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DEPARTMENT OF PSYCHOLOGY

MORNINGNESS/EVENINGNESS TRAIT AS A POSSIBLE PREDISPOSING BIOLOGICAL FACTOR IN STUDENTS SELECTING THEIR COLLEGE MAJOR

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ABSTRACT

Many factors underlie college students' selection of their major field of study, including personal, sociocultural, economic, and financial. This study tests whether an underlying personal biological trait, morningness/eveningness preferences, also influences this procedure. Biological rhythms, especially daily circadian rhythms, influence many internal cycles throughout organisms' everyday living. Human circadian rhythms produce three daily activity preference types: some preferring mornings (M-Type), some evenings (E-Type), and most preferring neither (I-Type). Earlier data showed PSU students are generally evening-predisposed. For comparison, this study collected morningness/eveningness (M/E) survey information from 309 undergraduate students in specific majors: business, engineering, science, and mathematics fields. Participants ranged in age from 18 to 50 (mean = 21.4), and ranged in semester standing from 5th to 9th term, distributed as 11.7, 20.0, 6.2, 46.9, and 15.2 percent, respectively. Of the 309 that began the survey, only 145 (52:48 percent male:female) completed both surveys and were included in the analysis. Self-rated M/E scores were obtained using the 13-item Basic Language Morningness Scale (BALM) (Brown, 1993) and the 19-item Morningness-Eveningness Questionnaire (MEQ) (Horne & Östberg, 1976), based on habitual sleep time preferences, greatest activity times, and mental and physical feelings of best times of day. While all majors were composed of mostly I-Types, they varied in their proportions of M-Types, E-Types, and I-Types, and proportions also differed depending on the M/E scale (BALM vs. MEQ). To supplement the comparison, data were used from the previous study (For a review see Brown & LaJambe, 2004). The Chi

Square statistical tests of overall differences in the proportions of chronotypes among 15 majors were non-significant for the BALM ($\chi(28) = 33.36$, $p = 0.223$) and MEQ ($\chi(28) = 23.39$, $p = 0.393$) scales. However, individual analyses within a few majors showed some striking chronotype differences, suggesting a possible chronotype factor influencing that major selection.

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Introduction

Aside from native intellectual aptitude, there are many factors that underlie college major selection. These factors include: personal, sociocultural, and financial. Apparently personal interest in a particular subject has a large bearing on the major field of study that college students choose to focus on (Beggs, Bantham, & Taylor, 2008). Students want to be able to build upon their interests and strengths when selecting a college major, and so they choose a field they not only feel will best fit them, but one at which they will excel.

Additionally, personal interests also exist across genders. To date, women are underrepresented in the science and engineering fields, and instead lean more toward emotionally rewarding fields such as social work and education (Ma, 2009).

Just as there is a large gap in what majors males and females tend to select, there is a large gap across cultures. Asian students are most likely to enter the fields of science, engineering, and mathematics (Staniec, 2004). Additionally, the frequency of blacks entering the science, engineering, and mathematics fields is becoming increasingly higher than whites because of efforts to entice minorities into these fields (2004). However, research determined that business management is still the most popular major for both blacks and whites (Cross, 1999).

Along with personal and sociocultural factors, financial factors strongly influence the majors students choose. Lucas (2001) found that effectively maintained inequality (EMI) secures advantages for students from high socioeconomic status (SES) families. These advantages encompass both the level of schooling and the content of schooling. While many students do not base their college major selections on the financial benefits

they will reap by having a degree, Relative Risk Aversion (RRA) theory states that parents seek to ensure their children will progress to a point of economic stability at least as equal to where they started (Breen & Goldthorpe 1997; Goldthorpe, 1996). This means that parents try to ensure their children will either maintain their SES or advance, but will not move backward. RRA theory explains that college major choice could be quite dependent on both the SES a student is at when declaring their major, and where they want to be financially once they earn their degree.

While personal, sociocultural, and financial factors all play a role in college students' selection of their majors, a biological predisposition may be at work here as well. Biological rhythms underlie all major changes in both our body and our behavior in a cyclical manner. They are responsible for controlling our body temperature, the times we sleep, and the times we are most active on a day to day basis, a women's menstruation period on a month to month basis, and the annual change of seasons causes some humans to experience severe depression during the Winter months, also known as Seasonal Affective Disorder (Smolensky & Lamberg, 2001; Hill, 2002). Most daily biological rhythms follow a nearly 24-hour period that aligns quite closely with the cycle of night and day, and for this reason are called circadian rhythms (Brown, 1982; Vitaterna, Takahashi, & Turek, 2001). The circadian rhythm is one of the most prominent cycles of the biological clock, along with monthly and yearly cycles.

