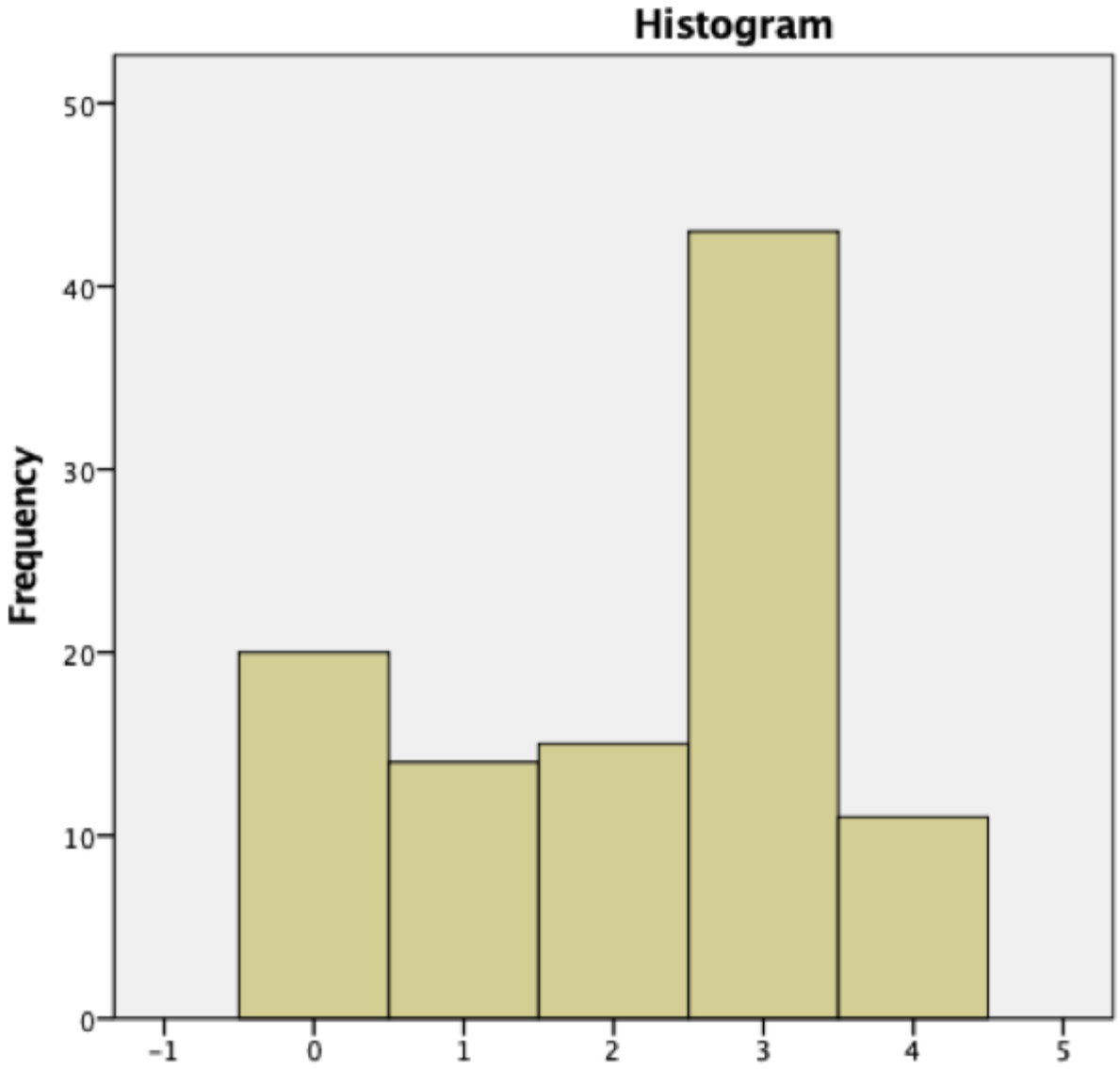
LESSON 3

ANALYZING DATA

Descriptive statistics

To understand how data helps us answer our research questions, let's first look at some data. **The dependent variable provides us with data**. In one of my previous classes, I had students complete a questionnaire which assessed how many pets students have had/or currently have, as well as their level of happiness and life-satisfaction using well-known measures of subjective well-being. We can use this data to understand the various statistics researchers use to test their hypotheses.

