A VALIDATION STUDY OF THE SHORT ASSESSMENT OF MORNINGNESS-EVENINGNESS IN AN HIV-AFFECTED POPULATION

by

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ABSTRACT

Examination of human rhythms has shown individual differences. Some people have more energy during the day (morning types); some people have more energy at night (evening types). The Horne-Östberg Morningness-Eveningness Questionnaire is a widely used measure of morningness-eveningness. With 19 items, it is too long for convenient use in some health care settings such as a busy ambulatory clinic. A Short Assessment of Morningness-Eveningness was developed by Felver and Lundstedt in 1991. Initial validation testing of this one-question instrument showed significant support in a predominately female, college educated population (Felver & Hoeksel, 1992). A second validation testing showed significant support in a healthy male population (Horneck & Mackey-Feist, 1992). Nevertheless, validity is lacking in other populations such as the chronically ill. The purpose of this study was to further examine the validity of the Short Assessment of Morningness-Eveningness in an HIV-affected population.

The sample consisted of people with AIDS (N=30, ages 20-58, Mean ± SD=35±9) from Roseburg and Portland, Oregon. Criterion-related validity testing was employed by using the Horne-Östberg Morningness-Eveningness Questionnaire as the standard. Subjects completed a demographic data form, the Short Assessment of Morningness-Eveningness, and the Horne-Östberg Morningness-Eveningness Questionnaire.

The Horne-Östberg Morningness-Eveningness Questionnaires were scored according to previously printed guidelines (Horne & Östberg, 1976). Subjects were assigned by score to one of three categories: morning, neither, or evening. The Short Assessment of Morningness-Eveningness was scored separately and subjects were given similar category assignments.

Support was added to the validity of the Short Assessment of Morningness-Eveningness by statistical significance of the Weighted Kappa (p=0.0337) and Spearman rho r (p=0.0005). Weighted Kappa was 0.40, indicating that a borderline agreement was present between the Horne-Östberg Morningness-Eveningness Questionnaire and the Short

Assessment of Morningness-Eveningness. The Spearman rho *r* was 0.60, illustrating a moderate relationship between the two instruments. The Cronbach's alpha of the Horne-Östberg was .82, consistent with other reports in the literature.

Further testing with a larger sample is needed to demonstrate the usefulness of the Short Assessment of Morningness-Eveningness in an HIV-affected population. The use of the Short Assessment of Morningness-Eveningness may sensitize nurses who practice within an ambulatory care setting to consider individual rhythms when scheduling activities or appointments.

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Introduction

Some individuals are fatigued in the evening, go to bed early, and arise in the morning feeling refreshed and fully alert. These are morning types. Some individuals perform best in the evening, go to bed late, and are not very alert upon arising. These people are considered evening types. Many physiological, biochemical, and psychological differences have been observed between morning and evening-types (Kerkhof, 1985). Assessment of morningness-eveningness has potential usefulness in nursing research and nursing practice. Researchers need to account for physiological and performance differences between morning and evening types. For practicing nurses, knowing morning or evening preference can influence the effectiveness of care interventions. In a population affected by Human Immunodeficiency Virus (HIV), fatigue is a frequently reported symptom (Tindell et al., 1988). Fatigue is more prevalent as HIV infection progresses (Darko et al., 1992), complicating the illness and contributing to disability. Knowing the morning or evening preference can help the nurse

assist the clients in planning activities when they have the most energy.

Questionnaires have been developed to measure morningness-eveningness for research and clinical purposes. The Horne-Östberg Morningness-Eveningness Questionnaire (1976) is the most widely used and referenced measure of morningness-eveningness (Appendix D), but has been criticized for its length (Torsvall & Akerstedt, 1980). With 19 items, it is too long for convenient use in some health care settings such as a busy ambulatory clinic or an inpatient critical care unit. A shorter questionnaire could provide nurses with a more rapid means of assessing morning-evening preference. A Short Assessment of Morningness-Eveningness (Appendix C) was developed by Felver and Lundstedt in 1991. Using the Horne-Östberg Morningness-Eveningness Questionnaire as the external criterion, initial validation testing of this one-question instrument showed significant support in a predominately female, college educated population (Felver & Hoeksel, 1992). A second validation testing showed significant support in a healthy

male population (Horneck & Mackey-Feist, 1992). However, validity had not yet been examined in other populations, such as the non-college educated and the chronically ill. The purpose of this study was to examine the validity of the Short Assessment of Morningness-Eveningness in a HIV-affected population using the Horne-Östberg Morningness-Eveningness Questionnaire as the external criterion.

HIV and Fatigue

Fatigue is a common symptom of illness, including HIV disease. Kaslow et al. (1987) illustrated in the Multicenter AIDS Cohort Study that persistent fatigue lasting two weeks or more was an indicated symptom. The researchers studied nearly five thousand men who were followed-up at six-month intervals and evaluated with a questionnaire, physical examination, and laboratory tests. Darko et al. (1992) examined fatigue, sleepiness, and disturbances of sleep and their influence on the morbidity and disability caused by HIV infection. It was demonstrated that patients with more advanced HIV infection (low hematocrit, low T_4-helper cell count, and high lactate

dehydrogenase) were more disabled by fatigue during the day and slept more. In sum, fatigue can be an overriding symptom that causes people with AIDS to alter their activities and employment.

The Concept of Morningness-Eveningness

The concept of the morningness-eveningness continuum arose in the early 1900s. Researchers observed individual differences in the association between daily trends of body temperature, muscular activity, and metabolism (Jundell, 1904; O'Shea, 1900 as cited in Kerkhof, 1985; Marsh, 1906). The rise and fall of the temperature curve corresponded with the times subjects woke up and went to bed. In the 1930s, researchers continued to explore differences in sleeping patterns (Wuth, 1931; Winterstein, 1932 as cited in Kerkhof, 1985). Freeman and Hovland (1934) explored diurnal variations in performance and factors affecting diurnal variations such as sleep, food, and exercise. These differences were then categorized into types (Leopold-Levi, 1932 as cited in Kerkhof, 1985). Kleitman (1939) identified two extreme types (morning and evening) and also

acknowledged an intermediate type.

Subsequently, research on morningness-eveningness has studied other variables. Patkai (1970) studied the diurnal rhythm of adrenaline secretion in subjects with different working habits. Individuals who preferred evening work excreted more adrenaline in the evening than in the morning. The reverse was true for those preferring morning work. Studies have demonstrated morning-evening differences in performance efficacy, alertness and tiredness. Froberg (1977) reported that, as regards the selfrating indices, the morning group scored significantly higher both in the morning and in the evening for 'energy alertness' and the 'tiredness' index ($p<0.01$ & $p<0.05$, respectively). Horne, Brass, and Petitt (1980) studied two groups of subjects sitting at a conveyor belt detecting and rejecting faulty items. Morning types' correct rejection levels were significantly better than evening types' in the morning, while they were worse in the evening. Differences have been demonstrated between morning and evening types in performing a reaction-time task with visual and auditory warning

signals (Kerkhof, Korving, Geest, & Rietveld, 1980). In the morning, morning types performed better; in the evening, the evening types performed better. Data from these studies provide further support to the concept of morningness-eveningness.

Horne-Östberg Morningness-Eveningness Questionnaire

Östberg (1973a) undertook a study to search for factors which could be used for assessment of interindividual differences in the capacity to adapt to night work and shift work. Psychology students (N=107) were given questionnaires concerning personal preferences and habits. The subjects monitored their oral temperature and food intake at specified time intervals. On the basis of his results, Östberg concluded that the morning and evening group do have different circadian patterns of oral temperature and food intake, and the questionnaires had the power to discriminate between extreme morning and evening types of individuals in terms of these patterns.

Östberg (1973b) continued his previous work in order to test the hypothesis that the questionnaire employed on

morning-evening types is sensitive enough to show significant differences among shift workers. It appeared that the morning group subjects had the most overall difficulty in adapting to the schedule of shift work used. The researcher concluded that a refinement of the questionnaire used should eventually result in a tool for assessing a person's circadian type.

In 1976, Horne and Östberg translated the Östberg questionnaire from Swedish to English. They revised all aspects of the questionnaire, including the scoring and addition and deletion of questions. The questionnaire was administered to 150 adult college students, aged 18 to 32. The subjects answered 19 items. A majority of items were multiple choice with four responses. A time scale divided into 15 minutes was used in a few questions. The questionnaires were then scored with a scale. The scores were added together and subjects classified as definitely morning type (score 70-86), moderately morning type (score 59-69), neither type (score 42-58), moderately evening type (score 31-41), or definitely evening type (score 16-30).