The circadian cycle is a biological rhythm in mammals and most other organisms that allows them to "prepare" for environmental changes depending on the time of day. This not only ensures that an organism will do the correct thing depending on the time of day, but for many organisms, it also ensures their health, well-being, and at times,

survival (Vitaterna et al., 2001). For example, if a small nocturnal animal were to leave its habitat during the day, it may become prey for a larger animal.

Each organism's circadian cycle is managed by a circadian clock that controls the rest and activity cycle of the organism (Smolensky & Lamberg, 2001). Though the location of the circadian clock is different for most organisms, in mammals it can be found in a collection of nerves called the suprachiasmatic nuclei (SCN). The SCN resides in a section at the base of the forebrain called the anterior hypothalamus (Ralph, Foster, Davis, & Menaker, 1990). The SCN sends information to other parts of the hypothalamus and the brain in order to better manage nervous, endocrine, anatomical, and behavioral responses (Jacobs, Yamatodani, & Timmerman, 2000).

While the circadian cycle has many important jobs and regulates much of mammals' physiology and behavior, one of its most important roles is the regulation of the sleep and wake cycle. When an organism is exposed to the normal light-dark cycle of night and day, its body becomes "entrained," or aligned, to this cycle (Vitaterna et al., 2001). This "entrainment" ensures the organism will excrete melatonin at the correct time of day, making certain it will enter its sleep cycle at night. According to Cardinali, Furio, Reyes, and Brusco (2006), melatonin is a hormone that plays a major role in circadian rhythmicity and the sleep-wake cycle. Apparently it responds to signals from the SCN to indicate the status of the circadian clock (i.e. internal clock time relative to external clock time). Furthermore, melatonin is also an indicator of biological night. It is secreted when a person is to become sleepy and continues to be secreted for the duration of an individual's "night."

While most organisms are content to enter the sleep and wake cycles their bodies have predetermined for them, humans have the ability to shift the entrainment of their circadian rhythms. Changes in one's sleep pattern resulting from jet lag or shift work often reset their circadian clock (Vitaterna et al., 2001). For instance, when crossing time zones, a person's circadian clock resets itself so that the person can adapt to the light-dark cycle of that time zone, and will then set itself back when the individual returns to their home time zone.

Even more interesting is the discovery by Pittendrigh (1960) that an organism's response to light can be altered depending on what phase of the light-dark period the organism was in when light was presented. Pittendrigh's research determined that exposure to light in the beginning of one's normal dark period resulted in a "phase delay," meaning that the onset of the next phase of the circadian cycle (i.e. sleep, wake, etc.) will begin later than normal, while exposure to light toward the end of one's normal dark period resulted in a "phase advance," or a premature beginning of the next phase of the cycle. This finding helped predict how an organism will entrain to shifts in its "normal" light-dark cycle as well as unusual cycles like those with abnormal light to dark ratios. This also indicated that entrainment occurs because of specific resetting events, not as a result of changes in the speed of the cycle (Vitaterna et al., 2001).

Although each organism's daily rhythms of rest/activity behavior reflects its adherence to a circadian clock, in humans slight apparent differences in the period of the circadian clock produce three types of people, classified as having different "chronotypes": those who are more morning-predisposed (M-Type), those who are evening-predisposed (E-Type), and those in the intermediate group who prefer neither

morning nor evening extremes (I-Type). M-Type persons are commonly referred to as "larks" because they are quite active and cognitively alert during the early morning, E-Type persons are often referred to as "night owls" because they are most active and cognitively alert in the evening. An M-Type person awakens feeling refreshed each morning and becomes sleepy in the early evening, causing them to go to bed early and fall asleep faster. Conversely, E-Type persons awaken later in the morning, taking longer to become fully alert, yet remain alert until late into the evening, becoming sleepy and going to bed long after dark. Finally, I-Type persons awaken somewhat later than M-Type and go to bed somewhat earlier than E-Type, functioning best in daylight. Chronotypes are often discussed using the terms "morningness" and "eveningness," which describe the degree to which one exhibits the traits that indicate a morning or evening predisposition (Kerkhof, 1985).