The first step is to understand the sample in terms of ***descriptive statistics***, which describe, organize and summarize the data. If we want to know how many students in by previous class own 0, 1,2, 3 etc pets, we would use a frequency distribution, which tells us the number of times (frequency) a specific data point (0, 1,2 3, 4 etc. pets) is indicated in the sample. For example, let's say a past class's frequency distribution looks like this:



Histogram showing how many people report having 0,1,2,3,4 pets. Source: Mindi Foster. Used with permission.

This shows that approximately 40 people have 3 pets, 20 people have none, etc.

This graph summarizes the sample, but often it's more common to use one number to represent a sample. In that case, we would use ***measures of central tendency***, which describe the sample, on average.

- If we want to know how happy the class was, on average, we would calculate the ***mean*** happiness score. For instance, if we measured a class's happiness on a scale of 0 (not happy) to 4 (extremely happy) and the mean happiness score was 3.3, we could infer that the class is a very happy bunch.
- Alternatively, we could calculate the ***median*** (the midpoint of an ordered set of numbers), or
- A ***mode*** (the most common number reported by your sample).

Which measure of central tendency we use to describe our sample depends on whether

it is a ***normal, or symmetrical*** distribution, or a ***skewed*** distribution. A skew is named for which direction the tail of distribution falls. If it falls at the high end (the positive side) the data is positively skewed; if it falls at the low end (the negative side), the data is negatively skewed. Watch a screencast that exemplifies Measures of Central Tendency.

To recap, although it is the mean that is most commonly used, if the data is skewed, it is the median that is generally a better descriptor of the average because the mean is sensitive to extreme scores. Notice how when the distribution of scores is negative, the mean is pulled to the left, and similarly, pulled to the right for positively skewed data. The average isn't likely that low or high, respectively, but because the mean is sensitive to extreme scores, it shifts. As such, the median (which remains in the middle) is a better descriptor. You can see this happening if you calculate the mean of this set of scores:

1, 2, 4, 5, 3, 4, 2

Versus this set:

1, 2, 4, 5, 3, 4, 200.

The mean of the first set is 3; the mean of the 2nd set is 31.3. That extreme score of 200 pulled the mean to the right on the scale. But if you look at the scores, you'll know that 31.3 isn't really reflective of the average score of the participants, given all but one score was 5 and below.