Horne and Östberg used the criterion of individual differences in the circadian variation of oral body temperature as the external validation of the questionnaire. Forty-eight subjects were randomly selected from the original pool of 150 subjects to provide daily oral temperature readings, using calibrated mercury-in-glass thermometers, every half-hour while awake over a 3-week period. The results provided evidence of a significant difference ($p=0.05$) in temperature peak time between morning and evening types. The body temperature rhythm of the evening group reached its peak about 70 minutes later than that of the morning group. Horne and Östberg recommended that the questionnaire be further validated with other subjects as well. Versions in other languages have been prepared and validated (Ishihara et al., 1984; Kerkhof et al., 1980; Mecacci & Zani, 1983; Paikemsirimongkol & Rerkjirattikal, 1992). The Japanese and Thai versions used the oral body temperature rhythm as the external validity of the questionnaire, the Dutch version used a reaction-time task with a visual and auditory warning signal, and the

Italian version used diary logs of bed times and rising times.

Short Assessment of Morningness-Eveningness

In 1991, Felver and Lundstedt developed a one-question instrument to measure morningness-eveningness in hospitalized patients. It was developed because the standard measure of morningness-eveningness (Horne-Östberg) is too lengthy for convenient use in this population. The Short Assessment of Morningness-Eveningness was administered to 17 cardiac intensive care patients (Lundstedt, 1991). The question was understood by all of her subjects and deemed ready for validation testing in healthy persons.

Felver and Hoeksel (1992) conducted a validation study of the Short Assessment of Morningness-Eveningness using the Horne-Östberg Morningness-Eveningness Questionnaire as the external criterion. The two questionnaires were administered to 137 healthy, predominantly female, college educated persons, aged 18 to 65 years (M=35, SD ± 11). Chi-square analysis showed that group assignment using the Short Assessment of Morningness-Eveningness was significantly

related to group assignment from the Horne-Östberg Morningness-Eveningness Questionnaire (χ^2=90.0, 4 df, p<0.0001). The Short Assessment had a strong correlative relationship (0.77; p<0.0001) with the scores on the Horne-Östberg Questionnaire.

Horneck and Mackey-Feist (1992) conducted a second validation study of the Short Assessment of Morningness-Eveningness. They administered the Short Assessment and Horne-Östberg questionnaire to 71 healthy males, aged 19-66 years (M=30, SD ± 12). Statistical results from their study were similar to those of Felver and Hoeksel (χ^2=47.4, df=4, p=.0001; r=.80, p<.05) and supported a strong, direct relationship between the Short Assessment of Morningness-Eveningness and the Horne-Östberg Morningness-Eveningness Questionnaire. The authors recommended further validity testing of this instrument with non-college educated/non-students and older individuals.

This study replicated the methods used by the previous two validation studies. The morningness-eveningness classification from the two questionnaires were be compared

in an HIV-affected population in order to add support to the validity of a shorter and more suitable questionnaire for assessment of morningness-eveningness.

Conceptual Framework

For the purpose of this study, the investigator used an existing model (Westfall, 1992) to support morningness-eveningness type as a factor in biological rhythms. The model is depicted in Figure 1. Individual factors and environmental cues influence individual responses. Morningness-eveningness type, called chronotype in the model, is identified as one of six individual factors that contribute to individual responses. Individual responses include physiologic, pathologic, behavioral and experiential. Knowing individual rhythm responses assists nurses to plan care around times that maximize resistance, protect when susceptible, and identify fluctuations of customary and present rhythms.

Methods

Sample and Setting

The desired convenience sample was 100 people with AIDS. A total of 51 questionnaire packets were returned. Twenty questionnaires were excluded due to failure to meet inclusion criteria and failure to complete the questionnaires. One subject declared he was a night shift worker, and was excluded to be consistent with Felver and Hoeksel's 1992 study. A total of 30 people with AIDS completed the questionnaire packets. Data were collected in Roseburg and Portland, Oregon, at HIV ambulatory clinics and offices of HIV/AIDS service organizations.

Inclusion criteria consisted of AIDS diagnosis, age between 18 and 90, and able to read, write, and understand English.

Instruments

Subjects completed three forms: a Demographic Data Record (Appendix B), the Short Assessment of Morningness-Eveningness (Appendix C), and the Horne-Östberg Morningness-Eveningness Questionnaire (Appendix D).

Procedures

Subjects were recruited from HIV ambulatory clinics and the offices of HIV/AIDS service organizations in Roseburg and Portland, Oregon. The questionnaires were made available in the lobby along with pencils and a box for completed questionnaires. Office staff provided minimal assistance in distributing the instruments to the subjects when they came into the clinic for treatment. A cover letter explained the study. After the subjects completed the demographic data record and the two questionnaires, they were asked to place the forms in a box. Those who did not wish to participate could simply refuse or turn in incomplete questionnaires. If the demographic record did not identify a subject with an AIDS diagnosis, the corresponding questionnaire was not used in the study.

Human Subjects

A cover letter from the investigator invited subjects to participate and explained the study (Appendix A). Participation in the study was voluntary. To insure anonymity, the subject's name did not appear on the forms.

The investigator was not aware of who participated in the study. The study had no known risks and involved only the minor inconvenience of spending 20 minutes filling out forms. Subjects were not paid for participating in this study. A subject's completion of the questionnaire was his/her consent to participate in the study. Subjects were informed that they would receive no direct benefit, but might help others in the future by assisting nurses to give better care.

Data Analysis

The Horne-Östberg Morningness-Eveningness Questionnaire, the Short Assessment of Morningness-Eveningness and the Demographic data were scored using the same criteria in Felver and Hoeksel's study (1992; See Appendix E for complete scoring criteria). The Horne-Östberg Morningness-Eveningness Questionnaire data were tabulated using the scoring criteria of Horne and Östberg (1976; See Appendix F for complete scoring criteria). The Demographic Data Record and the Short Assessment of Morningness-Eveningness were scored using the criteria in

Appendix E.

Horne-Östberg's scoring criteria (Appendix F) were used to separate subjects into one of three categories: morning, neither, or evening. The Short Assessment identified subjects as early, no preference or late persons.

Interrater reliability from the 30 subjects' packets was verified at 99%. Any discrepant responses were discussed and resolved, using the guidelines provided in Appendix E.

The agreement between the category assignments from the Horne-Östberg Morningness-Eveningness Questionnaire and the Short Assessment was measured using a Cohen's Kappa test. The strength of the relationship between the Horne-Östberg Morningness-Eveningness Questionnaire and the Short Assessment was assessed by Spearman rho correlation using the category assignment of the Short Assessment with the actual Horne-Östberg scores. Frequency distributions were computed on the demographic data. One-way ANOVA was used to test for differences among the mean ages, bedtime hours and waketime hours in the morningness-eveningness categories for

both instruments. The Cronbach's alpha of the Horne-Östberg Morningness-Eveningness Questionnaire scores was computed on the data as a measure of its internal consistency. Data analysis was performed on a 386 IBM compatible computer using CRUNCH (Crunch Software Corporation).

Results

Demographic and Descriptive Data

The study sample consisted of 30 people with AIDS by self-report with a mean age (± SD) of 35.3 (± 9.2). The majority of the sample was male (77%) with 23% of the subjects being female. Descriptive data are presented in Table 1.

The largest number of subjects identified themselves as either not working (n=11) or having a trade occupation (n=10). Four subjects indicated they had a professional occupation, and five subjects did not respond. With regard to education level, the majority of subjects (n=20) had some college or above.

Subjects were asked if they had a usual bedtime and waketime. The majority of subjects indicated that they had a usual bedtime (76%, n=22) and waketime (80%, n=24). Twenty subjects had both a usual bedtime and a usual waketime. Four subjects did not have either a usual bedtime or a usual waketime. Two subjects who indicated a usual

bedtime had no usual waketime. Conversely, three subjects who did not usual bedtime indicated a usual waketime.

Seventy-three percent (n=22) of the subjects reported that they were unable to work because of HIV disease. Of the remaining 27% (n=8) who indicated that they were still able to work, five indicated a trade occupation, one listed a professional occupation and two gave no response for occupation. Two of these subjects who could still work indicated a high school education, with six indicating some college or above.

