

Circadian Rhythms and Marital Adjustment

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CIRCADIAN RHYTHMS AND MARITAL ADJUSTMENT

BY

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Abstract

Previous research has indicated that circadian rhythms influence human performance on a variety of tasks. There is individual variation in these rhythms, with some people peaking in the morning, some in the evening, and others at intermediate times between the two. It has been hypothesized that this variation may play a role in marital and family adjustment. The purpose of this study was to examine the relationship between a couple's degree of similarity (in terms of morningness-eveningness) as defined by scores on the Morningness-Eveningness Questionnaire (Horne & Ostberg, 1976) and their marital adjustment as defined by scores on the Dyadic Adjustment Scale (Spannier, 1976). A sample of 55 couples, who agreed to serve as subjects, was divided into three groups. One group was composed of 20 well-adjusted couples (defined as couples who received a "well-adjusted" score on the Dyadic Adjustment Scale). The second group was composed of 13 distressed couples (defined as couples who had requested or were receiving marital therapy and who received a "distressed" score on the Dyadic Adjustment Scale). The third group consisted of 22 couples chosen non-systematically from various community organizations and thus, believed to represent an "average" population. The Dyadic Adjustment Scale and the Morningness-Eveningness Questionnaire were administered to each member of the couple. The results indicated that there was a strong relationship between a couple's degree of similarity in terms of morningness-eveningness and their marital adjustment. There was a greater proportion of well-adjusted couples attaining a very similar morningness-eveningness rating than of average or distressed

couples and a greater proportion of distressed couples attaining a dissimilar morningness-eveningness rating, with a greater proportion of average couples attaining a somewhat similar morningness-eveningness rating. There was a strong correlation between the degree of similarity in morningness-eveningness and marital adjustment scores--as marital adjustment scores increased, degree of similarity in morningness-eveningness increased. Scores on the Dyadic Adjustment Scale were significantly different across levels of similarity in morningness-eveningness with subjects with similar morningness-eveningness scores attaining higher adjustment scores than subjects with dissimilar morningness-eveningness ratings. These results strongly support the hypothesis that variation in circadian rhythm plays a significant role in marital adjustment. Implications for therapy and diagnosis and prediction with couples were discussed and several possibilities for future research were explored. In addition, this study determined that the Dyadic Adjustment Scale and the Morningness-Eveningness Questionnaire were stable over time.

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"As the hours go round, we perform a complex series of cycles internally, a progression of changes that alter our performance, our senses, the way we metabolize food, the symptoms of our illness, our vulnerability to stress and disease, and even some of the subtle displays of vitality and idiosyncrasy we fondly know as personality" (Gay Gaer Luce, 1970, p. 44). With these words, Gay Gaer Luce emphasizes the widespread effects of circadian rhythms on human functioning.

As early as the 19th century, large numbers of studies had indicated that there is a rhythmic variation in body temperature. Kleitman (1938) performed an experiment which examined the temperature curves of subjects over a 24-hour period. The results indicated that for most subjects a minimum temperature was observed between 01.00 and 06.00 hours and a maximum between 15.00 and 23.00 hours. In a later study, Colquhoun (1970) examined the circadian variation in body temperature of a group of 70 young men during the course of a 24-hour period in which they followed a sequence of activities similar to the "average industrial man". One finding of this study was that in subjects active during the day and sleeping at night, body temperature, after reaching a minimum in the small hours of the morning, rises rather steeply after awakening, and then more slowly to a maximum in the evening, whereafter it falls very sharply during the night. Other studies have indicated that other physiological processes also exhibit marked circadian changes. Adkins (1964) found that heart-rate is lowest during the night, usually with a minimum in the small hours followed by a rise towards a maximum in the afternoon. Respiratory functions followed a similar rhythm. Zulch and Hossman (1967)

studied circadian rhythms in blood pressure of 120 subjects and found that there was a minimum in the early morning and a maximum around 12.00 and 15.00 hours. Cerebral activity as measured by EEG parameters also showed a circadian rhythm, with an early morning peak and late evening trough (Frank, Harner, Matthews, Johnson & Halberg, 1961).

Circadian rhythms in urinary adrenaline and noradrenaline have been reported in subjects deprived of sleep for three days (Froberg, 1975). Reinberg, Ghata, Halberg, Gervais, Abulker, Dupont and Gaudreau (1970) found similar rhythms during complete bed-rest for 36 hours with 4-hourly hypocaloric meals. Harmonic analysis indicated crests for adrenaline occurred between 12:30 during habitual activity conditions and 14:00 for bed-rest conditions. The corresponding values for noradrenaline were about 14:30 and 12:30 respectively. Circadian rhythms also operate in metabolism changes such as glycogen levels, with levels becoming lowest early in the morning. Stroebel (1971) has performed experiments in which he conditioned rodents at different hours around the clock and later attempted to extinguish these responses. Results indicated that fear was learned most rapidly when there were high adrenal hormone levels in the blood.

Circadian Rhythms in Performance

Because of the marked circadian rhythms in physiological processes which have been listed above, it has been hypothesized that changes in the functioning of the brain will also vary cyclically as its operation is supported by many of these processes. (Colquhoun, 1971).

In turn, it is expected that the speed and accuracy with which all activities involving central nervous system function are executed will fluctuate throughout the day. Kleitman (1939, revised 1963) examined the performance of 6 subjects in terms of speed or accuracy on a series of standard tests, involving reaction time, card-sorting and multiplication, administered at various times throughout the day. Findings indicated that both speed and accuracy of performance had well-marked circadian rhythms, being lower in the morning and evening and highest around noon. The temperature curve was somewhat parallel to this performance curve which seemed to indicate a fairly close relationship between performance and temperature curves throughout the day. Kleitman then studied performances which were "purely sensorimotor and sensory-mental-motor" as represented by simple reaction-time and choice reaction-time respectively, again using 6 subjects. Results indicated that performance decreased during the morning and early afternoon and rose in the late afternoon and evening and that the variation was often related to the temperature curve. Kleitman concluded that there was probably no reaction-time curve independent of the temperature (Kleitman, Titelbaum & Feiveson, 1938). However, because there were so few subjects, and as other physiological measurements then available were so crude, this conclusion cannot be accepted until it is supported by further research. A similar series of studies, utilizing 25 to 30 subjects and measuring their performance on eight different tasks involving letter cancellation, vigilance detections, calculations, serial reaction, card sorting, paced reaction time, digit span, and time estimation, was carried out by Blake (1967). Results indicated

that there was significant variation throughout the day on all tests except the paced reaction time, a finding which is inconsistent with the Kleitman findings. The results on the other tests complemented the Kleitman findings showing that performance on such short and simple tasks has a daily rhythm and that this rhythm is quite parallel to that of body temperature. Other studies have found simple reaction time to be slowest in the small hours of the morning and fastest in the late afternoon, often with a plateau during the daytime hours (Adkins, 1964). These results are in agreement with the Kleitman findings on reaction times.

Arschoff, Greake, Poppel, and Wever (1972) studied tasks such as grip strength, tapping, and time estimation in subjects who were living in artificial light-dark cycles with a rigorously controlled schedule. Performance on these tasks tended to fluctuate around a plateau in the daytime and to be minimum during the night. These rhythms persisted during four days of continuous darkness.

These studies indicate that performance at short, simple tasks such as reaction time, sorting tasks, etc., generally reaches a minimum in the early morning and a maximum in the afternoon. In contrast to these results physical performance rhythms tend to result in highest efficiency in the early morning and lowest in the afternoon (Klein, Wigmann & Bruner, 1968). The results of these studies led to research on rhythmic performances in working situations, especially those involving shift-work.