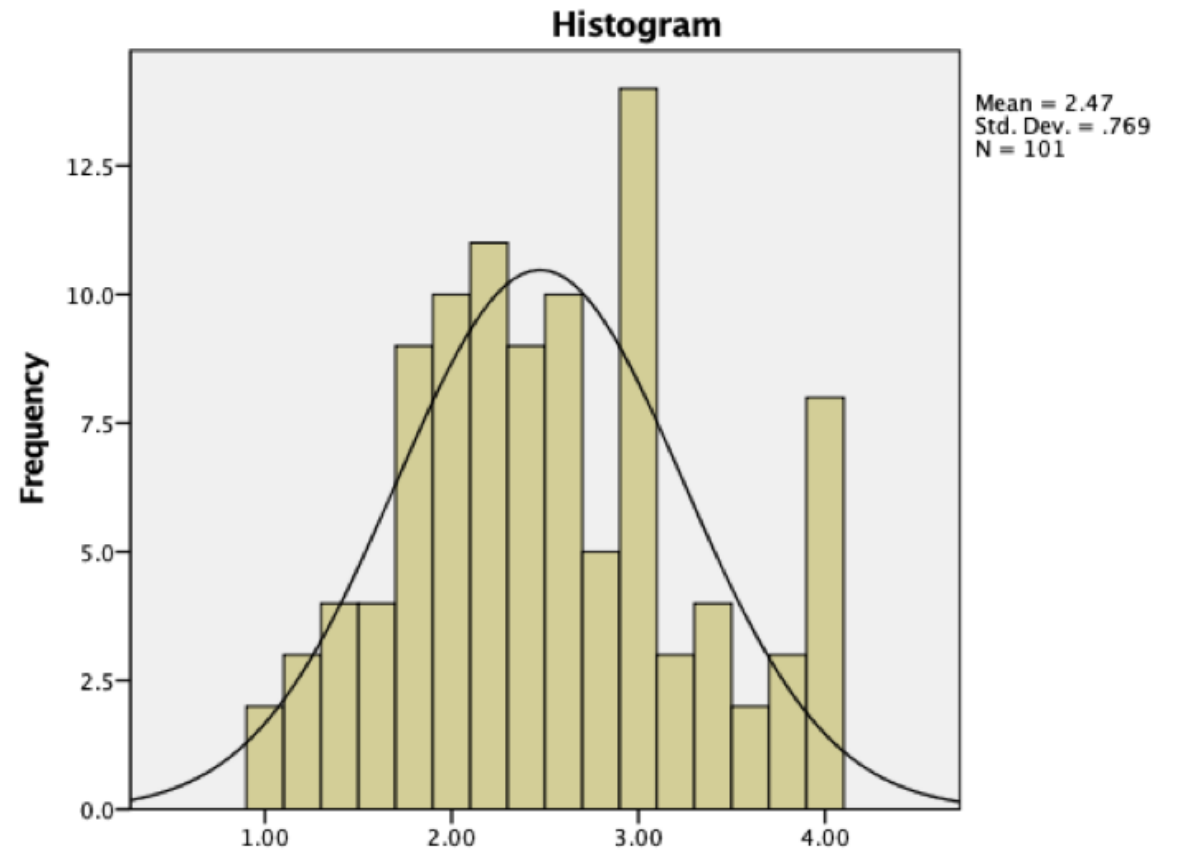
Another set of descriptive statistics are ***measures of variability***, which assess how far spread apart the scores are from the mean. The most commonly used is the ***standard deviation***, which is a numeric indicator of how large that spread is. The mean tells us, on average, what people score. But we also know that not everyone scores at the mean… think about a test score. The average on a quiz, may be 5/10, but it's unlikely everyone got a 5. Some people did better than that average, some did worse. The standard deviation tells us, on average, how far from the mean people tend to be. View this Standard Deviation screencast.

So why is standard deviation so important to know? Class A and Class B had the same mean. I might then conclude that both classes are performing the same. However, the standard deviation tells us something different. Class A tends to cluster around the mean (low standard deviation) and as such, everyone is essentially performing similarly, around the average. But Class B is not clustering around the mean. Some people are performing really well, but many others are failing horribly. This class needs extra help! I wouldn't have known this if I had just paid attention to the means.

Point to Ponder: How would we describe the sample of students enrolled in this

course in terms of their happiness levels?

Click below when you think you know.



Number of students reporting their levels of happiness. Source: Mindi Foster. Used with permission.

Answer

Given happiness was measured on a scale of 0 to 4, and the mean was almost 2.5, we could infer this sample is moderately happy, as their average score hits right in the middle of the scale.

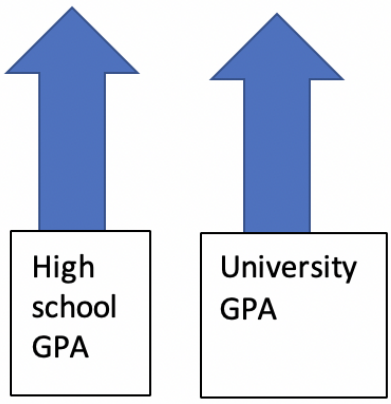
But, look at the standard deviation. You can see the curve is more tall than it is flat, indicating small variability. The standard deviation score gives us a numeric index of how much variability there is. A standard deviation of .77 indicates most of the distribution is falling .77 units above and below the mean. That is, while the average is 2.5, most people are scoring between 1.73 and 3.27 on the happiness score.