Several self-rating survey instruments have been developed to classify chronotypes, among which are the Basic Language Morningness scale (BALM) (Brown, 1993) and the Horne-Östberg Morningness-Eveningness Questionnaire (MEQ) (Horne & Östberg, 1976). The BALM scale is normally distributed, with about 15 percent of the population testing as M-Type, 15 percent testing as E-Type, and the majority of people testing as I-Type. The BALM scale scores classify people into "extreme," "strong," "moderate," or "mild" M- and E-Types, or as a member of the intermediate group (Brown, 1993; Brown & LaJambe, 2004). The score distribution of the BALM scale is shown in Figure 1 below.

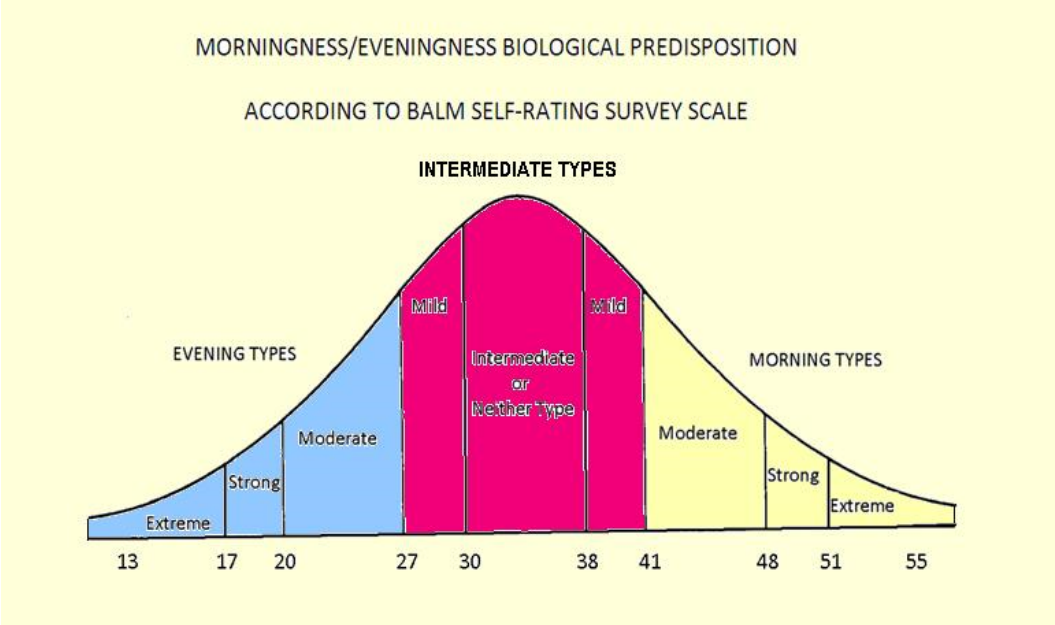

Figure 1. BALM scores distribution plot for degrees of morningness and eveningness (Brown and LaJambe, 2004)

Often the BALM scale is used to classify chronotype and the MEQ is used to confirm the classification. Learning what BALM or MEQ score an individual tests as has many benefits. Researchers discovered that desynchronization with one's circadian clock causes both insomnia and extreme fatigue (Bittencourt, Santos-Silva, DeMello, Andersen, & Tufik, 2009), but knowing what morningness/eveningness (M/E) type a person is could help them synchronize their schedules with their clock in order to prevent disorders such as these from occurring (Smolensky & Lamberg, 2001). Additionally, because almost all physiological and biological processes are controlled by underlying biological rhythms, research has shown correlations between disruptions in circadian rhythms and weight gain, a decrease in mental and physical performance, and a slower metabolism (Vitaterna et al., 2001). Having the knowledge about what M/E type an

individual is could help them maximize their daily performance and results on mental and physical tasks, such as recalling information, working out, increasing their metabolism, or losing weight. BALM and MEQ scores provide the information that conveys what the best times of the day are for humans to be active or in a state of rest. Adhering to these results could help maximize one's overall health and wellbeing.

Learning one's M/E type could impact more than just physiological and biological processes. Research has shown that the major area of study declared by college students may be related to their M/E type. In a study involving undergraduate students in Japan (257:160, female:male), Harada and Inoue (1999) discovered that women in medicine-related fields preferred morningness more than women majoring in education, humanities, and economics (p=0.0582). Additionally, they found women majoring in the natural sciences and agriculture scored significantly higher on the 7-item Torsvall and Åkerstedt questionnaire (Harada & Inoue, 1999), suggesting a greater preference for morningness. While there were no significant differences found in this study between male participants, when compared with women, females preferred morningness significantly more than males.