When asked how they would rate the extent to which HIV has limited their abilities to think, focus, or perform other mental tasks, two thirds of the subjects (66%, n=20) indicated such limitations occurred at least half of the time. The remaining 33% (n=10) indicated such limitations occurred some of the time (n=6) or not at all (n=4). Of these 10 subjects, 70% (n=7) indicated they were unable to work due to HIV disease.

When asked how they would rate the extent their daily routine had been disturbed during the last two weeks, 90%

routine had been disturbed during the last two weeks, 90% (n=27) of the subjects indicated at least some disturbance. Only three subjects (10%) indicated that their daily routine had not been disturbed during the last two weeks before participating in this study. Two of these three subjects also indicated that HIV disease had not limited their ability to work, think, focus or perform other mental tasks.

Ninety percent of the subjects indicated that they knew what medications they were taking. The most frequently listed medications were antimicrobics, antidepressants, and narcotic analgesics (See Table 2). Fifteen subjects (50%) took one to five medications; nine subjects (30%) took six to ten medications. The extent to which the medications effected how the subjects completed the questionnaires is unknown.

Descriptive data by Horne-Östberg and Short Assessment categories. Variables were examined further by Horne-Östberg and Short Assessment categories (See Tables 3 and 4). Caution must be exercised when interpreting the Horne-Östberg evening category because of the low n value (n=3) in

determine homogeneity of between subjects variances, with a $p>0.05$ indicating homogeneity of variances, one of the assumptions underlying ANOVA. The Bartlett test showed homogeneity of between subjects variances with regard to age for the Horne-Östberg groups (4.695, $p=0.096$) and the Short Assessment groups (4.975, $p=0.083$). One-way ANOVA was used to test for differences in mean ages. There were no significant difference among the mean ages in the morningness-eveningness categories for either instrument.

Examination of gender according to the Horne-Östberg and Short Assessment categories showed more men in all categories except the Horne-Östberg evening category, where two of the three subjects were women. The largest gender difference was noted in the Horne-Östberg neither category (male, 87%; female, 13%).

All categories except the Short Assessment early category had a higher percentage of subjects with some college or above. The Horne-Östberg neither category contained the largest difference with four subjects having only high school educations and 11 subjects with some

only high school educations and 11 subjects with some college or above.

The majority of the subjects in all categories indicated they were unable to work due to HIV disease. Interestingly, 40% (n=6) of the subjects in the Horne-Östberg neither category answered no when asked if they were unable to work due to HIV disease. This same category had a larger number of subjects with a college education (n=11). Consequently, subjects in the more educated neither category subjects were more able to work.

In response to how they would rate the extent to which HIV has limited their abilities to think, focus, or perform other mental tasks, a majority of the subjects indicated some of the time or more in all categories. It is interesting to note that four subjects in the Horne-Östberg neither category and three subjects in the Short Assessment no preference category indicated that HIV had not limited their ability to think, focus, or perform other mental tasks. Thus, subjects in the neither category, which were more educated and able to work, were mentally limited by HIV

to a smaller extent than the other categories.

When asked how they would rate the extent their daily routine had been disturbed during the last weeks, a majority of the subjects in all categories indicated from somewhat to a great deal. The Horne-Östberg neither category had the highest number of subjects (n=3) who indicated that their daily routine had not been disturbed during the last two weeks.

Bedtime hour was examined according to Short Assessment and Horne-Östberg categories. The Bartlett test for homogeneity of between subjects variances met the assumption that groups had equal variances (Horne-Östberg 5.302, p=0.072; Short Assessment 4.546, p=0.103). The one-way ANOVA was used to test for a difference among the mean bedtime waketime hours. For the Horne-Östberg bedtime hour, a F-ratio value of 21.372 (p=0.0000) was obtained, indicating that there was a statistically significant difference among the bedtime hour means. The Scheffé test was used to determine which of the group means differ from each other. The Scheffé for the Horne-Östberg categories

demonstrated that the mean bedtime for the neither types was greater than the mean bedtime for the morning types (p=0.0000) and the mean bedtime for the evening types was greater than the mean bedtime for the neither types (p=0.0028), but the mean bedtimes for the neither types and the evening types were not different (p-values > 0.0500 are not shown). For the Short Assessment bedtime hour, a F-ratio value of 1.414 (p=0.261) was obtained, indicating that there was no significant difference among the category means for bedtime hour. No solid conclusions can be made from the ANOVA tests for the dependent variable of bedtime hour because of eight missing observations. However, there is no reason to believe there is an association between bedtime hour and the missing observations. The missing observations fell into all categories.

Waketime hour was examined similarly. For the Horne-Östberg waketime hour, the Bartlett test indicated equal variances among the groups (2.923, p=0.232). ANOVA indicated a significant difference among the waketime hour means (F=5.734, p=0.0103). The Scheffé test indicated that

the mean waketime for the evening types was greater than the mean waketime for the morning types (p=0.0186), but the mean waketime for the neither types was not different from the mean waketime for the morning types or evening types (p-values >0.0500 are not shown). No solid conclusions can be made from the ANOVA test for the dependent variable of waketime hour because of six missing observations. Again, there is no reason to believe there is an association between waketime hour and the missing observations. The missing observations fell into all categories. For the Short Assessment waketime hour, the Bartlett test did not meet the assumption that groups have equal variances; therefore, ANOVA was not appropriate. A visual inspection of the Short Assessment category means for waketime hour (See Table 4) showed a difference between the means for the early and late categories (M=6:42am and M=8:00am respectively), but no difference between the means for the early (M=6:42am) and no preference (M=6:54am) categories. The standard deviation for the late category was twice as large as the standard deviations for the early and no

preference categories. This was due to outliers: two of the five subjects in the late category indicated a usual waketime hour of 10:30 a.m.

In summary, the ANOVA tests demonstrated that there were no differences among mean ages in the Short Assessment and Horne-Östberg categories. One would expect the bedtime and waketime hours of the late/evening people to be later than the early/morning people. The one-way ANOVA showed differences between the mean bedtime and waketime hours in the Horne-Östberg categories. The Short Assessment categories did not have statistically significant differences between the mean bedtime and waketime hours. However, visual inspection of the mean waketime hours for the Short Assessment showed differences between the early and late categories, as well as greater variability in the late group.

Comparison of Short Assessment and Horne-Östberg Categories

Figure 2 demonstrates a three-by-three frequency matrix comparing category assignments by Horne-Östberg and Short Assessment instructions. According to the Short Assessment,

the highest percentage of people with AIDS were found to be early persons (47%, n=14). The percentage of people with AIDS categorized as morning individuals by their Horne-Östberg scores was slightly less than the percentage sorted by the Short Assessment, differing by 7% (n difference of 2). Greater differences were noted in the categorization of subjects into neither/no preference and evening/late persons, with the largest difference (23%, n difference of 7) in the neither/no preference category. Whereas 15 subjects were classified as neither by the Horne-Östberg questionnaire, only eight were classified as no preference by the Short Assessment instrument. In sum, the Short Assessment overestimated the early and late categories and underestimated the no preference category.

Agreement of the Short Assessment and Horne-Östberg Category Assignment

Cohen's Kappa was used to measure the agreement between the category assignment for the Horne-Östberg and Short Assessment instruments. For Kappa, the off-diagonal cells representing disagreement are treated as if they all

represented the same amount of disagreements. However, with morningness-eveningness assessment, some disagreements in assignments, that is, some off-diagonal cells in the three-by-three matrix (See Figure 2), are of greater importance than others. For example, an early versus late disagreement is more important than an early versus no preference disagreement. Therefore, the Weighted Kappa is calculated and reported. Weighted Kappa considers the various kinds of disagreements as representing differing amounts of disagreements (Cohen, 1968). The Weighted Kappa for the sample (value=0.40, p=0.0337; 83% perfect agreement, 72% chance agreement) indicated a borderline agreement between category assignments.

Relationship Between Short Assessment and Horne-Östberg Morningness-Eveningness Questionnaire

Spearman rho correlation coefficient was used to indicate the degree of relatedness between the group assignment of the Short Assessment instrument with the actual scores of the Horne-Östberg Morningness-Eveningness Questionnaire. A value of 0.60 was significant at p= 0.0005

(See Table 5).

Internal Consistency of Horne-Östberg Questionnaire

Cronbach's alpha was used to measure the internal consistency reliability of the Horne-Östberg Morningness-Eveningness Questionnaire scores. Computations yielded an acceptable alpha at .82, thus providing good evidence of internal consistency.