LESSON 3

INFERENTIAL STATISTICS

Once we've described our sample, we most often want to perform inferential statistics, which allow us to infer about whether our hypotheses are significantly supported by our data. A common inferential statistic you have heard about often in the media is the correlation (the relationship between two variables). You might also have heard about its numeric index of strength and direction, the correlation coefficient.

The first thing to consider is the direction of the correlation coefficient. Is it positive or negative?



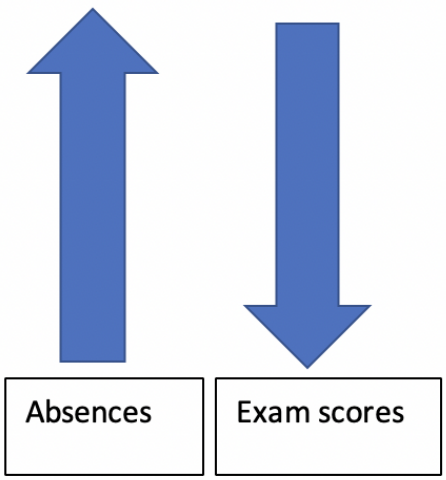
A positive correlation (indicated by a positive number) occurs when high scores on one variable are associated with high scores on another variable or low scores on one variable are associated with low scores on another variable. Let's look at the example of High school GPA and University GPA. For example, a positive correlation would be that higher GPAs in high school are related to higher GPAsin University; or lower GPAs in high school are related to lower GPAs in University.

Point to Ponder: Think of some other sets of variables that might be positively related. Click here for some examples.

Examples:

Real-world positive correlations include:

height/weight	The taller you are, the heavier you are
familiarity/liking	The more familiar we are with something/someone, the more we like it/them
GRE (graduate record examination)/success in graduate school	The better our GRE scores, more successful we will be in graduate school



A negative correlation (indicated by a negative number) occurs when high scores on one variable are associated with low scores on another variable. In other words, the two variables increase or decrease in opposite directions. This is also referred to as an inverse correlation, as the variables are inversely related. For example, the more you miss class, the lower your exam score will be; or the less you miss class, the higher your exam score will be.

Point to Ponder: Think of some other sets of variables that might be negatively related. Click here for some examples.

Examples:

Real-world negative correlations include:

smoking/health	The more you smoke cigarettes, the less healthy you will be
flossing/tooth decay	The less you floss, the more tooth decay you will have
passion/commitment	The more passion we feel for our partner, the less committed we are. And, by the same token, as passion

	decreases, commitment increases!

The second thing to consider is strength; how strong is the relationship. This number ranges from -1 to +1, where the closer the coefficient is to -1 or +1, the stronger it is. 1 represents a perfect relationship (something that rarely, if ever occurs in the real world). Zero reflects no relationship.

Putting strength and direction together, you can have strong, medium or weak positive correlations and strong, medium or weak negative correlations. Advertisers and the media tend to tell us there are relationships between things (e.g., "X is related to Y, study claims") but rarely tells you how strong that relationship is. Remember, you can have a strong correlation between two variables, even though it is in a negative direction. And, you can have a weak correlation that is still positive. So, "positive" refers to the variables going in the same direction; it does not have anything to do with strength; and "negative" refers to variables going in opposite directions, again, nothing to do with being weak. For example, the correlation between flossing and tooth decay is -.80; the more you floss, the less likely you'll be to have rotten teeth, and this relationship is very strong.

Activity (aligned with Learning outcome 2): Self-Test

Take a moment to review what you have learned. When you feel ready, take this self-test that does not count towards your course grade but is designed to help you gauge your own learning. Additionally recalling information is one of the best ways to help you retain it! Select the most correct answer.

Question 1 of 3

A correlation between being depressed and self-esteem that is -.70 is interpreted

- ○ **a.** The more people are depressed, the higher their self-esteem
- ○ **b.** The more people are depressed, the lower their self-esteem
- ○ **c.** Depression and self-esteem are unrelated

Correct!