Circadian Rhythms in Performance: Industrial and Shift-Work Studies

Kleitman and Jackson (1950) performed a laboratory study to test whether the relationship between temperature and performance observed in the "waking-day" studies were maintained during the hours when the subject would normally have been sleeping. They recorded changes in performance efficiency and in body temperature in 9 male subjects who were required to follow certain rotating watch-keeping duty schedules. The performance measures used were: 1) flying a "Link Trainer", 2) complex choice reaction-time, and 3) colour-naming. Colour-naming performance was found to be related to body temperature. Performance on the Link Trainer and the reaction-time tests were related to body temperature during the day but not at night.

Chiles, Alluisi and Adams (1968) carried on an eight-year study on the effects of efficiency of various work-rest schedules during confinement in a simulated aerospace vehicle crew compartment. The subjects worked on either a "4-on - 4-off" or on a "4-on - 2-off" stabilized schedule, and physiological and performance measures were taken during each 24-hour period. The performance measures included tests of vigilance, arithmetic-computation, problem-solving and pattern recognition. The performance curves on these tasks parallel the physiological curves of temperature during both the day and the night, not only during the day as was the case in the Kleitman and Jackson study.

Colquhoun, Blake and Edwards (1968) performed a series of experiments designed to study rhythmic performances in a shift-work situation. The first experiment compared performance of those under a "rotating"

system to performance of those under a "stabilized" system. Twenty-eight male subjects were studied over a period of 12 days of testing. The performance measures were a test of auditory discrimination and one of simple calculations. Results from the rotating shift indicated that the circadian rhythm of temperature was stable over the experimental period and that efficiency at mental tasks was closely related to this rhythm. Subjects working under the stabilized system exhibited an adaptation of body-temperature rhythm to the new schedule in that the temperature during the "night" shift became higher than the temperature during the "day" shift. This adaptation occurred over a period of 6 days. The three performance measures were quite closely related with temperature during most of the trial despite the fact that the temperature rhythm had undergone a phase-shift. These results support the Chiles, Alluisi and Adams findings.

The second experiment studied temperature and performance rhythms under different 8-hour stabilized systems. The three shifts studied were: a "night" shift (22.00 - 06.00), a "morning" shift (04.00 - 12.00), and a "day" shift (08.00 - 16.00). Thirty-one male subjects were studied over a period of 12 consecutive days. Performance was measured by scores on the vigilance test and the calculations test. Results indicated that changes in temperature and in performance were quite related in the day shift. During the night shift, vigilance response latency and calculation output were closely related with temperature but detection rate on the vigilance test did not follow the temperature curve as closely. During the morning shift, performance followed the temperature curve fairly closely during the first half of the shift, but

tended to follow a reversed direction in the latter part of the shift. Colquhoun et al. hypothesize that this inverse relationship could be due to partial sleep deprivation in that the subjects reported difficulty in getting to sleep early enough to rise at 03.00 hours.

These studies suggest that the efficiency with which mental tasks are carried out does follow a circadian rhythm which is related to that of body temperature. In addition, both performance and temperature rhythms adapt in response to unusual working conditions as was indicated in the Colquhoun, Blake and Edwards (1968) study. The tasks measured in these studies were fairly simple ones, but it seems probable that more complex tasks such as social interaction would be at least equally affected by these rhythms. However, further research is needed to fully understand this circadian periodicity.

Individual Variations in Circadian Rhythms

From the results of studies relating performance and body temperature Kleitman (1963) observed that all people did not follow the same rhythm, but that there seemed to be two distinct curves, one peaking early in the day, the other later on. Also, there were intermediate gradations between the two. There also seems to be a wide variation in the ability of people to adjust to phase shifts (Conroy & Mills, 1970). There have been several studies performed to explore the associations of differences in performance or temperature rhythms with other characteristics of the subjects. Much of this research has been concentrated on relating circadian rhythms to the dimension of introversion-extraversion.

Colquhoun (1960) reported that efficiency at detecting small changes in visual stimuli was positively correlated with introversion (as measured by scores on the "Unsocialibility" scale of the Heron Personality Inventory (Heron, 1956)) in the morning, but negatively correlated in the afternoon. Colquhoun and Corcoran (1964) found that this relationship held up when the task was "letter-cancellation" and unpaced, although only for speed of the task and not for accuracy. Unfortunately these studies tested different groups of subjects at different times of day and no physiological measures were employed, so it was not possible to examine the relationship between physiological and psychological rhythms.

Blake (1967) analyzed the normal circadian rhythms of body temperature of 74 naval ratings. Oral temperatures were correlated with the subjects' scores on the "unsocialibility" scale of the Heron Personality Inventory (Heron, 1956). Results indicated that the correlation changed from significantly positive (introverts with relatively higher temperatures) to significantly negative (introverts with relatively lower temperatures) over the period from 08.00 to 21.00. During the late evening and the sleeping hours this trend was reversed. The subjects were divided into two groups: 22 extroverts, as defined by a score of 2 or less on the Heron scale, and 25 introverts, as defined by a score of 5 or more on the Heron scale. The temperature of the "introvert" groups rose more rapidly in the early morning and started to fall at an earlier point in the evening than that of the "extrovert" group. This research suggests that temperature curves for introverts and extroverts are parallel to the performance curves examined in the Colquhoun and Corcoran study (1969).

Blake (1971) performed a study designed to relate the above

findings to other evidence on individual differences in rhythms of both temperature and performance by taking measures of these two variables simultaneously at different times of day from subjects whose introversion-extroversion rating was already known. Blake hypothesized that the more introverted subjects would show temperature and performance rhythms that were phase-advanced to those of extroverted subjects. The "unsocialibility" section of the Heron scale was used to differentiate introverts from extroverts as described above. Performance measures used were letter cancellation, vigilance (an auditory discrimination task), simple calculations, serial reaction, card sorting, paced reaction time, digit span, and time estimation. In the letter cancellation task, the correlation between output and introversion was positive at 08.00 hours but negative at 21.00 hours. The "introvert" group had a higher output than the "extrovert" group at 08.00 hours. These results are in agreement with those of the above studies. In other performance measures this relationship was not obtained. However, there were differences in the temperature curves. Introverts showed a more rapid increase in body temperature from 04.00 hours to 14.00 hours. From 14.00 to 19.00 hours there was no difference between the curves, and between 18.00 and 20.00 hours, the temperature of the introverts tended to flatten while that of the extroverts continued to rise to reach a peak value at least an hour later than in introverts. Thereafter, the curves fall at identical rates, but the tenth of a degree difference evident at 20.00 hours is maintained until 04.00 when the two curves converge. The major difference between the two curves is one of phase.

Patkai (1969) used a self-assessment questionnaire to divide the subjects into two groups, one which preferred morning work and one which

preferred evening work. The Maudesley Personality Inventory was administered to obtain a measure of introversion-extroversion. Various tasks involving reaction-time, arithmetic and colour-naming were administered at different times of the day and the adrenalin output was measured. It was found that reaction time performance related to preferred time of day and to output of adrenalin at different times. Also, morning types were found to be significantly more introverted than afternoon types. These results supported the previous research findings.

Following this line of research, Horne and Ostberg (1977) performed a study to investigate whether morning or evening types are related to the extroversion scale. From the results of previous research it was hypothesized that extroverts are more inclined to be evening types and introverts to be morning types. The experimenters used the morningness-eveningness self-assessment questionnaire developed by Horne and Ostberg (1976) to distinguish between morning, evening and intermediate types and the Eysenck Personality Inventory to assess introversion-extroversion. Measures of oral temperature were taken as a check on the external validity of the Morningness-Eveningness Questionnaire and as an indicator of possible circadian differences between introversion and extroversion. Forty-eight subjects between the ages of 18 and 32 years logged their bed-time, arising time, and nap times during the day for three weeks. They also recorded their temperature at half-hour intervals during the day. Results indicated that the average oral temperature up to the peak time (i.e., time of highest temperature reading) tend to be higher for introverts than extroverts, with the reverse trend after the peak time.