Summary

In summary, when comparing categorizations of the Short Assessment and Horne-Östberg instruments, a weighted agreement of 83% (p=0.0337) was shown. The most similarity was seen in the morning/early category, with the greatest variation in the neither/no preference category. The Spearman rho r (0.60, p=0.0005) demonstrated the relatedness between the Short Assessment instrument and the actual scores of the Horne-Östberg Morningness-Eveningness Questionnaire. Thus, this study of people with AIDS demonstrates that there is a moderate relationship between the Short Assessment instrument and the actual Horne-Östberg scores. In addition, there is a significant (p=0.0337)

agreement between group assignment using the Short Assessment and Horne-Östberg instruments.

Discussion

The purpose of this replication study was to examine the validity of the Short Assessment of Morningness-Eveningness in an HIV-affected population using the Horne-Östberg Morningness-Eveningness Questionnaire as the external criterion. Data were collected and analyzed from 30 people with AIDS. The Kappa test was used to determine if an agreement was present between the category assignments of the Horne-Östberg and Short Assessment instruments. Because some disagreements in assignments are of greater importance than others, Weighted Kappa (K_w) was reported. The Spearman rho correlation coefficient was used to demonstrate the degree of relatedness between the Short Assessment and the raw scores on the Horne-Östberg Morningness-Eveningness Questionnaire.

Agreement Between Category Assignments

Borderline agreement between the category assignments was demonstrated in the sample as indicated by the value of K_w (0.40). Despite a borderline value of K_w, the corresponding result of weighted percent agreement (83%) was

relatively high and the p value (0.03) was significant. A low p value reflects that the majority of disagreements between category assignments were moderate (i.e., one level removed). It is important to note that the three-by-three matrix (See Figure 2) demonstrates only two extreme disagreements (i.e., two levels removed). One subject who was categorized as a morning person by Horne-Östberg was categorized as a late person by the Short Assessment. The inverse was also true: one subject who was categorized as an evening person by the Horne-Östberg was categorized as an early person by the Short Assessment. A five-by-three frequency matrix (Figure 3) comparing category assignments by Horne-Östberg and Short Assessment instructions is an additional demonstration of the level of disagreement. Figure 3 more clearly demonstrates that the level of disagreement between category assignments was moderate or small.

An examination of the calculation of K_w may help explain the borderline K_w value (0.40) for this sample. For the calculation of K_w, a ratio is formed between the chance-

corrected observed agreement and the chance-corrected perfect agreement (Feinstein & Cicchetti, 1990). If the chance agreement is large (72% in this study) the correction process can convert a relatively high value of perfect agreement into a low value of K_w. The correction factor for chance agreement depends on the category totals. This investigator might justifiably complain about the limitation imposed by K_w because the sample obtained from this challenge population (chronically-ill) was highly unbalanced for its proportion of category totals.

Comparison of Data From Three Short Assessment Validation Studies

Table 5 compares some of the sample demographic data and key statistics of this study with those of Felver and Hoeksel (1992) and Horneck and Mackey-Feist (1992). The previous two validation studies examined the Short Assessment in healthy populations. In one study, the population was predominantly female gender and the other, entirely male. In contrast, this study examined the validity of the Short Assessment in a chronically-ill

population (AIDS) with 77% male and 23% female subjects. The sample size of the current study was significantly less than the other studies.

Correlation coefficients. The correlation coefficient of the current study (Spearman's r=0.60) was different from the Pearson's r of 0.80 in the Horneck and Mackey-Feist study and the Pearson's r of 0.77 in the Felver and Hoeksel study. Despite a different r value for the current study, the corresponding p value (0.0005) was almost identical with the p value (0.0001) in the Horneck and Mackey-Feist study and p value (< 0.0001) in the Felver and Hoeksel study.

Significance of chi-square and kappa. Chi-square is a test of association. Cohen's Kappa is a type of association measuring agreement. The statistical significance for the K_w (p=0.03) is consistent with the significant chi-square tests in the Felver and Hoeksel and Horneck and Mackey-Feist studies, although the K_w of 0.40 does not support and strengthen the validity testing of the Short Assessment to the extent these previous studies have.

Cronbach's alpha. The Cronbach's alpha of the Horne-

Östberg Morningness-Eveningness Questionnaire was 0.82 in the present study. Felver and Hoeksel (1992) demonstrated a Cronbach's alpha of 0.89. Horneck and Mackey-Feist (1992) demonstrated a Cronbach's alpha of 0.87. Smith et al. (1989) and Posey and Ford (1981) reported computations of 0.82 and 0.89 respectively in their studies which used the Horne-Östberg Morningness-Eveningness Questionnaire. Thus, the Cronbach's alpha of the present study is consistent with other reports in the literature, providing good evidence that the Horne-Östberg Questionnaire has internal consistency in the chronically-ill AIDS population.

Specific Study Trends

Disagreements in category assignments. The disagreements in category assignments were examined further by viewing the three-by-three matrix with the subjects' raw scores from the Horne-Östberg Morningness-Eveningness Questionnaire (Figure 2). It became evident that the border between category assignments was blurred. Three subjects who were categorized as neither persons by Horne-Östberg and early persons by the Short Assessment were on the morning

side of the neither category. Three subjects who were categorized as morning persons by Horne-Östberg and no preference persons by the Short Assessment were on the neither side of the morning category. Moreover, two subjects who were categorized as neither persons by Horne-Östberg and late persons by the Short Assessment were on the evening side of the neither category. Consequently, the borderline scores inclined towards perfect agreement - the shaded cells of the three-by-three matrix (Figure 2). The five-by-three matrix (Figure 3), as discussed previously, provides further evidence of how close the scores are to perfect agreement. One hypothesis for this occurrence was presented in a previous validation study. Horneck and Mackey-Feist (1992) demonstrated a major lack of category agreement between neither/no preference and evening/late categories. They speculated that the Short Assessment no preference category might have been an unacceptable label because subjects may have felt obligated to select a definite answer, rather than be classified no preference. They also offered another possibility: "no preference" does

not imply a time frame choice.

It is also conceivable that the morningness-eveningness orientation of people with AIDS changes. Their answers may be based on how they operated before their illness, before they were unable to work or stay physically active. Consequently, one of the two instruments may misidentify them. Nevertheless, it is encouraging to recognize a trend in the raw Horne-Östberg scores towards agreement with the Short Assessment instrument.

Horne-Östberg neither category. Another interesting trend, which may have clinical significance, is worthy of note. The Horne-Östberg neither category indicated a larger number of subjects with some college education or above. Furthermore, more subjects in the neither category were able to work and were mentally limited by HIV to a smaller extent than the other categories. Two suppositions are given as to why this occurred. First, the more educated subjects in the neither category may be working in areas they find fulfilling and rewarding; therefore, they are less likely to leave their work. Second, the more educated neither

category subjects may be mentally limited by HIV to a lesser extent because they are more aware of their options and seek health care earlier and with more regularity.

Direction for the Future

Additional testing with a larger sample is needed to demonstrate the usefulness of the Short Assessment of Morningness-Eveningness in an HIV-affected population. A larger sample would increase the opportunity for a less skewed distribution of Horne-Östberg raw scores and a more balanced proportion of category totals, resulting in a higher value of K_w (e.g. > 0.40).

Clarification of two demographic data questions, such as with the "work" and "routine" questions, would be beneficial. Currently, as the questions read, it cannot be determined what type of work (i.e., employment or household chores) subjects are unable to do because of HIV disease or what kind of routine (i.e., sleeping or eating) had been disturbed the last two weeks.

Method and design factors. Data collection was difficult, in part, because of the confidentiality/anonymity

issue surrounding AIDS. Creative data collection methods are recommended, such as distributing the study questionnaire on a computer bulletin board for people with AIDS.

Investigators need to be cognizant of the timing of studies, in connection to demands upon their subjects. Data collection for this study occurred in ambulatory clinics and offices of HIV/AIDS service organizations. Subjects may not have had enough time to complete the questionnaire before honoring their prior commitments. This may have contributed to the number of incomplete questionnaires.