Submit Answer Next Question

Also note, that correlation is not causation. The media are culprits for interpreting correlations as causal. See this short YouTube example:

This ad states that if you do X, then Y will happen. This is causal language, indicating that if, for example, you eat dark chocolate, you'll live longer. Causal language often implies that one thing leads to, causes, or increases/decreases something else. However, this relationship is only correlational…no one has ever randomly assigned a group of humans to eat dark chocolate and another group of humans to not eat dark chocolate, and measured how long they lived. (Can you imagine how difficult it would be to prevent the control group from eating dark chocolate their whole life??). Just because two variables increase together, doesn't mean one causes increases in the other. Just because increases in eating dark chocolate is associated with longer life spans doesn't mean eating dark chocolate will make you live longer.

Another reason we can't claim causality in correlations is because we weren't able to control many other variables (called extraneous variables). There may be a 3rd variable responsible for that relationship. For instance, there is a famous correlation between the number of household appliances and the use of birth control; the more household appliances a woman owned, the more likely she was to use birth control (Li, 1975, as cited in Stanovich, 2019). If we thought correlations were the same as causation, we'd assume that we should give out dishwashers to tweens to prevent future pregnancy (Stanovich, 2019). However, what haven't we controlled for, that might be responsible for that relationship? What might be related to both, having appliances and using birth control? Income, education, etc. So, be wary about the media headlines saying "If you do X, Y will happen", because correlation does not imply causation.

Activity (aligned with Learning outcome 2): Self-Test

Take a moment to review what you have learned. When you feel ready, take this self-test that does not count towards your course grade but is designed to help you gauge your own learning. Additionally recalling information is one of the best ways to help you retain it!

Are you understanding the difference between talking about a correlation, versus causation? Select the most correct answer.

Question 1 of 1

Which hypothesis goes with which type of research design? Note that there are two correct answers.

- ○ **a.** Pets increase health-experiment
- ○ **b.** Pets increase health-questionnaire
- ○ **c.** Pets and health are related-experiment
- ◉ **d.** Pets and health are related-questionnaire

Correct! Hypotheses have to be phrased in a way that is consistent with their design. In experimentation, we are looking for causation; as such we use causal language such as “cause” “affects” “increase/decrease”. In correlational designs, such as questionnaires, we use ‘relational’ language because we know that correlation is not causation.

Submit Answer

We can test whether the correlation we found in our sample (a subset of the larger population) is a good model of what we would find in our population, or, if what we found was due to chance. We can use probability theory to get the probability (a "p-value") that our result is due to chance. If there is a really low probability that our result is due to chance, then we say, our results are "significant". The criterion for deciding this is often discipline specific, and in psychology, we generally use a p-value of < .05. This means that there fewer than 5 times in 100 times that the study was conducted would our results be due to chance. If our p value is > .05, that means there are more than 5 times in 100 that our results are due to chance. That is too high for most psychologists to have confidence in their findings, so we would say the relationship we were testing was "not significant".

Is the correlation between number of pets and happiness significant among you? For example, what if the correlation we looked at above had a p value of .177. That would mean that it is not significant, indicating that although the size and direction of the correlation indicated the more pets people have, the happier they are, that small correlation is not significant. If that were the case, you could argue there is no basis for assuming pet ownership and happiness are related.

So far, you've learned about how to create a good experiment, and how to interpret some data. Let's now examine how this knowledge can provide you with critical thinking tools that can help you evaluate science.

LESSON 3

PITFALLS OF RESEARCH & WAYS TO AVOID THEM

Teaching you about how psychologists do research is giving you the tools to critically evaluate scientific findings that you hear about. One of the skills to practise is to always **look for alternative explanations** for the findings you're being presented with, whether it be by the media, or in an academic journal. Recall, you were first introduced to this critical thinking skill in Lesson 1. Lesson 2 provides you with tools to enhance this skill. Often there are pitfalls in how a study was conducted that we can identify, and critically evaluate by suggesting an alternative explanation. Then, we can create our own study to potentially address these issues. That's the beauty of science…we'll never create a perfect study; there will always be ways to improve it and futher our knowledge base. Below is a table summarizing some of the pitfalls of research we've already examined above, and some new ones.