The extroverts tended to have peak times 33 minutes later than the introverts but, due to the large variance around these peak times, there was not a significant difference between peak times for the two groups. There were trends for extroverts to retire and arise later than introverts but the differences were not significant. The average temperature curves of the morning, evening and intermediate types tend to show similar trends to the respective groupings of extroverts, introverts and ambiverts. The authors concluded that there seemed to be a tendency for extroverts to be evening types and introverts to be morning types but that this relationship is not substantiated statistically. Tune (1969) performed a similar study which included subjects over 32 years of age in which he found that sleeping habits are to some extent dependent upon the interaction of age and extroversion-introversion. In line with the results of the Horne and Ostberg study he found no significant differences in sleep-wake habits between extroverts and introverts in subjects between the ages of 20-29, however, there were clear differences for older subjects. Extroverts over 40 slept longer, awoke later, and became more like evening types, while introverts over 40 slept shorter and became more like morning types. In the Horne and Ostberg study morning types (as indicated by scores on the Morningness-Eveningness Questionnaire) tended to have a higher temperature up to peak time than evening types with a reverse trend following the peak, but there were no significant differences between the groups. The morning types displayed a relatively rapid temperature rise levelling out and peaking at 19.30 hours, while the evening types have a steady temperature rise throughout the day, reaching a peak about 20.40 hours.

The rate of temperature decline is similar, but the evening types lag behind by about an hour leading to a difference in bedtime of about one and one-half hours. There were also significant differences between morning, evening and intermediate types for arising time, with morning types arising on the average about 8.07 hours. Morning types and intermediate types were not significantly different for bedtime with both retiring about 23.30 hours, but both were significantly different from evening types who retired about 1.05 hours. One drawback of this study is that it involved students who are not necessarily typical of a normal population in that they are more likely to have a more flexible schedule, with some periods when there are relatively few demands on them and others when it is not atypical to work almost around the clock. Further studies on a more normal population will be necessary to substantiate these results.

In 1977 Froberg performed an experiment which examined the question of whether these differences between morning and evening subjects (as defined by a Morningness-Eveningness Questionnaire) existed under conditions of sleep deprivation and controlled activity and diet. In contrast to what previous research had suggested, no significant differences between the groups were indicated by the results. The authors hypothesized that the rhythm individuals display may be due to "synchronized schedules" such as sleep-wakefulness rather than differences in endogenous circadian rhythms. Further studies will have to be performed before any definite conclusions can be drawn.

The studies discussed demonstrate that there do seem to be physiological rhythms which affect performance in various ways. Luce (1970) points out

relationships between these circadian rhythms and human performance. When blood sugar levels become low, many people show irritability. In fact married couples sometimes notice a rhythm of quarreling: fights begin around the hour of a delayed dinner, or in the wee hours of the morning, both times when blood sugar is low. The level of glycogen in the body partially determines how much energy people have and when people are least able to handle stress. Stroebel's (1972) work in conditioning rodents indicated that fear was learned most rapidly at the time of high adrenal levels in the blood. Although man is more complex, this study suggests that fearful events in the morning, when adrenal levels are high, may be more stressful than the same events later in the day. Although most of these studies have measured performance on simple tasks, this evidence suggests that the circadian rhythms would also influence more complex tasks such as social interactions and thus play a role in human relationships. In addition, some studies demonstrate that there do seem to be significant differences between morning type people and evening type people. These differences include such variables as daily temperature curves, performance on mental and physical tasks, and temperaments: i.e., introversion and extroversion. As discussed above, many studies have suggested that morning types tend to be introverts while evening types tend to be extroverts. This suggests that there may be significant personality differences between the two types with morning people tending to be inner-directed, thoughtful, reserved, and to enjoy socializing during the day. In contrast, evening people may tend to be outer-directed, sociable, outgoing and prefer to be with others during the evening hours. If, as the evidence suggests,

these differences do exist between morning and evening types, it can be hypothesized that relationships may be affected by the variations in rhythms of the people involved. The Horne and Ostberg (1977) study indicates that there are significant differences between morning and evening types in terms of bedtime, arising time and peak times. In a marital relationship, these differences could create problems such as lack of time together, lonely mornings or nights, going to bed alone, and sexual difficulties. Adjustments would have to be made in order to overcome the differences.

Effects of Circadian Rhythms on Marital and Family Adjustment

A study done by Colquhoun, Blake and Edwards (1968) indicates that people working on stabilized night-shifts exhibit an adaptation of body-temperature rhythms to that schedule. This suggests that human circadian rhythms are able to adjust to external schedules to some extent. This raises interesting questions as to whether married couples are able to adjust their rhythms to become more compatible with each other. It is possible, however, that if the marriage is not going well the couple will tend to revert to their original rhythms or become more resistant to adaptation. These questions should be further explored in future research. Kleitman (1939) commented that there are more marriages broken from incompatible temperatures than incompatible temperaments. The studies reviewed in this paper have indicated that there may be an element of truth to this statement in that people's inner rhythms affect their personality and performance and thus can also be expected to affect

their relationships.

Kantor and Lehr (1975) address the issue of how rhythms affect family life in their discussion of clocking in their book, Inside the Family. They feel that an important part of family functioning involves the question of how they structure the day, how they view time, and how they adjust to each other's schedules. They suggest that differences in people's daily cycles (i.e., in their arising time, their bedtime, and their peak time) can have many effects, namely: "If people are out of phase with one another, they may not be able to be home together at the same time, much less make love or fight with one another. Every experience is affected in one way or another by the way in which a family regulates the members' clocking. Whether a person feels his day has been well-spent, whether a man and woman make love satisfactorily, whether a family spends any time together at play are all in part a question of clocking" (Kantor & Lehr, 1975, p. 82).

Adams and Cromwell (1978) explored this question further in a preliminary study of morning-night people in the family. Morning people are those who wake up easily and are most active in the morning and night people are those who wake up slowly and are most active during the evening and night-time. They collected and analyzed responses from married students to open-ended questions concerning "morningness" and "eveningness". The responses indicated that the subjects did view this distinction as a definable aspect of their lives and could classify it on the following characteristics: 1) patterns of arising and bedtime; 2) timing of energy and efficiency peaks; 3) type and time of preferred activities; 4) personal values. Couples who were mismatched in terms of rhythms mentioned that

this created conflict and the need for compromise in their relationships. They listed problems such as going to bed alone, lonely mornings or nights, lack of time for conversation and shared activities, and sexual problems. From this study the authors present the following hypotheses: a) night couples tend to be more involved in extra-familial social networks; b) morning couples are more likely to report greater job satisfaction in daytime schedules; c) morning couples tend to have sexual intercourse in the morning and night people at night; d) mismatched couples are more likely to have a poor overall marital adjustment, unmanaged conflict, and potential for marital stress than matched couples; e) mismatched couples are likely to spend less time in shared activities, conversation, and sexual activity than matched couples; f) mismatched couples reporting satisfactory marriages are likely to exhibit greater flexibility and adaptability in both partners in various aspects of their relationship than matched couples. Although this study suggests interesting hypothesis, it should be noted that it is an impressionistic, non-standardized study which involves no systematic research. More research will have to be done in order to provide an empirical test of these hypotheses.

This current study proposed to provide an empirical test of some of these hypotheses. Specifically, the hypotheses to be tested were:

1. There would be a significantly greater proportion of matched (in terms of morningness-eveningness) couples than of mismatched couples in a sample of well-adjusted couples as defined by scores on the Dyadic Adjustment Scale (Spannier, 1976). Also, there would be a significantly greater proportion of mismatched couples (in terms of morningness-evening-

ness) than of matched couples in a known sample of distressed couples.

2. There would be a positive correlation between the degree of similarity in morningness-eveningness scores for a couple and their marital adjustment scores.