Implications for Nursing

If the Short Assessment of Morningness-Eveningness is found useful in an ambulatory setting, it would provide a convenient and expedient way to obtain information about patients' morningness-eveningness. Nurses can use the Short Assessment to be aware of their patients morningness-eveningness orientation. Fatigue is an important feature of HIV infection, having obvious implications in terms of disability and quality of life. By using the Short

Assessment, nurses would understand why a morning-oriented patient would arrive at the clinic for a late afternoon appointment and be fatigued. Based on the patients' morningness-eveningness, nurses can counsel patients with AIDS on the scheduling of work hours or activities (i.e., shopping, appointments) and how to prioritize those activities. It may be more important for patients to maximize their time of high energy for traveling to their medical appointment, not for shopping. Or, patients may want to maximize their time of highest energy for a much anticipated leisure activity. The nurse who is practicing within an ambulatory setting could also counsel patients on how to use information about their morningness-eveningness orientation by themselves. If hospitalized, the patient can explain his or her morningness-eveningness orientation to the nursing staff, so that activities (i.e., eating, bathing) are done when the patient is the least fatigued. This enhancement in their clinical care would be a welcome improvement to HIV-affected patients.

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Table 1

Demographic Data for the People with AIDS (N=30)

Variables		
Age (in years)		
min-max	20-58	
mean	35	
SD	9	
	n	%
Gender		
male	23	77
female	7	23
Occupation		
-not working (disabled/retired/ unemployed)	11	37
-trade	10	33
-professional	4	13
-no response	5	17
Education		
-junior high	1	3
-some high school	4	13
-high school graduate	5	17
-some college	15	50
-college graduate	4	13
-post graduate	1	3
Usual bedtime		
no	7	24
yes	22	76
Usual wake time		
no	6	20
yes	24	80
Unable to work due to HIV disease		
no	8	27
yes	22	73
Ability to think, focus, or perform other mental tasks limited by HIV disease		
-not at all	4	13
-some of the time	6	20
-half of the time	16	53
-most of the time	3	10
-all of the time	1	3
Daily routine disturbed during the last two weeks		
-not at all	3	10
-somewhat	6	21
-moderately	7	24
-frequently	7	24
-a great deal	6	21
Know their medications		
no	3	10
yes	27	90

Table 2

Medication Data for People with AIDS

Classifications	Number of Subjects Taking Medication
Antimicrobic	
Antiretroviral	15
Antibacterial	11
Antifungal	9
Antiviral	5
Antibiotic	5
Antimycobacterial	4
Antiparasitic	3
Antitubercular	3
Corticosteroid	
Corticosteroid	2
Gastrointestinal	
Gastric acid-blocker	2
H_2-antagonist	2
Antidiarrheal	1
Gastrointestinal stimulant	1
Psychiatric	
Antidepressant	7
Antianxiety	2
Analgesic	
Narcotic	6
Nonsteroidal antiinflammatory	2
Cardiovascular	
Beta-blocker	2
	2
Antianginal/antihypertensive	
Hematopoietic hormone	1
Blood viscosity agent	1
Antihyperlipidemic	1
Central Nervous System	
CNS stimulant	1
Sedative/hypnotic	1
Anticonvulsant	1
Respiratory	
Antihistamine	1
Bronchodilator	1
Other	
Investigational drug: DNCB	1
Alcoholism treatment	1
Chinese herbs	1

Table 3

Demographic Data for People with AIDS by Horne-Östberg Category

Variables	Horne-Östberg Category		
	Morning n=12 (40% of N)	Neither n=15 (50% of N)	Evening n=3 (10% of N)
Age			
M ± SD	37 ± 7	35 ± 11	32 ± 8
Gender			
male	75% (n=9)	87% (n=13)	33% (n=1)
female	25% (n=3)	13% (n=2)	67% (n=2)
Education			
-high school graduate or below	42% (n=5)	27% (n=4)	33% (n=1)
-some college or above	58% (n=7)	73% (n=11)	67% (n=2)
Unable to work due to HIV			
no	8% (n=1)	40% (n=6)	33% (n=1)
yes	92% (n=11)	60% (n=9)	67% (n=2)
Ability to think, focus, or perform other mental tasks limited by HIV			
-not at all	0% (n=0)	27% (n=4)	0% (n=0)
-some of the time	42% (n=5)	7% (n=1)	0% (n=0)
-half the time	42% (n=5)	60% (n=9)	67% (n=2)
-most of the time	8% (n=1)	7% (n=1)	33% (n=1)
-all the time	8% (n=1)	0% (n=0)	0% (n=0)
Daily routine disturbed during the last two weeks			
-not at all	0% (n=0)	20% (n=3)	0% (n=0)
-somewhat	25% (n=3)	13% (n=2)	50% (n=1)
-moderately	25% (n=3)	27% (n=4)	0% (n=0)
-frequently	8% (n=1)	33% (n=5)	50% (n=1)
-a great deal	42% (n=5)	7% (n=1)	0% (n=0)
Bedtime hour			
M ± SD	9:06pm ± 1hr (n=11)	11:12pm ± 36min (n=9)	11:30pm ± 24min (n=2)
Waketime hour			
M ± SD	6:06am ± 1hr30min (n=11)	7:24am ± 1hr18min (n=11)	9:30am ± 1hr24min (n=2)

Table 4

Demographic Data for People with AIDS by Short Assessment Category

Variables	Short Assessment Category		
	Early n=14 (47% of N)	No preference n=8 (27% of N)	Late n=8 (27% of N)
Age			
M ± SD	39 ± 8	31 ± 8	34 ± 12
Gender			
male	71% (n=10)	75% (n=6)	88% (n=7)
female	29% (n=4)	25% (n=2)	13% (n=1)
Education			
-high school graduate or below	50% (n=7)	38% (n=3)	0% (n=0)
-some college or above	50% (n=7)	63% (n=5)	100% (n=8)
Unable to work due to HIV			
no	29% (n=4)	13% (n=1)	38% (n=3)
yes	71% (n=10)	88% (n=7)	63% (n=5)
Ability to think, focus, or perform other mental tasks limited by HIV			
-not at all	7% (n=1)	38% (n=3)	0% (n=0)
-some of the time	29% (n=4)	13% (n=1)	13% (n=1)
-half the time	50% (n=7)	38% (n=3)	75% (n=6)
-most of the time	14% (n=2)	13% (n=1)	0% (n=0)
-all the time	0% (n=0)	0% (n=0)	13% (n=1)
Daily routine disturbed during the last two weeks			
-not at all	7% (n=1)	25% (n=2)	0% (n=0)
-somewhat	14% (n=2)	38% (n=3)	13% (n=1)
-moderately	36% (n=5)	0% (n=0)	25% (n=2)
-frequently	14% (n=2)	13% (n=1)	50% (n=4)
-a great deal	21% (n=3)	25% (n=2)	13% (n=1)
Bedtime hour			
M ± SD	9:48pm ± 1hr18min (n=12)	10:42pm ± 48min (n=4)	10:36pm ± 1hr42min (n=6)
Waketime hour			
M ± SD	6:42am ± 1hr12min (n=14)	6:54am ± 1hr24min (n=5)	8:00am ± 2hr54min (n=5)

Table 5

Comparison of Data From Three Short Assessment Validation Studies

Demographic Data	Felver & Hoeksel (1992)	Horneck & Mackey-Feist (1992)	Beal (1994)
N	136 (Healthy, predominantly female, college educated population)	71 (Healthy male population)	30 (Chronically ill population)
Age			
M ± SD	35 ± 11	30 ± 12	35 ± 9
Min-Max	18-65	19-66	20-58
Gender (%)			
Male	10	100	77
Female	90	0	23
Statistical Results			
Category Association	χ^2=90.0, df=4 ($p < 0.0001$)	χ^2=47.4, df=4 ($p = 0.0001$)	-
Correlation	r=0.77 ($p < 0.0001$) (Pearson r)	r=0.80 ($p = 0.0001$) (Pearson r)	rho=0.60 ($p = 0.0005$) (Spearman)
Category Agreement	-	-	κ_w=0.40 ($p = 0.03$)
Internal Consistency of Horne-Östberg	$\alpha = 0.89$	$\alpha = 0.87$	$\alpha = 0.82$