The current research seeks to extend the literature on the influence one's chronotype has on selecting a college major. Earlier Penn State University data showed that undergraduate students who took the morningness/eveningness surveys in several sections of an introductory psychology course over several years are predominantly evening-predisposed (Brown & LaJambe, 2004). Characteristically, those students are predominantly first through fifth semesters in their college progression. For comparison, this study collected M/E data from undergraduate Penn State University students in the

selected majors of business, engineering, science, and mathematics fields. These students were at least fifth semester standing in their academic progression. Despite the apparent M/E-Type predispositions suggested in the Harada and Inoue study, the hypothesis to be tested in this study is whether any of the selected majors will deviate significantly in their chronotype as a possible basis for the selection of their major.

Methods

Subjects. Penn State University students served as the participants in this study. The investigator recruited participants by first finding all 400-level courses in the mathematics, science, business, and engineering disciplines and contacted the instructors of each through e-mail, detailing the conditions and aims of the current research. These courses were chosen because they are often comprised of students in at least their fifth term with a declared major. As instructors replied with their class schedules, the investigator went to each class over a three week period and explained the rationale for conducting the study and where to access the survey online. Students were told that they must have a declared major in one of the selected disciplines and be in at least their fifth term in order to participate in the study. Students were assured their participation would provide them with information on the degree of their morningness or eveningness and how they could utilize this information to enhance their overall well-being. Participation was voluntary and no monetary or course credit compensation was offered. Instead, participants were promised to receive the results of their survey, along with an explanation of the chronotype related to their survey score.

Materials. Participants were recruited to complete two M/E questionnaires: The BALM scale and the MEQ, described above. The BALM scale is a 13-item survey that determines a person's chronotype based on their "feeling best" times of day. The MEQ is a 19-item scale that determines chronotype based on one's habitual sleep time and greatest activity time preferences. When used together, the scales correlate at $r = 0.87$ and are used jointly to establish the reliability of determining chronotypes (Brown & LaJambe, 2004).

Procedure. Data were collected using the web-based survey tool SurveyMonkey.com. The surveys used were uploaded to SurveyMonkey by the investigator prior to recruitment of participants. Complete surveys from majors with a minimum of 20 persons in each were compared. These were Accounting, Engineering, the Life Sciences, and Landscape Contracting. An additional 15 majors collected earlier by Brown & LaJambe (2004) also were used in the comparison. Data from a total of 715 students were used in the analysis.

Results

According to the scores for both the BALM and MEQ surveys, all selected majors were composed of students who have mainly Intermediate chronotypes (I-Types) as shown in Figures 2 and 3. This result is not surprising since approximately two-thirds (68%) of the general population is in the Intermediate category, as shown in the BALM distribution plot (Figure 1) above. However, Figures 2 and 3 also clearly show that some majors were markedly different in their proportion of morning types (M-Types), evening types (E-Types) and I-Types, and that the proportions in each chronotype category were

slightly different depending on the M-E scale (BALM vs. MEQ). For example, according to the BALM scale, accounting, human development and family studies (HDFS), and psychology BA and BS students displayed far greater proportions of E-Types compared to M-Types, with all other majors showing similar results but with less drastic differences in the proportions of each. However, when looking at the MEQ graphs, nearly all majors had a significantly greater proportion of E-Types to M-Types. No majors preferred morningness to eveningness, but engineering majors had the most nearly-equal distribution of M- and E-Types based on both the BALM and MEQ distribution graphs. Another interesting result is that the results of the BALM scale showed far more M-Types than the MEQ scale, with only two majors (engineering and secondary education) on the MEQ distribution graph showing M-Type proportions greater than 10 percent.