3. There would be differences in marital adjustment between couples who are similar on morningness-eveningness and those who are dissimilar on morningness-eveningness.

In addition, this study determined the test-retest reliability of the Morningness-Eveningness Questionnaire and of the Dyadic Adjustment Scale. If these scales do have test-retest reliability, the results of this and other studies employing these instruments can be accepted with a fair degree of confidence. However, if the scales are not stable over time, this will create problems in interpreting the data. This finding would also raise questions as to the interpretation of other research that has been performed using these tools.

Method

Subjects

The subjects were 55 couples between the ages of 18 and 32 who were divided into 3 groups, a "distressed" group consisting of 13 couples, a "well-adjusted" group consisting of 20 couples, and a "non-selected" group of 22 couples. It was decided to restrict the sample to couples aged 18 to 32 because the Morningness-Eveningness Questionnaire was validated on a sample of this age range, and research has shown that circadian rhythms are to some extent dependent on age (Tune, 1969). The distressed group consisted of couples who had requested and/or were

receiving marital therapy. In addition, they had to have attained a combined mean score below 84 on the Dyadic Adjustment Scale. The normative mean for the well-adjusted sample used in validating this scale was 115 and that for the divorced sample was 71. The cut-off score selected was one-half of a standard deviation above the mean score for divorced couples. Thus, the distressed sample clearly attained scores in the marital discord direction. More importantly, the use of this cut-off point ensured no overlap between the well-adjusted and distressed groups. The well-adjusted sample consisted of couples whose combined mean score was above 115 on the Dyadic Adjustment Scale. As noted above, this criterion was the mean total score for the well-adjusted sample used in validating the scale, and ensured that there was no overlap between the well-adjusted and distressed groups. The third group consisted of couples chosen non-systematically from various community organizations (see below). This group was not pre-selected according to any particular criteria and could include distressed and well-adjusted couples (as defined above) as well as average couples. Thus, it is felt that this group is more likely to be representative of the general population. This group shall hereafter be referred to as the "average" group. The reason for inclusion of this group was to determine whether the results obtained using non-overlapping groups were consistent with those obtained using a sample that is felt to be more representative of the general population.

The three groups were of unequal sizes because of difficulty in obtaining a sample of 20 couples who met the distressed criteria. The distressed couples were contacted through the Psychological Service Centre

of the University of Manitoba, through the University of Manitoba Counselling Service, through Family Services of Winnipeg, and from a private psychologist. Although these agencies were co-operative, there was difficulty in obtaining a sufficient number of couples for the following reasons. First, all the agencies reported that there were fewer distressed couples seeking help than had previously been the case. It was hypothesized that couples were tending to seek individual help after separation rather than marital therapy. Secondly, many therapists were hesitant to ask extremely distressed couples to participate in research. Thirdly, many of the couples who did fill in the forms attained scores above the cut-off on the Dyadic Adjustment Scale. This could be partly due to the tendency of the therapists to request the couple's help in the research only after the marital situation had been improved. In future research, it would be desirable to have couples fill in the forms prior to the initial interview.

The well-adjusted and average groups were contacted through YWCA clubs, church and sports organizations, businesses, schools, and neighbourhood groups. Upon receipt of all the questionnaires given to these groups, they were blindly sorted into two piles so that each couple's questionnaires had an equal opportunity to appear in either pile. It was decided that the first 20 couples in the first pile who met the well-adjusted criteria would be included in the study. The remaining questionnaires in this pile were then discarded. The questionnaires in the second pile were accepted in total and made up the "average" group. No pre-conditions were set for inclusion in this group.

In order to ensure that there were no systematic biases with respect to annual income, amount of formal education, years of marriage, and number of children, statistical tests were performed to determine if there were significant differences between groups.

The result of the one-way ANOVAs indicated that there were no significant differences between the well-adjusted, distressed, and average groups in terms of income, $F(2,52) = 0.599$, $p = .55$; years of education, $F(2,52) = 2.28$, $p = .11$; years of marriage, $F(2,52) = 0.115$, $p = .89$; and number of children, $F(2,52) = 0.223$, $p = .80$.

Although the above ANOVAs indicated that there were no significant differences between the groups, it should be noted that the groups were less similar on the amount of formal education variable than on the other variables. This suggests that level of education may be functioning as a mediator variable in this study. In order to determine whether this was so, a multiple regression analysis was performed. In this analysis, the unique contribution of the similarity in terms of morningness-eveningness variable to the variance of marital adjustment scores was examined by partialling out the effects of age, income, level of education, number of children, and years of marriage. This was accomplished by employing a hierarchical solution with the similarity in terms of morningness-eveningness variable (the major one in our study) entered last after all other sources of variance had been partialled out.

This analysis indicated that education accounted for 6% of the variance, while all the other variables (except similarity in morningness-eveningness) accounted for only 4% of the variance. Since these variables account for only 10% of the total variance (less than half the amount

accounted for by the similarity in morningness-eveningness---see Results section), the need to be concerned with a systematic bias in the data which results from these extraneous sources of variance can be eliminated.

Procedure

In order to attain a sample of distressed couples the researcher requested assistance from the Psychological Service Centre, the University of Manitoba Counselling Service, Family Services, and a private psychologist. Initial contact was made with the appropriate person in the agencies in order to explain the purposes of the research, the time commitment involved, and what assistance was required from the agency. In addition, the researcher offered to provide feedback on the results of the study. When the agency agreed to assist in the research, a number of envelopes containing the questionnaires were deposited with the contact person who subsequently distributed the envelopes to various therapists/counsellors. They, in turn, explained the nature of the research to various clients, informed them of the time commitment involved, assured them of the confidentiality of their responses, and asked if the couple would be willing to participate in this study. If the couple agreed the therapist gave them an envelope and asked them to fill in the forms it contained, at home and without consultation with one another. Subjects were told that the forms were to be returned the next week in a sealed envelope which would be given to the researcher. The therapist then returned the sealed envelopes to the contact person who subsequently returned the forms to the researcher. Each envelope contained two copies

of the Dyadic Adjustment Scale, two Morningness-Eveningness Questionnaires and two brief Information Sheets. These materials are presented in the Appendices.

The other two groups were contacted through YWCA clubs, church and sports organizations, businesses, schools, and neighbourhood groups. Initial contact was made with a contact person from the organization, initially by a telephone call and followed up by a letter. At this time, the contact person was informed as to the nature of the study, the time commitment involved, and the confidentiality of the subjects' responses. Again the researcher offered to provide feedback on the results of the study to the groups involved. The contact person then approached the group and conveyed the above information to the members. If the members of a group agreed to participate in the research, the contact person distributed the self-addressed envelopes containing the two questionnaires and information sheets to the members of the group. The members were requested to fill in the forms at home without consultation with one another and to return them to the researcher in the sealed envelope addressed to the researcher. This procedure was repeated approximately two months later. These second returns were used only for the purpose of assessing test-retest reliability for the two scales. There was no second distribution among the distressed couples due to difficulty in finding subjects.

In addition to being assigned to one of the three groups on the basis of the criteria discussed above, each couple was assigned a similarity (in terms of morningness-eveningness) score on the basis of their response to the Morningness-Eveningness Questionnaire. The process

of determining the morningness-eveningness score for each couple is elaborated on in the Material section of the thesis. It should be noted that although there were five potential degrees of similarity, ranging from very similar (rating of one) to very dissimilar (rating of five), none of the couples in this study attained morningness-eveningness scores that were different enough from each other to result in assignment of the very dissimilar ratings (four and five). Thus there was only a range from one to three in terms of similarity and difference in morningness-eveningness. These may be conceptualized as ranging from very similar (score of one) to somewhat similar (score of two) to dissimilar (score of three). The lack of couples obtaining very dissimilar ratings was unexpected and will be dealt with more extensively in the Discussion section.