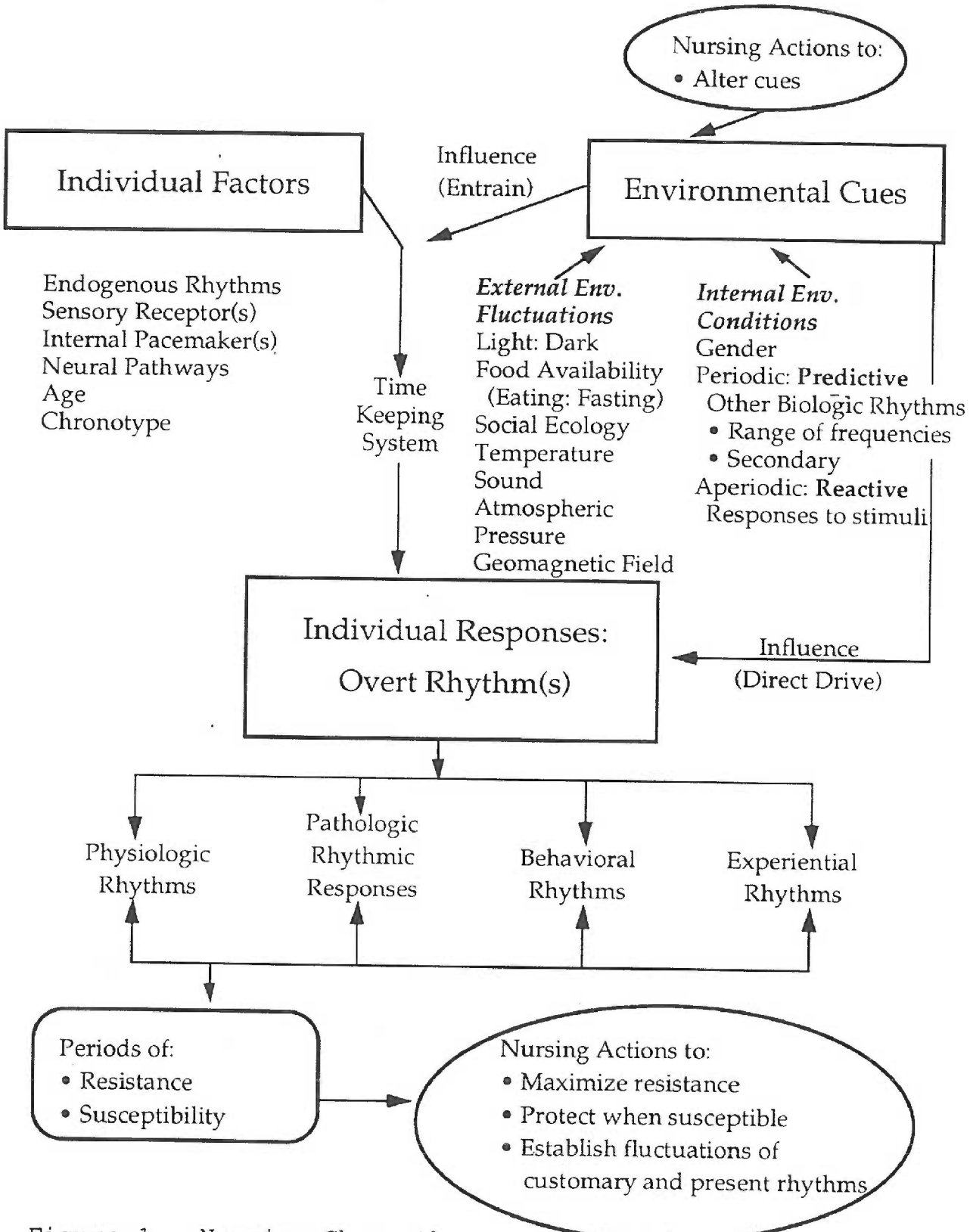


Figure 1. Nursing Chronotherapeutic Model. (From Westfall, U.E., 1992. Nursing chronotherapeutics: a conceptual framework. IMAGE: Journal of Nursing Scholarship, 24 (4), 307-312; with permission).

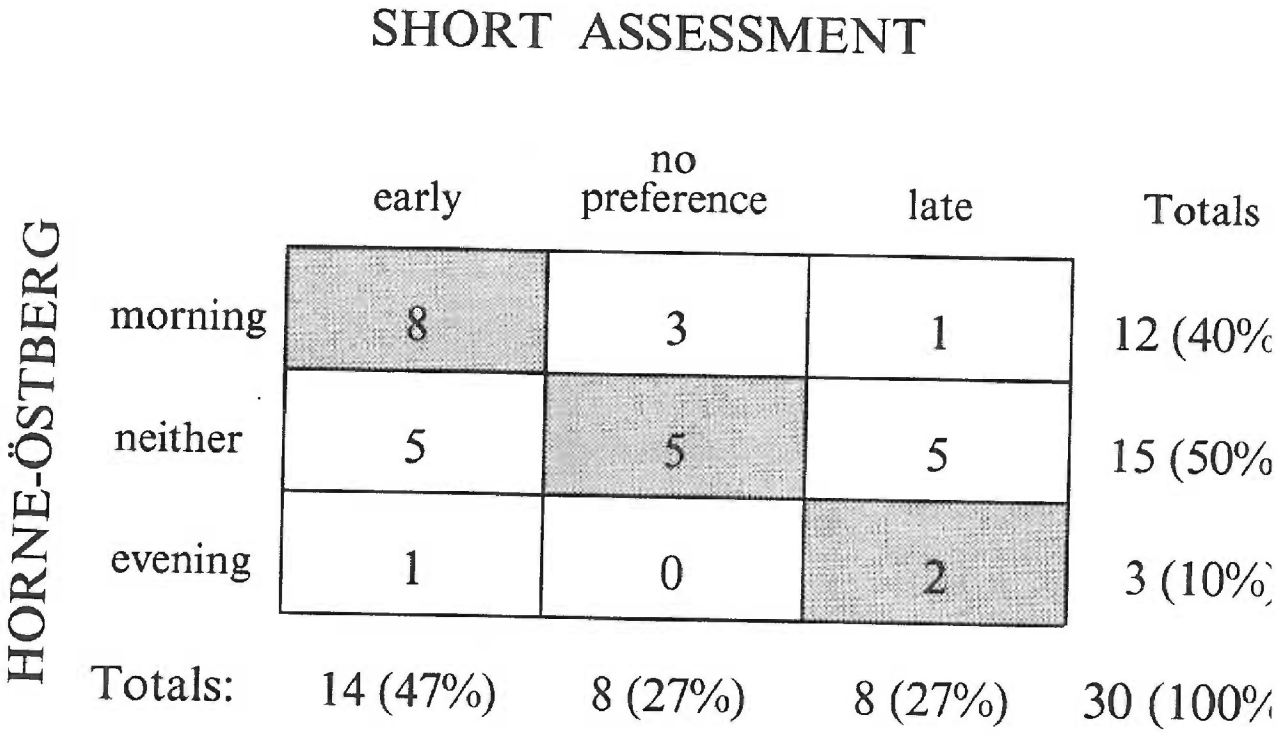
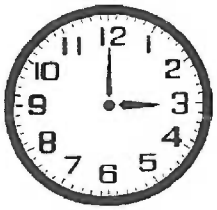


Figure 2. Three-by-three frequency matrix comparing category assignments by Horne-Östberg and Short Assessment instructions.

SHORT ASSESSMENT

HORNE-ÖSTBERG	early	no preference	late	Totals
definite morning	3	0	0	3 (10%)
moderate morning	5	3	1	9 (30%)
neither	5	5	5	15 (50%)
moderate evening	1	0	2	3 (10%)
definite evening	0	0	0	0 (0%)
Totals	14 (47%)	8 (27%)	8 (27%)	30 (100%)

Figure 3. Five-by-three frequency matrix comparing category assignments by Horne-Östberg and Short Assessment instructions.



Appendix A
WHAT IS YOUR BEST TIME OF DAY?

Dear sir or madam:

You are being invited to participate in a nursing research study. The study is being performed by a graduate student nurse, Doug Beal.

I am interested in helping nurses plan nursing care that best fits the schedules of their patients. The title of my study is "A Validatic Study of the Short Assessment of Morningness-Eveningness in an HIV-affected Population."

I invite you to participate in this study if you match the follow: criteria:

* age 18 or older
* HIV positive
* AIDS diagnosis
* are willing to answer the questions on the following pages

The questions ask about your best time of day for scheduling activities. The questions will take about 20 minutes of your time. **THIS IS TOTALLY ANONYMOUS AND VOLUNTARY. PLEASE DO NOT PUT DOWN YOUR NAME.** I will not be aware of who participates in the study. You will receive no direct benefit, but you may help others in the future b assisting nurses to give better care.

Your completion of the questionnaire is your consent to participat in the study. **PLEASE DO NOT FILL OUT THIS FORM MORE THAN ONE TIME.**

Thank you!