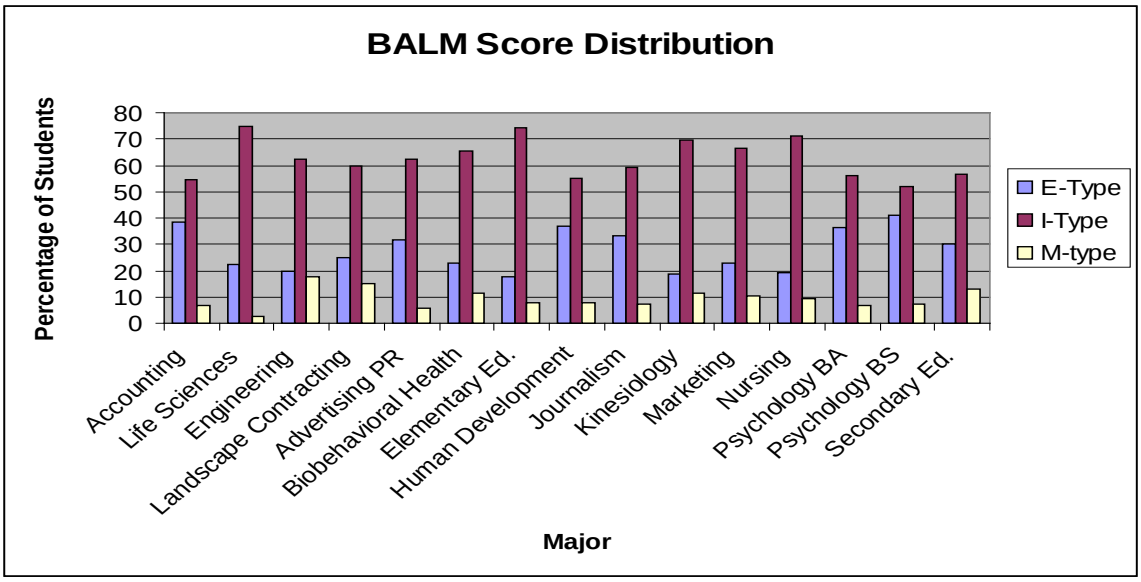

Figure 2. BALM Score Distribution. This graph shows the proportions of E-, I-, and M-Types across all majors according to the BALM scale scores. No significant differences were found.

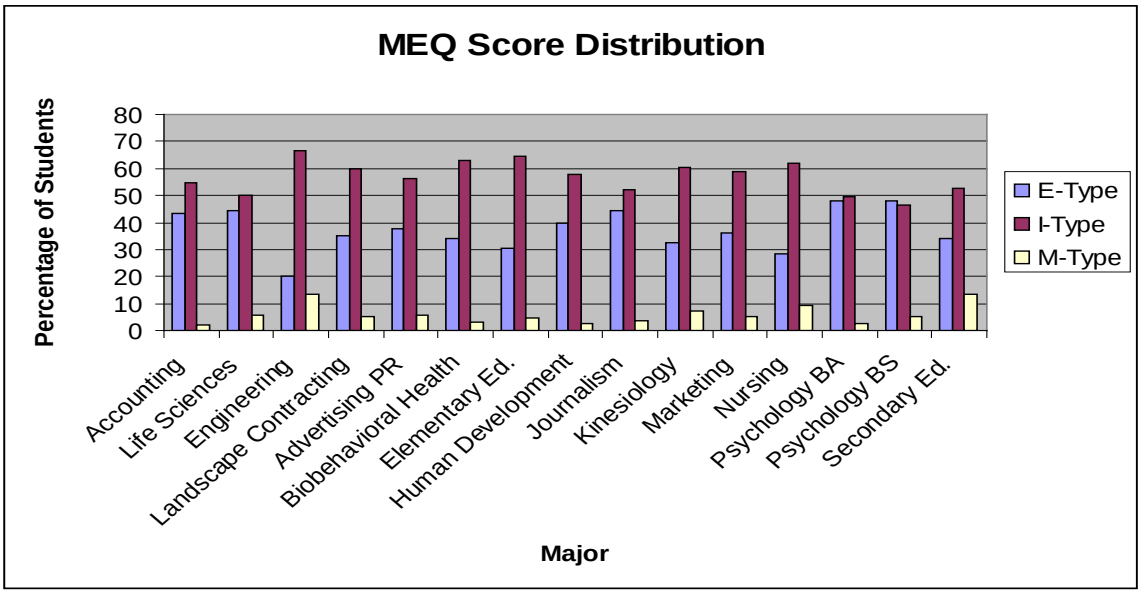

Figure 3. MEQ Score Distribution. This graph shows the distribution of E-, I-, and M-Types across all majors according to the MEQ scale scores. Again, no significant differences were found between majors, but MEQ results showed a greater proportion of E-Types to M-Types across all majors than did the BALM results.