Materials

A. The Dyadic Adjustment Scale. The scale has been designed to assess the quality of a marriage. The scale consists of 32 items which can be grouped into four components (dyadic satisfaction, dyadic cohesion, dyadic consensus, and affectional expression). The average intercorrelation between these four empirically derived subscales is .68, indicating that these factors are interrelated and not orthogonal.

The internal consistency reliability of the scale is .96. There has not, however, been a test-retest reliability measure done on this scale so it is not known whether the measure is stable over time. This drawback is common to most well-used marital adjustment scales and reduces the power of the scale to detect effects because it reduces the reliability of the scale. It was decided to determine the test-retest

reliability of the scale as part of this study. Although stability is not always considered a desirable characteristic of a test, a scale which measures marital adjustment should be expected to be stable over a short period of time (i.e., two or three months), if there are no major changes introduced by major factors such as trauma, counselling, etc. In order to be useful, the scale should indicate general adjustment over time, rather than the state of the marriage only at the time of testing. It is important, however, to consider that marital adjustment may change over time due to such factors as trauma, counselling, birth of children, etc.

B. The Morningness-Eveningness Questionnaire (Horne & Ostberg, 1976).

This questionnaire is the only psychometric instrument known to the writer which has been developed to assess morningness-eveningness. Although it does have certain drawbacks which are elaborated on below, the research on it suggests that it can be used to discriminate between morning and evening types. Because research in this area is very new, highly reliable and valid scales have not yet been developed.

This questionnaire consists of 19 questions, designed to assess morningness-eveningness. Four choices of answer are given, indicating: definite morning type, moderate morning type, moderate evening type, and definite evening type.

The scores are added together and the sum converted into a 5-category Morningness-Eveningness Scale:

	Score
Definitely Morning Type	70 - 86
Moderately Morning Type	59 - 69
Neither Type	42 - 58

	Score
Moderately Evening Type	31 - 41
Definitely Evening Type	16 - 30

This questionnaire was originally administered to 150 adults ranging in age from 18 to 32 years. The responses were then item-analyzed and questions which were unable to discriminate were rejected. The scale was then validated on a sample of 48 subjects randomly selected from the original pool of 150 subjects. The criterion of individual differences in the circadian variation of oral temperature was taken as an external validation of the scale. The subjects recorded their temperature at half-hour intervals during their waking hours. At the end of this period the oral temperature changes over each day were averaged out for each subject and a polynomial curve fitting program was employed in order to smooth the averaged oral temperature curve for each subject and to objectively identify the peak time. The average temperature curves up to 18.00 hours show morning types to have a higher temperature than evening types. Beyond 18.00 hours and after the peaks, the earlier trend was reversed, with a higher evening temperature and a lower temperature decline for evening types. Although there were no significant differences between any of the groups on the hourly points along the curves, there were significant differences between the groups in terms of peak time, arising time and bedtime. The fact that no significant differences were found between the groups at hourly points could be due to the small sample size of only 16 subjects in each group. This small sample size limits the power of the study to detect an effect even if one did exist.

There was a significant difference between the peak times of morning and evening types, with morning types peaking at an average of 19.32 and evening types at 20.40. The intermediate group peaked at 20.25 which was not significantly different from the other two groups. There were significant differences in bedtime between morning and evening groups and between intermediate and evening groups, with morning and intermediate types retiring at about 23.30 and evening types retiring at 1.05. All three groups were significantly different for arising time, with morning types arising on the average at 7.24, the intermediate types at 8.07, and evening types at 9.18. The results indicate that the scale does have a degree of validity in differentiating between morning and evening types, but there are problems with it as discussed below.

The age range used in the sample places some limits on the generalizability of the scale to people over 32. However, since the sample used in this study consists of couples under 32, this drawback should not interfere with this study. Also, the sample consisted largely of students, who may not be representative of the general population, particularly with regard to lifestyle. Students generally have a more flexible schedule than people working in regular jobs and are more able to follow their internal rhythm in terms of arising time and bedtime. The significant differences between the groups in bedtime, arising time, and peak time indicate that the questionnaire is able to differentiate between the three groups to some extent. It is felt that in terms of this study, the differences in bedtime, arising time, and peak time are sufficient because these tend to be variables which are most

likely to affect marital adjustment. Couples who wake up and retire at different times may have problems in synchronizing their schedules in order to be able to spend time together. There would be more need for compromise in scheduling for mismatched couples than for matched couples. Another problem with the questionnaire is that there has been no test-retest reliability measure performed on it. Although research suggests that circadian rhythms change over age and in response to life styles, it would be expected that they would remain relatively stable over a couple of months if there were no drastic changes in life style. Given that no test-retest reliability is available on the Morningness-Eveningness Questionnaire and that it is being used as a research instrument, this study also attempted to determine the test-retest reliability of the questionnaire. This would help clarify the appropriateness of its use in research.

Because this scale was validated on a "foreign" population, the norms may be questionable: i.e., they may not be generalizable to the population used in this study. However, since both populations come from similar climates and cultures, there is no reason to suspect an a priori difference.

Although this scale does have the drawbacks discussed above, it is felt that this questionnaire is acceptable for the purposes of this study. As stated above, research in this area is very recent, and this questionnaire is the only psychometric instrument known to the writer which has been developed to assess morningness-eveningness. Also, this scale is able to differentiate between groups on the basis of differences in both bedtime and arising time, and between peak

times. It is felt that these differences are sufficient because these tend to be the variables which are most likely, as discussed above, to affect marital adjustment.

Similarity scores were assigned to each couple on the basis of a comparison of their classification on the Morningness-Eveningness Questionnaire. Couples in the same classification were rated as 1, couples in adjacent classifications were rated as 2, couples separated by one classification were rated as 3, couples separated by two classifications were rated as 4, and couples separated by three classifications were rated as 5.

Results

In order to determine the test-retest reliability of the two scales, a Pearson product moment correlation was performed on each set of scores. An examination of the two sets of scores obtained on the Dyadic Adjustment Scale indicates a fairly high correlation between the two, $\underline{r} = .73$, $\underline{p} < .01$. Similarly, an examination of the data indicates that the two sets of scores on the Morningness-Eveningness Questionnaire are highly correlated, $\underline{r} = .74$, $\underline{p} < .01$.

A chi-square test was performed in order to determine whether there were significant differences between the three marital adjustment groups across levels of similarity in morningness-eveningness. This was tested using a 3 x 3 contingency table as indicated in Table 1. An examination of the results indicated that there were significant differences between the groups, $\underline{\chi}^2 (4) = 20.37$, $\underline{p} < .01$. As indicated in Table 1, the percentage of well-adjusted couples attaining a very similar rating

Table 1

Contingency Table for Crosstabulation of Marital Adjustment Category by
Degree of Similarity in Terms of Morningness-Eveningness

<u>Marital Adjustment</u>		<u>Similarity in Morningness-Eveningness</u>		
		<u>Very Similar</u>	<u>Somewhat Similar</u>	<u>Dissimilar</u>
Well-adjusted	Actual Frequency	18	2	0
	Percentage	58	11	0
Average	Actual Frequency	11	9	2
	Percentage	36	50	33
Distressed	Actual Frequency	2	7	4
	Percentage	6	39	67

was considerably greater than that of average or distressed couples. In contrast, the percentage of distressed couples attaining a dissimilar rating was considerably greater than that of well-adjusted and average couples, while the percentage of average couples attaining a somewhat similar rating was greater than that of the other two.

