)	8.32 (8.24)	8.50 (7.38)	8.08 (7.40)	6.47 (5.64)	7.84 (6.97)
Long-Time Users										
no history (N=21)	13.66 (7.88)	14.14 (5.92)	14.30 (5.90)	14.10 (5.82)	14.05 (5.94)	6.27 (6.32)	5.90 (5.20)	5.77 (4.33)	5.17 (3.91)	5.78 (4.44)
history (N=13)	10.40 (6.96)	9.53 (5.46)	10.37 (5.49)	11.38 (5.26)	10.42 (5.06)	4.49 (5.54)	4.59 (4.73)	5.66 (4.83)	4.85 (4.51)	4.90 (4.67)
Phase Means	13.28 (7.53)	13.37 (6.83)	13.61 (6.93)	13.72 (6.74)		5.60 (5.67)	5.57 (5.43)	5.69 (5.13)	5.40 (4.67)	

Note. Phase 1 = menstrual; Phase 2 = postmenstrual; Phase 3 = intermenstrual; Phase 4 = premenstrual.

Appendix M

Multivariate Analysis of Variance for Family History of Mental Illness

(Mean Affect Scores)

Source	df	Error	F
	Between Subjects		
Family History Group (FH)	2	89	0.16
Pill Group (PG)	4	180	0.89
FH X PG	4	180	1.81
	Within Subjects		
Cycle Phase (CP)	6	540	0.19
CP X FH	6	540	1.43
CP X PG	12	540	0.39
CP X FH X PG	12	540	1.20

Note. *$p < .05$. **$p < .01$.

Appendix N

Multivariate Analysis of Variance for Personal History of Mental Illness

(Mean Affect Scores)

Source	df	Error	F
	Between Subjects		
Personal History Group (PH)	2	89	3.58 *
Pill Group (PG)	4	180	1.07
PH X PG	4	180	1.59
	Within Subjects		
Cycle Phase (CP)	6	540	0.33
CP X PH	6	540	0.32
CP X PG	12	540	0.51
CP X PH X PG	12	540	1.16

Note. *$p < .05$. **$p < .01$.

Appendix O

Analysis of Variance for Personal History of Mental Illness

(Mean Positive Affect Scores)

Source	df	F
	Between Subjects	
Personal History Group (PH)	1	0.01
Pill Group (PG)	2	1.49
PH X PG	2	1.57
S within-group error	90	(167.26)
	Within Subjects	
Cycle Phase (CP)	3	0.09
CP X PH	3	0.01
CP X PG	6	0.38
CP X PH X PG	6	0.78
CP X S within-group error	270	(10.59)

Note. Values enclosed in parentheses represent mean square errors.

S = subjects.

*p < .025. **p < .01.

Appendix P

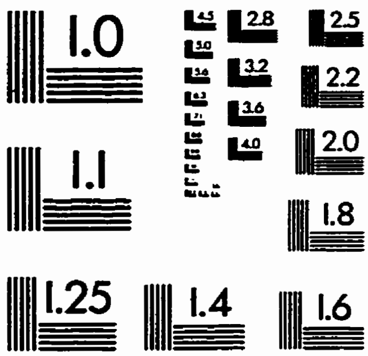
Multivariate Analysis of Variance for Personal History of Mental Illness

(Affect Variability Scores)

Source	df	Error	F
	Between Subjects		
Personal History Group (PH)	2	89	2.19
Pill Group (PG)	4	180	0.16
PH X PG	4	180	0.03
	Within Subjects		
Cycle Phase (CP)	6	540	2.57 *
CP X PH	6	540	0.24
CP X PG	12	540	1.37
CP X PH X PG	12	540	1.63

Note. *$p < .05$. **$p < .01$.

IMAGE EVALUATION TEST TARGET (QA-3)



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