The chronotype frequencies and proportions based on the results of the BALM scale indicate that well over half the participants, 450, tested as I-Type (62.9%) while 201 tested as E-Type (28.1%), and the remaining 64 tested as M-Type (9.0%). This is shown in Figure 4a. Figure 4b displays the results of chronotype frequency using the MEQ scale. Again, most of the participants, 407, tested as I-Type (56.9%), while 266 tested as E-Type (37%), and 42 as M-Type (5.9%).

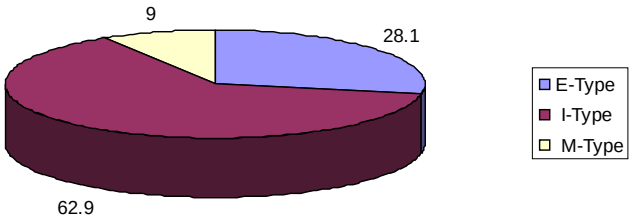

Figure 4a. Chronotype frequency according to BALM scale

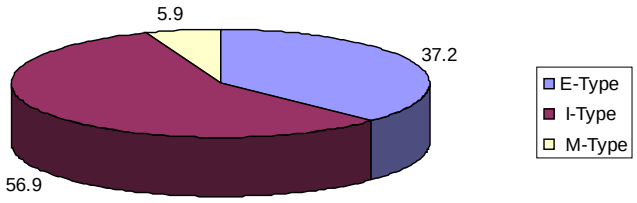

Figure 4b. Chronotype frequency according to MEQ scale

Analysis of the results, using a Chi Square statistical tests of differences in the proportions of chronotypes in each major, indicate no differences for the BALM ($\chi(28) = 33.36$, $p = 0.223$) or for the MEQ ($\chi(28) = 23.39$, $p = 0.393$) scales. These are shown in Tables 1 and 2

Table 1. BALM scale Chi Square test results. BALM scale scores were used to classify chronotypes across 15 majors, proportions of each are shown here.

Major * BALM Category

		BALM Category			
		E-type	I-type	M-type	Total
MAJOR	Accounting	38.6%	54.5%	6.8%	100.0%
	Life Sciences	22.2%	75.0%	2.8%	100.0%
	Chem Engineering	20.0%	62.2%	17.8%	100.0%
	Landscape	25.0%	60.0%	15.0%	100.0%
	Advertising PR	31.8%	62.4%	5.9%	100.0%
	Biobehavioral Health	22.9%	65.7%	11.4%	100.0%
	Elementary Education	17.6%	74.5%	7.8%	100.0%
	Human Development	36.8%	55.3%	7.9%	100.0%
	Journalism	33.3%	59.3%	7.4%	100.0%
	Kinesiology	18.6%	69.8%	11.6%	100.0%
	Marketing	23.1%	66.7%	10.3%	100.0%
	Nursing	19.0%	71.4%	9.5%	100.0%
	Psychology BA	36.6%	56.3%	7.0%	100.0%
	Psychology BS	41.1%	51.8%	7.1%	100.0%
	Secondary Education	30.2%	56.6%	13.2%	100.0%
Total		28.1%	62.9%	9.0%	100.0%

Table 2. MEQ Chi Square test results. MEQ scale scores were used to classify chronotypes across 15 majors, proportions of each are shown here.

Major * MEQ Category

		MEQ Category			
		E-type	I-type	M-type	Total
MAJOR	Accounting	43.2%	54.5%	2.3%	100.0%
	Life Sciences	44.4%	50.0%	5.6%	100.0%
	Chem Engineering	20.0%	66.7%	13.3%	100.0%
	Landscape	35.0%	60.0%	5.0%	100.0%
	Advertising PR	37.6%	56.5%	5.9%	100.0%
	Biobehavioral Health	34.3%	62.9%	2.9%	100.0%
	Elementary Education	30.4%	64.7%	4.9%	100.0%
	Human Development	39.5%	57.9%	2.6%	100.0%
	Journalism	44.4%	51.9%	3.7%	100.0%
	Kinesiology	32.6%	60.5%	7.0%	100.0%
	Marketing	35.9%	59.0%	5.1%	100.0%
	Nursing	28.6%	61.9%	9.5%	100.0%
	Psychology BA	47.9%	49.3%	2.8%	100.0%
	Psychology BS	48.2%	46.4%	5.4%	100.0%
	Secondary Education	34.0%	52.8%	13.2%	100.0%
Total		37.2%	56.9%	5.9%	100.0%

Discussion

Conclusions and findings

While chronotypes are often normally distributed, the results of this study were not, with there being a greater proportion of E-Types to M-Types. These findings are similar to Brown and LaJambe (2004). In sum, there may be a predisposing factor that

influences college students' selection of certain majors in terms of the moderate to extreme chronotypes. However, pair-wise comparisons of just eveningness and morningness scores were not attempted. This question still needs to be answered with additional research.