A one-way ANOVA was performed to determine whether there were significant differences in marital adjustment scores across levels of similarity in morningness-eveningness. It was necessary to consider the effects of violation of the assumption of homogeneity of variance because the cell sizes were unequal. It was not known if the three groups were distributed normally so a Bartlett-Box F test was used to test for homogeneity of variance because this test is robust to violation of the normality assumption. From the results, it can be concluded that the variances for the groups were homogeneous, Bartlett-Box F = 2.13, $p > .01$, so that the ANOVA can be interpreted without concern for the effects of the unequal cell sizes on the assumption violation. On the basis of the one-way ANOVA, it can be concluded that the scores on the Dyadic Adjustment Scale were significantly different across levels of similarity in morningness-eveningness, $F(2,52) = 11.70$, $p < .01$, with subjects in the very similar rating group obtaining a mean score of 114.26 on the scale; subjects in the dissimilar rating group obtaining a mean score of 86.83; and subjects in the somewhat similar group obtaining a mean score of 96.50. These results should be interpreted with some degree of caution because of the low number of subjects ($n = 6$) who obtained a very dissimilar rating.

A Pearson product moment correlation was performed in order to test the correlation between the raw scores on the Dyadic Adjustment Scale and degree of similarity in morningness-eveningness. The scores

on the Dyadic Adjustment Scale ranged from 62 to 140, while there was only a range of three ratings in similarity in morningness-eveningness. This discrepancy in range limits the possible correlation between the two variables. The results indicated that there was a significant correlation between the two variables, $\underline{r} = 0.55$, $\underline{p} < .01$, with low marital adjustment scores being associated with decreased similarity in morningness-eveningness scores. Similarity in terms of morningness-eveningness accounted for 30% ($\underline{r}^2 = .30$) of the variance in the scores on the Dyadic Adjustment Scale. Although these results indicated that similarity in morningness-eveningness accounted for 30% of the variance in adjustment scores, it must be noted that this is based on a simple correlation and may be artificially raised by the inclusion of extraneous sources of variance. However, when a multiple regression procedure was employed in order to determine the unique contribution of similarity in morningness-eveningness to the variance of adjustment scores, the results indicated that 21% of the variance was uniquely accounted for by the similarity in morningness-eveningness variable. This analysis has been discussed in more detail under the Subjects section.

Discussion

One of the purposes of this study was to determine the test-retest reliability of the Morningness-Eveningness Questionnaire and of the Marital Adjustment Scale. The results indicated that both scales have an acceptable test-retest reliability, suggesting that they are fairly stable over time. It should be noted that although the reliabilities were high enough to justify concluding that the scales are

stable, they were fairly low compared to those obtained for some instruments such as intelligence tests. This is most likely due to the nature of the variables under study. Marital adjustment and morningness-eveningness are variables which might be expected to vary over time due to changes in life situations such as change of occupation, birth, and developmental stages of children, seasonal variations (i.e., length of day), change of financial situation, and/or other stresses of varying duration. Scores on instruments measuring these variables would also be expected to vary somewhat over time, thus leading to reduced test-retest reliability. The variability in morningness-eveningness seems especially plausible in this climate with its great seasonal variation and constantly changing hours of daylight. It would be interesting to determine the test-retest reliability of the scale in a more moderate climate with constant hours of daylight in order to determine whether the reliability would be higher in such a climate. However, since the results indicated that both scales do have acceptable test-retest reliability scores, the results of this and other research employing these instruments can be interpreted with some degree of confidence in terms of being stable over time.

The first hypothesis suggested that there would be a significantly greater proportion of matched (in terms of morningness-eveningness) couples than of mismatched couples in a sample of well-adjusted couples (as defined by scores on the Dyadic Adjustment Scale (Spannier, 1976)). The results of the chi-square strongly support this hypothesis. Matched couples were much more likely to be in the well-adjusted sample. In fact, there were no well-adjusted couples in the dissimilar sample. This

finding raises several interesting issues. First, there is the issue of the chicken and the egg; i.e., which comes first--a happy marriage or matched circadian rhythms? It could be that couples who are well-adjusted have been able to adapt their circadian rhythms to move closer to those of their partners. On the other hand, it may be that couples who have similar rhythms at the time of their marriage tend to be happier than those who are mismatched. In order to determine which explanation is supported, a longitudinal study examining the pattern of a couple's similarity in terms of morningness-eveningness should be performed. A large sample and naturalistic observation methods could be used. This research would determine whether the couple had similar circadian rhythms prior to marriage or whether the similarity developed afterwards.

Another issue that arises is the question of whether well-adjusted couples are actually matched in terms of morningness-eveningness or whether they simply perceive themselves to be matched. Because this study employed self-report measures, this issue cannot be resolved until further research employing behavioural and physiological measures of circadian rhythms are performed. The first hypothesis also suggested that there would be a significantly greater proportion of mismatched (in terms of morningness-eveningness) couples than of matched couples in a known sample of distressed couples. This hypothesis was also strongly supported by the results of the chi-square analysis.

Although the results of the chi-square analysis do support the hypothesis, they must be interpreted with caution due to the small number of subjects in each cell. Although the results in this study

were significant, the low number of subjects may have distorted the findings. The significance could be an artifact of the non-representativeness of the subjects employed, rather than a generalizable finding.

The second hypothesis suggested that there would be a positive correlation between the degree of similarity in morningness-eveningness scores for a couple and their marital scores. The Pearson product-moment correlation was fairly high ($r = .55$), indicating that as similarity in morningness-eveningness increases, marital adjustment also increases. Various explanations could be offered for this relationship. It could be that couples who are well-adjusted are willing to adapt their schedules to each other, whereas couples who are not getting along would not be willing to exert this effort. Previous research suggests that such adaptation is possible (Colquhoun et al., 1968). Alternatively, it could be that as couples learn to adapt their circadian rhythms to each other, their marriage will become better. Further research is needed to settle this issue.

In order to determine the unique contribution that degree of similarity in terms of morningness-eveningness made to the variance of marital scores, a multiple regression analysis was performed. The results indicated that morningness-eveningness similarity accounted for a substantial amount of the variance of marital adjustment scores, suggesting that it is an important factor in marital adjustment. However, in interpreting the multiple regression, it should be noted that attempts had been made to ensure that the three marital adjustment groups were not significantly different on any of the covariates and thus the contribution of the covariates would be expected to be low. It would be interesting

to examine the unique contribution of similarity in morningness-eveningness to the variance in marital adjustment scores, partialling out for the covariates, without prior matching of the groups. This analysis would indicate whether similarity in morningness-eveningness remains as powerful a factor in marital adjustment when other variables are not controlled for.

The final hypothesis stated that there would be differences in marital adjustment between couples who are similar on morningness-eveningness and those who are dissimilar. The results of a one-way ANOVA confirmed this hypothesis. Couples who were similar on morningness-eveningness tended to have higher adjustment scores than couples who were dissimilar, with marital adjustment scores increasing as degree of similarity on morningness-eveningness increased.

The size of the correlation between marital adjustment and similarity in terms of morningness-eveningness suggests that knowing a couple's similarity in terms of morningness-eveningness may have important diagnostic, predictive and therapeutic implications. Determining a couple's morningness-eveningness similarity could be an important factor in deciding which problem areas to center on, in choosing treatment interventions and in predicting the couple's chances of success in therapy. It is important to note that, although morningness-eveningness may be an important variable affecting marital adjustment, it would have to be considered in relation to other variables that are important in marital adjustment.

If further research indicates that a marriage will improve as the couple learns to adapt their circadian rhythms to each other, this has important implications for therapy with distressed couples. If such couples were dissimilar in terms of morningness-eveningness, one

of the goals of therapy might be to help the couple adjust their circadian rhythms so that they would become more similar to each other. Various techniques developed to alter circadian rhythms could be utilized within the framework of couple therapy. Such an intervention might include assigning homework task such as staying up later each night or getting up earlier each morning, changing meal times, utilizing free time for short naps and changing activity schedules. Again, research needs to be performed in order to determine which interventions would prove more effective.