Very truly yours,

Doug Beal, RN, BSN
Graduate student
School of Nursing
Oregon Health Sciences University
(503)725-7325

Appendix B

Subject 53

Age:_____

Gender:_____ male _____ female

Occupation:_____

Education:
_____junior high
_____some high school
_____high school graduate
_____some college
_____college graduate
_____post graduate

Do you have a usual bedtime? _____yes _____no
If yes, what is the time? _____

Do you have a usual waking time? _____yes _____no
If yes, what is the time? _____

Have you been given an AIDS diagnosis? _____yes _____no

Are you unable to work because of HIV disease? _____yes _____no

How would you rate how much HIV has limited your ability to think, focu or perform other mental tasks? (*Circle the number on the scale that relates to you.*)

1 2 3 4 5
not at all all the time

How would you rate how much your daily routine has been disturbed duri the last two weeks? (*Circle the number on the scale that relates to yo*

1 2 3 4 5
not at all a great deal

Do you know what medications you are taking? _____yes _____no
If yes, please list them. Please include prescriptions, over-the-count drugs and others. If needed, you can use the back of this page.

_____

_____

_____

_____

_____

_____

Appendix C

Short Assessment of Morningness-Eveningness

Some people get up early in the morning, are energetic soon after they get up, and like to go to bed early. Other people prefer to get up later, are most energetic later in the day, and like to stay up late. Do you consider yourself an early person, a late person, or do you have no preference?

Appendix D

Subject number _____
55

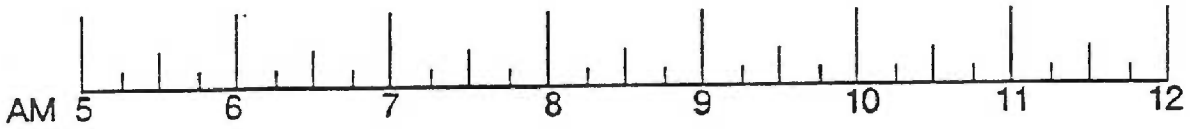
Horne-Östberg Morningness-Eveningness Questionnaire

Instructions:

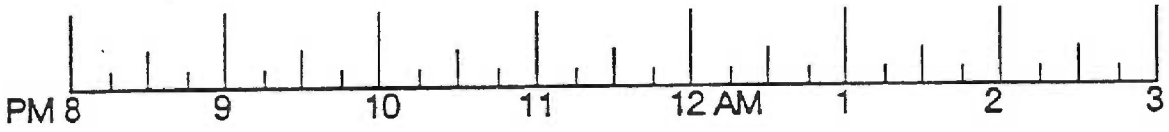
1. Please read each question very carefully before answering.
2. Answer ALL questions.
3. Answer questions in numerical order.
4. Each question should be answered independently of others. Do NOT go back and check your answers.
5. All questions have a selection of answers. For each question place an X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

The Questionnaire:

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



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?



3. If there is a specific time at which 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
   - ___Slightly dependent
   - ___Fairly dependent
   - ___Very dependent

4. Assuming adequate environmental conditions, how easy do you find getting up i the mornings?
   ___Not at all easy
   ___Not very easy
   ___Fairly easy
   ___Very easy

5. How alert do you feel during the first half hour after having woken in the mornings?
   ___Not at all alert
   ___Slightly alert
   ___Fairly alert
   ___Very alert

6. How is your appetite during the first half-hour after having woken in the mornings?
   ___Very poor
   ___Fairly poor
   ___Fairly good
   ___Very good

7. During the first half-hour after having woken in the morning, how tired do you feel?
   ___Very tired
   ___Fairly tired
   ___Fairly refreshed
   ___Very refreshed

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
   ___Less than one hour later
   ___1-2 hours later
   ___More than two hours later

9. You have decided to engage in some physical exercise. A friend suggests tha you do this one hour twice a week and the best time for him is between 7:00 - 8:00 AM. Bearing in mind nothing else but your own "feeling best" rhythm how you think you think you would perform?
   ___Would be in good form
   ___Would be in reasonable form
   ___Would find it difficult
   ___Would find it very difficult

10. At what time in the evening do you feel tired and as a result in need of sleep?

11. Your wish to be at your peak performance for a test which you know is going tc 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 AM
   ___11:00 AM - 1:00 PM
   ___3:00 - 5:00 PM
   ___7:00 - 9:00 PM

12. If you went to bed at 11:00 PM at what level of tiredness would you be?
   ___Not at all tired
   ___A little tired
   ___Fairly tired
   ___Very tired

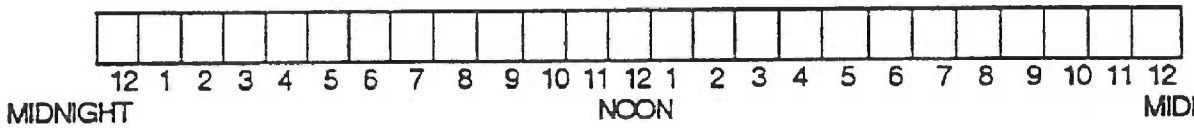
13. For some reason you have gone to bed several hours later than usual, but ther is no need to get up at any particular time the next morning? Which ONE of the following events are you most likely to experience?
   ___Will wake up at the usual time and will NOT fall asleep
   ___Will wake up at the usual time and will doze thereafter
   ___Will wake up at the usual time but will fall asleep again
   ___Will not wake up until later than usual

14. One night you have to remain awake between 4:00 - 6:00 AM in order to carry o
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
___Would take a nap before and sleep after
___Would take a good sleep before and nap after
___Would take ALL sleep before watch

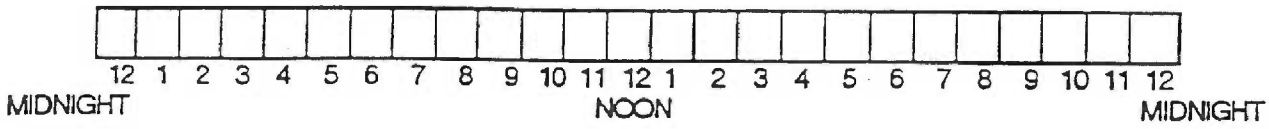
15. You have to do two hours of hard physical work. You are entirely free to plan yo
day and considering your own "feeling best" rhythm which ONE of the following times would you choose?
___8:00 - 10:00 AM
___11:00 AM - 1:00 PM
___3:00 - 5:00 PM
___7:00 - 9:00 PM

16. 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 10:00 - 11:00 PM. Bearing in mind nothing else but your own "feeling best" rhythm how do you think you think you would perform?
___Would be in good form
___Would be in reasonable form
___Would find it difficult
___Would find it very difficult

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?



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



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
___Rather more a "morning" than an "evening" type
___Rather more an "evening" than a "morning" type
___Definitely an "evening" type

Appendix E

Morningness-Eveningness Questionnaire Validation Study

Linda Felver and Renee Hoeksel

Scoring Instructions for Short Assessment of Morningness-Eveningness

early person	=	1
no preference	=	2
late person	=	3

Scoring Instructions for Demographic Data Record

gender: male = 0 female = 1

education:

junior high	=	1
some high school	=	2
high school graduate	=	3
some college	=	4
college graduate	=	5
post graduate	=	6

bedtime: no = 0 yes = 1

bedhour: use 24-hour decimal time (2 decimal places); use midpoint if range given.

waketime: no = 0 yes = 1

wakehour: use 24-hour decimal time; use midpoint if range given.

work: no = 0 yes = 1

mental:

not at all	=	1
some of the time	=	2
half the time	=	3
most of the time	=	4
all the time	=	5

routine:

not at all	=	1
somewhat	=	2
moderately	=	3
frequently	=	4
a great deal	=	5

medications: no = 0 yes = 1

Morningness-Eveningness Questionnaire Validation Study

Linda Felver and Renee Hoeksel

Scoring Instructions for Horne-Östberg Morningness-Eveningness Questionnaire

For questions 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16, and 19, the appropriate score for each response is displayed beside the answer box on the transparency template.

For questions 1, 2, 10, and 18, the cross made along each scale is referred to the appropriate score value range below the scale.

For question 17 the most extreme cross on the right hand side is taken as the reference point and the appropriate score value range below this point is taken.

The scores are added together and the sum converted into a five point Morningness-Eveningness scale:

TYPE	SCORE
Definitely Morning Type	70-86
Moderately Morning Type	59-69
Neither Type	42-58
Moderately Evening Type	31-41
Definitely Evening Type	16-30

If three point Morningness-Eveningness scale is desired, use the following:

TYPE	SCORE
Morning Type	59-86
Neither Type	42-58
Evening Type	16-41

Additional Scoring Instructions

For questions 1, 2, and 10:

if mark is between	score as
4 and 5	5
3 and 4	4
2 and 3	2
1 and 2	1

For questions 11 and 15: if subject writes in 9-11 am, score as if it were marked 8-10 am.