Sources of error

Because college students' sleep phases are often shorter or longer than preferred, responses to the questions on the M/E questionnaires may have been exaggerated or influenced toward one extreme or the other, as noted by Brown & LaJambe (2004). Also, college students' schedules are often irregular. More accurate results could have been obtained by surveying persons of the same ages, but with more predictable schedules (i.e. those with full-time jobs). A more accurate depiction of the ways in which chronotypes affect major selection could be achieved by conducting this study on a much larger scale, with equal numbers of all majors, and comparing evening and morning types directly while excluding the in-between type.

Implications

If a connection between one's chronotype and their college major selection were to be found on a larger scale, course scheduling could be altered to ensure that students' classes were scheduled during time periods that would help foster their ability to learn and perform best in class. In addition to course scheduling, academic advisors may be able to use M/E questionnaires to help steer students into majors that would best fit them.

Suggestions for further investigation

In order to achieve more accurate results, this study must be conducted on a larger scale. Future research should include a broader range of majors with equal numbers of students from all disciplines. A control group of college students with more regular schedules could be used for comparison (i.e. those who hold jobs while in school).

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Appendices

Basic Language Morningness (BALM) Scale*

Brown, F. M. (1993). Psychometric equivalence of an improved Basic Language Morningness (BALM) Scale using industrial population within comparisons. *Ergonomic, 36* (1-3), 191-197.

1. Thinking only of your "feeling best" times of day, what time would you get up if you were completely free to plan your day?

5 5:00- 6:30 in the morning
4 6:30-7:45 in the morning
3 7:45-9:45 in the morning
2 9:45-11:00 in the morning
1 11:00 morning - 12:00 noon

2. Thinking only of your own "feeling best" times of day, what time would you go to bed if you were completely free to plan your evening?

5 8:00-9:00 in the evening
4 9:00-10:15 in the evening
3 10:15 evening-12:30 at night
2 12:30-1:45 at night
1 1:45-3:00 at night

3. Under free time conditions, how easy do you find getting up in the morning?

1 Not at all easy
2 Slightly easy
3 Fairly easy
4 Very easy

4. If you go to sleep at night at a regular time, how wide awake do you feel during the first half hour after getting up in the morning?

1 Not at all wide awake
2 Slightly wide awake
3 Fairly wide awake
4 Very wide awake

5. If you go to sleep at night at a regular time, during the first half hour after getting up in the morning, how tired or rested do you feel?

4 Very refreshed
3 Fairly refreshed
2 Fairly tired
1 Very tired

6. In your free time you have decided to do some physical exercise. A friend says do this one hour twice a week and the best time is 7:00-8:00 in the morning. Thinking of nothing else but your own “feeling best” times of day, how do you think you would do at that time?

4 Would be in very good form
3 Would be in pretty good form
2 Would find it difficult
1 Would find it very difficult

7. Suppose you have nothing but free time, at what time in the evening do you feel tired and need to get some sleep?

5 8:00-9:00 in the evening
4 9:00-10:15 in the evening
3 10:15 evening-12:30 at night
2 12:30-1:45 at night
1 1:45-3:00 at night

8. You want to be at your top performance for a test [for a job promotion, for example] which you know is going to take two hours and will completely tire you out mentally. You are completely free to plan your day. Thinking only of your own "feeling best" times, which ONE of the 2-hour testing times would you choose?

4 8:00-10:00 in the morning
3 11:00 morning-1:00 in the afternoon
2 3:00-5:00 in the afternoon
1 7:00-9:00 in the evening

9. "Morning people" wake up early and are wide awake fast, but then feel tired in the evenings and like to go to bed before it gets late. "Evening people" take some time before they get going in the morning, but like to stay up late at night. Which ONE of these types do you think you are?

4 For sure a morning type
3 More a morning than an evening type
2 More an evening than a morning type
1 For sure an evening type

10. When would you like to get up (if you have a full day's work--8 hours--ahead of you, for example) if you were completely free to set your work time?