Although these treatment interventions might prove useful, there could be drawbacks. One issue that might arise would be that of which partner should change and how much change should be expected. This issue would have to be explored with the couple during therapy sessions. A second issue that arises is whether changing circadian rhythms creates a great deal of stress for the person. If so, this may not be the treatment of choice.

In terms of prediction, questions regarding morningness-eveningness could be included on marriage questionnaires. This might prove especially useful in premarital counselling; i.e., if a couple were mismatched they could be warned as to the problems that this might create and made aware of various ways of coping with these problems.

The major finding of this study is the high correlation between the two variables. The other tests are an elaboration upon this finding and serve to clarify the results. However, further research utilizing naturalistic, physiological and behavioural observations on larger samples over longer periods of time will need to be performed in order to further

explore the relationship between marital adjustment and similarity in morningness-eveningness. Such research should provide answers to some of the questions raised above.

There were several shortcomings in this study. The small number of subjects limits the reliability and generalizability of the results. The lack of behavioural and physiological measures of morningness-eveningness weakens the validity of the results. Self-report measures such as those employed in this study are subject to social desirability biases and subject misperceptions. The lack of couples attaining a very dissimilar morningness-eveningness rating was unexpected and may be an artifact of the procedures in this study. Alternatively, such results could suggest that married couples do adjust their rhythms to each other so that they become more similar in terms of morningness-eveningness. Possibly, couples who are extremely difficult in terms of morningness-eveningness may not stay married. If this were the case, a study which employed divorced couples rather than distressed couples would be likely to find many couples who would attain a very dissimilar rating. Further research is needed to clarify this issue.

Despite these shortcomings the significance of the results obtained suggest that similarity in morningness-eveningness is an important variable in marital adjustment. This conclusion supports and extends previous research on the subject. As early as 1939, Kleitman commented that "there are more marriages broken from incompatible temperatures than incompatible temperaments". Forty years later, Adams and Cromwell followed up on this hunch in a preliminary study of morning-night people in the family. One of the hypotheses that emerged from this impressionistic,

non-standardized study was that mismatched couples are likely to have poorer overall marital adjustment than married couples.

The present study has attempted to provide an empirical test of this hypothesis by using standardized instruments of measurement, by controlling for the influence of some extraneous variables, and by subjecting the results to a statistical analysis. The results obtained confirm Adams and Cromwell's hypothesis and suggest the need for further research in the area. The strength of the findings indicates that the relationship between marital adjustment and similarity in terms of morningness-eveningness may have implications for therapy, diagnosis, and prediction with couples. Although this is an exploratory study with many limitations, it is hoped that the findings presented in the paper will stimulate further research in what appears to be an important area.

APPENDICES

APPENDIX A

Dyadic Adjustment Scale

(Spannier, 1976)

Most persons have disagreements in their relationships. Please indicate below the approximate extent of agreement or disagreement between you and your partner for each item on the following list.

	Always Agree	Almost Always Agree	Occas- ionally Disagree	Frequently Disagree	Almost Always Disagree	Always Disagree
1. Handling Family Finances	<u>5</u>	<u>4</u>	<u>3</u>	<u>2</u>	<u>1</u>	<u>0</u>
2. Matters of Recreation	<u>5</u>	<u>4</u>	<u>3</u>	<u>2</u>	<u>1</u>	<u>0</u>
3. Religious Matters	<u>5</u>	<u>4</u>	<u>3</u>	<u>2</u>	<u>1</u>	<u>0</u>
4. Demonstrations of Affection	<u>5</u>	<u>4</u>	<u>3</u>	<u>2</u>	<u>1</u>	<u>0</u>
5. Friends	<u>5</u>	<u>4</u>	<u>3</u>	<u>2</u>	<u>1</u>	<u>0</u>
6. Sex Relations	<u>5</u>	<u>4</u>	<u>3</u>	<u>2</u>	<u>1</u>	<u>0</u>
7. Conventionality (correct or proper behaviour)	<u>5</u>	<u>4</u>	<u>3</u>	<u>2</u>	<u>1</u>	<u>0</u>
8. Philosophy of Life	<u>5</u>	<u>4</u>	<u>3</u>	<u>2</u>	<u>1</u>	<u>0</u>
9. Ways of dealing with parents or in-laws	<u>5</u>	<u>4</u>	<u>3</u>	<u>2</u>	<u>1</u>	<u>0</u>
10. Aims, goals, and things believed important	<u>5</u>	<u>4</u>	<u>3</u>	<u>2</u>	<u>1</u>	<u>0</u>
11. Amount of time spent together	<u>5</u>	<u>4</u>	<u>3</u>	<u>2</u>	<u>1</u>	<u>0</u>
12. Making major decisions	<u>5</u>	<u>4</u>	<u>3</u>	<u>2</u>	<u>1</u>	<u>0</u>

	Always Agree	Almost Always Agree	Occasi- onally Disagree	Frequently Disagree	Almost Always Disagree	Always Disagree
13. Household tasks	<u>5</u>	<u>4</u>	<u>3</u>	<u>2</u>	<u>1</u>	<u>0</u>
14. Leisure time interests and activities	<u>5</u>	<u>4</u>	<u>3</u>	<u>2</u>	<u>1</u>	<u>0</u>
15. Career decisions	<u>5</u>	<u>4</u>	<u>3</u>	<u>2</u>	<u>1</u>	<u>0</u>
	All of the time	Most of the time	More often than not	Occas- ionally	Rarely	Never
16. How often do you discuss or have you considered divorce, separation, or terminating your rela- tionship?	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
17. How often do you or your mate leave the house after a fight?	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
18. In general, how often do you think things between you and your partner are going well?	<u>5</u>	<u>4</u>	<u>3</u>	<u>2</u>	<u>1</u>	<u>0</u>
19. Do you confide in your mate?	<u>5</u>	<u>4</u>	<u>3</u>	<u>2</u>	<u>1</u>	<u>0</u>
20. Do you ever regret that you married (or lived together?)	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
21. How often do you and your partner quarrel?	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
22. How often do you and your mate "get on each other's nerves"?	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>



	Every Day	Almost Every Day	Occas- ionally	Rarely	Never
23. Do you kiss your mate?	<u>4</u>	<u>3</u>	<u>2</u>	<u>1</u>	<u>0</u>
	All of them	Most of them	Some of them	Very few of them	None of them
24. Do you and your mate engage in outside interests together?	<u>4</u>	<u>3</u>	<u>2</u>	<u>1</u>	<u>0</u>

How often would you say the following events occur between you and your mate?

	Never	Less than once a month	Once or twice a month	Once or twice a week	Once a day	More often
25. Have a stimulating exchange of ideas	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
26. Laugh together	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
27. Calmly discuss something	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
28. Work together on a project	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>

These are some things about which couples sometimes agree and sometimes disagree. Indicate if either item below caused differences of opinions or were problems in your relationship during the past few weeks. (Check yes or no.)

	Yes	No
29. Being too tired for sex	0	1
30. Not showing love	0	1

31. The dots on the following line represent different degrees of happiness in your relationship. The middle point, "happy", represents the degree of happiness of most relationships. Please circle the dot which best describes the degree of happiness, all things considered, of your relationship.

0	1	2	3	4	5	6
Extremely unhappy	Fairly unhappy	A little unhappy	Happy	Very happy	Extremely happy	Perfect

32. Which of the following statements best describes how you feel about the future of your relationship?

- 5 I want desperately for my relationship to succeed, and would go to almost any length to see that it does.
- 4 I want very much for my relationship to succeed, and will do all I can to see that it does.
- 3 I want very much for my relationship to succeed, and will do my fair share to see that it does.
- 2 It would be nice if my relationship succeeded, but I can't do much more than I am doing now to help it succeed.
- 1 It would be nice if it succeeded, but I refuse to do any more than I am doing now to keep the relationship going.
- 0 My relationship can never succeed, and there is no more that I can do to keep the relationship going.