Appendix F

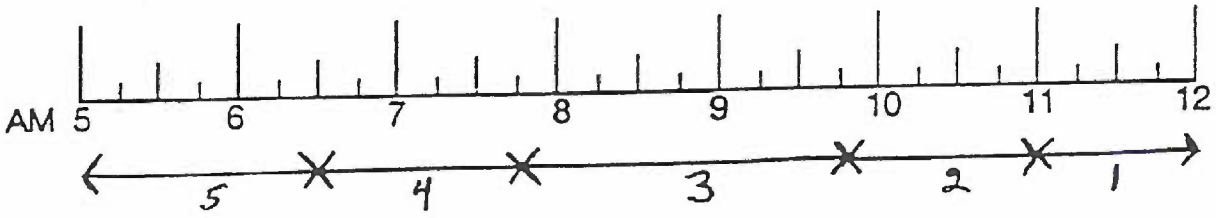
Horne-Östberg Morningness-Eveningness Questionnaire

Instructions:

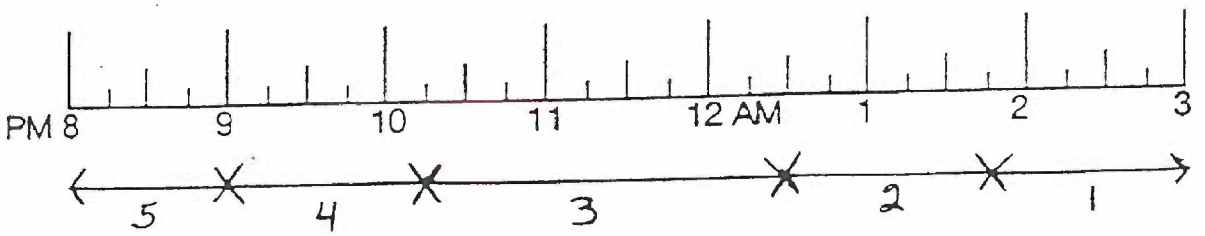
1. Please read each question very carefully before answering.
2. Answer ALL questions.
3. Answer questions in numerical order.
4. Each question should be answered independently of others. Do NOT go back and check your answers.
5. All questions have a selection of answers. For each question place an X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

The Questionnaire:

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



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?



3. If there is a specific time at which you have to get up in the morning, to what extent are you dependent on being woken up by an alarm clock?

4 ___Not at all dependent
3 ___Slightly dependent
2 ___Fairly dependent
1 ___Very dependent

4. Assuming adequate environmental conditions, how easy do you find getting up the mornings?
   1 ___Not at all easy
   2 ___Not very easy
   3 ___Fairly easy
   4 ___Very easy

5. How alert do you feel during the first half hour after having woken in the mornings?
   1 ___Not at all alert
   2 ___Slightly alert
   3 ___Fairly alert
   4 ___Very alert

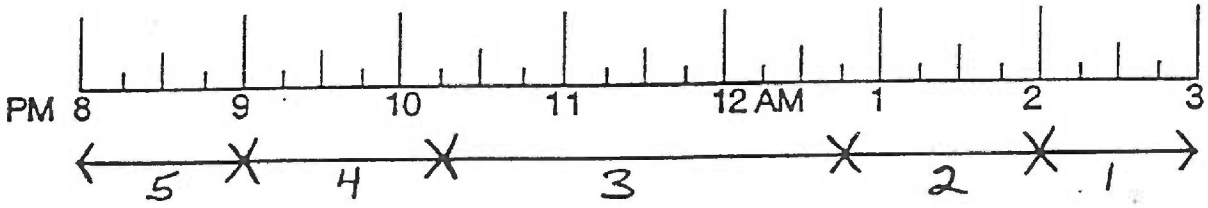
6. How is your appetite during the first half-hour after having woken in the mornings?
   1 ___Very poor
   2 ___Fairly poor
   3 ___Fairly good
   4 ___Very good

7. During the first half-hour after having woken in the morning, how tired do you feel?
   1 ___Very tired
   2 ___Fairly tired
   3 ___Fairly refreshed
   4 ___Very refreshed

8. When you have no commitments the next day, at what time do you go to bed compared to your usual bedtime?
   4 ___Seldom or never later
   3 ___Less than one hour later
   2 ___1-2 hours later
   1 ___More than two hours later

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 7:00 - 8:00 AM. Bearing in mind nothing else but your own "feeling best" rhythm how d you think you would perform?
   4 ___Would be in good form
   3 ___Would be in reasonable form
   2 ___Would find it difficult
   1 ___Would find it very difficult

10. At what time in the evening do you feel tired and as a result in need of sleep?



11. Your 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?
   6 ___8:00 - 10:00 AM
   4 ___11:00 AM - 1:00 PM
   2 ___3:00 - 5:00 PM
   0 ___7:00 - 9:00 PM

12. If you went to bed at 11:00 PM at what level of tiredness would you be?
   0 ___Not at all tired
   2 ___A little tired
   3 ___Fairly tired
   5 ___Very tired

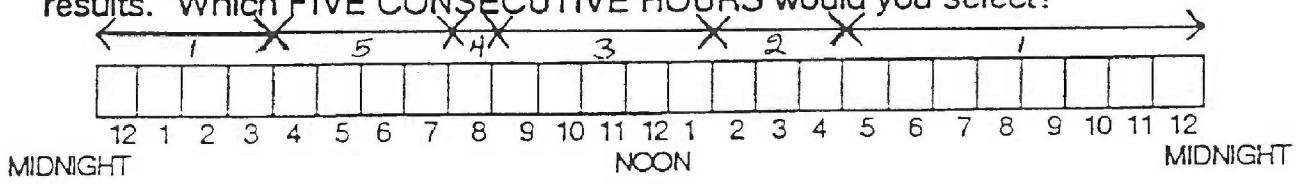
13. For some reason you have gone to bed several hours later than usual, but there is no need to get up at any particular time the next morning? Which ONE of the following events are you most likely to experience?
   4 ___Will wake up at the usual time and will NOT fall asleep
   3 ___Will wake up at the usual time and will doze thereafter
   2 ___Will wake up at the usual time but will fall asleep again
   1 ___Will not wake up until later than usual

14. One night you have to remain awake between 4:00 - 6:00 AM 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?
    1 ___Would NOT go to bed until watch was over
    2 ___Would take a nap before and sleep after
    3 ___Would take a good sleep before and nap after
    4 ___Would take ALL sleep before watch

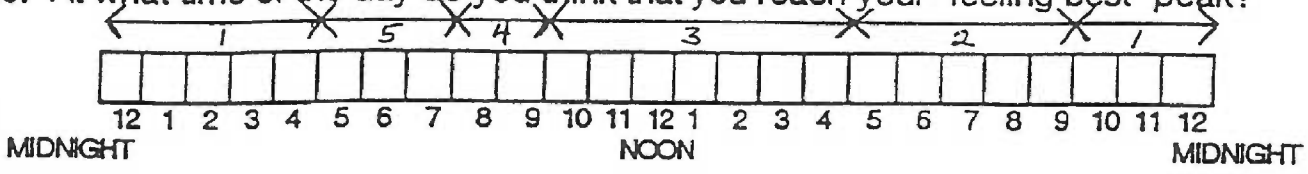
15. You have to do two hours of hard physical work. You are entirely free to plan your day and considering your own "feeling best" rhythm which ONE of the following times would you choose?
    4 ___8:00 - 10:00 AM
    3 ___11:00 AM - 1:00 PM
    2 ___3:00 - 5:00 PM
    1 ___7:00 - 9:00 PM

16. 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 10:00 - 11:00 PM. Bearing in mind nothing else but your own "feeling best" rhythm how do you think you think you would perform?
    1 ___Would be in good form
    2 ___Would be in reasonable form
    3 ___Would find it difficult
    4 ___Would find it very difficult

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?



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



19. One hears about "morning" and "evening" types of people. Which ONE of these types do you consider yourself to be?

6 ___Definitely a "morning" type
4 ___Rather more a "morning" than an "evening" type
2 ___Rather more an "evening" than a "morning" type
0 ___Definitely an "evening" type