4 Before 6:30 in the morning
3 6:30-7:30 in the morning
2 7:30-8:30 in the morning
1 After 8:30 in the morning

11. Suppose that you did not work, but you still always had to get up at 6:00 in the morning. What do you think it would be like for you?

1 Very difficult and unpleasant
2 Rather difficult and unpleasant
3 A little unpleasant but no great problem
4 Easy and not unpleasant

12. If you could go to sleep at a regular time every night, how much time would it take to "clear your head" in the morning after getting up from a night's sleep?

4 0-10 minutes
3 11-20 minutes
2 21-40 minutes
1 More than 40 minutes

13. If you were free to set your time, please mark how much do you would be a morning or evening active person?

4 Very much early morning active (wide awake mornings and tired evenings)
3 Somewhat morning active
2 Somewhat evening active
1 Very much evening active (tired mornings and wide awake evenings)

*** Numbers in front of item responses correspond to relative weights. Chronotype are determined based on the following scores: Neither Type: 30-38;**

	Evening Types	**Morning Types**
Extreme	**13-16**	**52-55**
Strong	**17-19**	**49-51**
Moderate	**20-26**	**42-48**
Mild	**27-29**	**39-41**

Horne-Östberg Morningness-Eveningness Questionnaire (MEQ)**

Horne, J.A. and Östberg, O. (1976). A self-assessment questionnaire to determine morningness-eveningness in human circadian rhythms. *International Journal of Chronobiology*, 4, 97-110.

1. Considering only your own "feeling best" rhythm, at what time would you get up if you were entirely free to plan your day?
_5____5:00 - 6:30 AM
_4____6:30 - 7:45 AM
_3____7:45 - 9:45 AM
_2____9:45 - 11:00 AM
_1____11:00 AM - 12:00 PM

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?
_5____8:00 - 9:00 PM
_4____9:00 - 10:15 PM
_3____10:15 PM - 12:30 AM
_2____12:30 - 1:45 AM
_1____1:45 - 3:00 AM

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 in 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 do 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?
_5____8:00 - 9:00 PM
_4____9:00 - 10:15 PM
_3___10:15 PM - 12:45 AM
_2___12:45 - 2:00 AM
_1___2:00 - 3:00 AM

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?
_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 usual time and will NOT fall asleep
_3____will wake up at usual time and will doze thereafter
_2____will wake up at 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 only 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 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 PM. Bearing in mind nothing else but your own "feeling best" rhythm how well do 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. During which time period would you want that five consecutive hours to END?

_1____12:00 - 4:00 AM
_5____4:00 - 8:00 AM
_4____8:00 - 9:00 AM
_3____9:00 AM - 2:00 PM
_2____2:00 - 5:00 PM
_1____5:00 PM - 12:00 AM

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

_1____12:00 - 5:00 AM
_5____5:00 - 8:00 AM
_4____8:00 - 10:00 AM
_3____10:00 AM - 5:00 PM
_2____5:00 - 10:00 PM
_1____10:00 PM - 12:00 AM

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" person
_4____rather more a "morning" than an "evening" type
_2____rather more an "evening" than a "morning" type
_0____definitely an "evening" type

****MEQ Chronotype Categories:**

Evening Type (ET): 16-41

Neither type (NT): 42-58

Morning Type (MT): 59-86

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The Pennsylvania State University, Berks Campus and University Park, PA
Schreyer Honors College Scholar
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THESIS:

Morningness/Eveningness Trait as a Possible Predisposing Biological Factor in Students Selecting Their College Major
Dr. Frederick Brown, Supervisor, Department of Psychology

HONORS:

Dean's List (5 semesters)
Schreyer Academic Excellence Scholarship
Wegmans Scholarship
Boscov Scholarship for Academic Excellence

WORK EXPERIENCES:

Teaching Assistant, **Penn State University Department of Psychology**
Found supplemental information for *Positive Psychology* course textbook, Fall Semester 2009

PEPP, Penn State Berks
Tutored high school students at Reading High School

INTERNATIONAL EDUCATION:

Venice, Italy, Winter Break 2007, ENGL/THEA 296H

SERVICE ACTIVITIES:

Big Brothers Big Sisters
- Completed data entry for families and volunteers

THON 2010
- Member on the Operations committee

OTHER:

Psi Chi – member