APPENDIX B

Information Sheet

Age _____ Sex _____ Occupation _____

Full-time _____ Part-time _____

ID _____ Years of Marriage _____

Education

_____ Under Grade 8
 _____ Grade 9 - 11
 _____ Grade 12
 _____ Some University
 _____ Technical Training
 _____ University Degree
 _____ Post Graduate Degree

Number and Age of Children

	Name	Age
1.	_____	_____
2.	_____	_____
3.	_____	_____
4.	_____	_____
5.	_____	_____
6.	_____	_____

Annual Income

_____ Under \$ 5,000
 _____ \$ 5,000 - \$ 10,000
 _____ \$ 10,000 - \$ 15,000
 _____ \$ 15,000 - \$ 20,000
 _____ Over \$ 20,000

Current Work Schedule

_____ Days (9 a.m. - 5 p.m.)
 _____ Evenings (4 p.m. - 12 p.m.)
 _____ Nights (12 p.m. - 8 a.m.)
 _____ Alternating Shifts

APPENDIX C

Morningness-Eveningness Questionnaire (Horne & Ostberg, 1976)

Instructions

1. Please read each question very carefully before answering.
2. Answer ALL questions.
3. Answer questions in numerical order.
4. Each question should be answered independently of others. Do NOT go back and check your answers.
5. All questions have a selection of answers. For each question place a cross alongside ONE answer only. Some questions have a scale instead of a selection of answers. Place a cross at the appropriate point on the scale.
6. Please answer each question as honestly as possible. Both your answers and the results will be kept in strictest confidence.
7. Please feel free to make any comments in the section provided below each question.

The Questionnaire, with scores for each choice

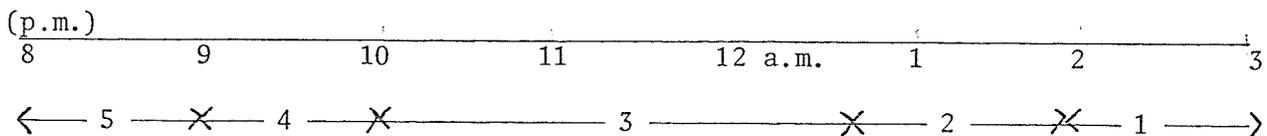
1. Considering only your own "feeling best" rhythm, at what time would you get up if you were entirely free to plan your day?

(a.m.) _____
 5 6 7 8 9 10 11 12
 ←—— 5 —X—— 4 —X—— 3 ————X—— 2 —X—— 1 ———→

2. Considering only your own "feeling best" rhythm, at what time would you go to bed if you were entirely free to plan your evening?

(p.m.) _____
 8 9 10 11 12 a.m. 1 2 3
 ←—— 5 —X—— 4 ————X—— 3 ————X—— 2 —X—— 1 ———→

3. If there is a specific time you have to get up in the morning, to what extent are you dependent on being woken up by an alarm clock?
- Not at all dependent _____ 4
Slightly dependent _____ 3
Fairly dependent _____ 2
Very dependent _____ 1
4. Assuming adequate environmental conditions, how easy do you find getting up in the mornings?
- Not at all easy _____ 1
Not very easy _____ 2
Fairly easy _____ 3
Very easy _____ 4
5. How alert do you feel during the first half hour after having woken in the mornings?
- Not at all alert _____ 1
Slightly alert _____ 2
Fairly alert _____ 3
Very alert _____ 4
6. How is your appetite during the first half hour after having woken in the mornings?
- Very poor _____ 1
Fairly poor _____ 2
Fairly good _____ 3
Very good _____ 4
7. During the first half-hour after having woken in the mornings, how tired do you feel?
- Very tired _____ 1
Fairly tired _____ 2
Fairly refreshed _____ 3
Very refreshed _____ 4
8. When you have no commitments the next day, at what time do you go to bed compared to your usual bedtime?
- Seldom or never later _____ 4
Less than an hour later _____ 3
1 - 2 hours later _____ 2
More than two hours later _____ 1
9. You have decided to engage in some physical exercise. A friend suggests that you do this one hour twice a week and the best time for him is between 7.0 - 8.0 a.m. Bearing in mind nothing else but your own "feeling best" rhythm, how do you think you will perform?
- Would be on good form _____ 4
Would be on reasonable form _____ 3
Would find it difficult _____ 2
Would find it very difficult _____ 1
10. At what time in the evening do you feel tired and as a result in need of sleep?



11. You wish to be at your peak performance for a test which you know is going to be mentally exhausting and lasting for two hours. You are entirely free to plan your day and considering only your own "feeling best" rhythm which ONE of the four testing times would you choose?
- | | | |
|------------------------|-------|---|
| 8.00 - 10.00 a.m. | _____ | 6 |
| 11.00 a.m. - 1.00 p.m. | _____ | 4 |
| 3.00 - 5.00 p.m. | _____ | 2 |
| 7.00 - 9.00 p.m. | _____ | 0 |
12. If you went to bed at 11.00 p.m. at what level of tiredness would you be?
- | | | |
|------------------|-------|---|
| Not at all tired | _____ | 0 |
| A little tired | _____ | 2 |
| Fairly tired | _____ | 3 |
| Very tired | _____ | 5 |
13. For some reason you have gone to bed several hours later than usual, but there is no need to get up at any particular time the next morning. Which ONE of the following events are you most likely to experience?
- | | | |
|---|-------|---|
| Will wake up at usual time and will NOT fall asleep | _____ | 4 |
| Will wake up at usual time and will doze there-after | _____ | 3 |
| Will wake up at usual time but will fall asleep again | _____ | 2 |
| Will NOT wake up until later than usual | _____ | 1 |
14. One night you have to remain awake between 4.00 - 6.00 a.m. in order to carry out a night watch. You have no commitments the next day. Which ONE of the following alternatives will suit you best?
- | | | |
|---|-------|---|
| Would NOT go to bed until watch was over | _____ | 1 |
| Would take a nap before and sleep afterwards | _____ | 2 |
| Would take a good sleep before and nap afterwards | _____ | 3 |
| Would take ALL sleep before watch | _____ | 4 |
15. You have to do two hours of hard physical work. You are entirely free to plan your day and considering only your own "feeling best" rhythm which ONE of the following times would you choose?
- | | | |
|-------------------|-------|---|
| 8.00 - 10.00 a.m. | _____ | 4 |
| 11.00 - 1.00 a.m. | _____ | 3 |
| 3.00 - 5.00 p.m. | _____ | 2 |
| 7.00 - 9.00 p.m. | _____ | 1 |
16. You have decided to engage in hard physical exercise. A friend suggests that you do this for one hour twice a week and the best time for him is between 10.00 - 11.00 p.m. Bearing in mind nothing else but your own "feeling best" rhythm how well do you think you would perform?
- | | | |
|------------------------------|-------|---|
| Would be on good form | _____ | 1 |
| Would be on reasonable form | _____ | 2 |
| Would find it difficult | _____ | 3 |
| Would find it very difficult | _____ | 4 |

17. Suppose that you can choose your own work hours. Assume that you worked a FIVE hour day (including breaks) and that your job was interesting and paid by results. Which FIVE CONSECUTIVE HOURS would you select?

12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12					
Midnight												Noon				Midnight													
_____ 1 _____					_____ 5 _____					_____ 4 _____					_____ 3 _____					_____ 2 _____					_____ 1 _____				

18. At what time of the day do you think that you reach your "feeling best" peak?

12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
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19. One hears about "morning" and "evening" types of people. Which ONE of these types do you consider yourself to be?
- | | |
|---|---------|
| Definitely a "morning" type | _____ 6 |
| Rather more a "morning" type than an "evening" type | _____ 4 |
| Rather more an "evening" type than a "morning" type | _____ 2 |
| Definitely an "evening" type | _____ 0 |

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