Activity (aligned with Learning outcome 4): Practice your critical thinking skills. Go back to the article, "***Are pets a healthy pleasure***", and critically evaluate that article for the pitfalls listed below. Read the pitfall, ask yourself what possible alternative explanation for the results could there be, and what possible resolution you could provide when re-designing the study.

Pitfall	Alternative explanation	Possible resolution
Vague or limited operational definitions (Did the study provide specific enough operational definitions? Were there other operational definitions that might have changed the results?)		
Non-random assignment (Did the study randomly assign participants across conditions to control for possible confounds?)		
Mismatch between the type of study/conclusions (Is the study claiming causation appropriately?)		

Was there participant bias? (When the participant's expectations influence their behaviour; can often result in the placebo effect)		
Is there External validity to the study (i.e., are the results generalizeable to other samples, situations etc. beyond the lab		

When done, click below for some possible answers.

Pitfall	Alternative explanation	Possible resolution
Vague or limited operational definitions (Did the study provide specific enough operational definitions? Were there other operational definitions that might have changed the results?)	the study defined pet as cat or dog…maybe blood pressure reduced because of those who owned a dog, because those who owned a dog also walked that dog?	add another experimental group to distinguish between dog/cat owner
Non-random assignment (Did the study randomly assign participants across conditions to control for possible confounds?)	Job type was not randomly assigned across conditions; those who adopted a pet were also stockbrokers, and had high blood pressure. Maybe this group showed reduced blood pressure because any change in their extremely stressful lifestyle would have been beneficial	
Mismatch between the type	this was well done; an experimental study	N/A

of study/conclusions (Is the study claiming causation appropriately?)	drawing causal conclusions	
Was there participant bias? (When the participant's expectations influence their behaviour; can often result in the placebo effect)	Did the stockbrokers know this was the point of the study? Perhaps that's why they showed reduced blood pressure--placebo	Ensure participants have expectations by not telling them what condition they're in (This is of course tricky given you can't ask someone to adopt a pet and not tell them why. This higlights the fact that an experiment is not always the only answer. A questionnaire study might have hidden the purpose of the study from participants better.
Is there External validity to the study (i.e., are the results generalizeable to other samples, situations etc. beyond the lab)	We don't yet know if other types of stressed workers would show the same effects	replicate the experiment on other high-stress workers like first responders
Was there experimenter bias? (Could the experimenter's knowledge of the experimenter influenced the results?)	The experimenter knew which sample was the experimental group, so it's possible she interacted with them in a way that reduced their blood pressure	Double blind experiment so that participants and experimenter are unaware of which participants are in which condition.

Activities

1. You are encouraged to watch this video after completing your notes/text readings:

Psychological Research – Crash Course Psychology #2 YouTube (10:50 min.)]

2. Supplemental Activity Understanding Random Assignment: grab a deck of cards. Each card represents 1 participant. Each participant has different characteristics (sex, height, weight, personality, family) and this is represented by the different card characteristics (number vs. face card, suit, number, even versus odd number etc.) The goal is to randomly assign participants to either the experimental or control conditions. Do this by flipping a coin: assign heads to the experimental and tails to the control condition. Each time you get a head, put the card in the 'experimental' pile; each time you get a tail, put the card in the 'control' pile. Then count how many of each characteristic ended up in each condition. Some of you would get relatively equal amount of each characteristic across the groups; this is ideal as it means the groups are now equal on everything (i.e., all extraneous characteristics that could affect the dependent variable) except your independent variable. As such, when the only difference between the groups is your independent variable because all else has been controlled for, then you can say your independent variable causes the dependent variable!

Now what about those of you who didn't get equal numbers of characteristics across the groups? Does that mean random assignment failed? Not necessarily. That is the nature of probabilities; sometimes, even with random assignment, there is more of something in one group than another. That's how easy it can be to get a result by

chance versus due to your independent variable. That's why control is so important: to reduce the chance that extraneous variables affected your outcome.

LESSON 3

DISCUSSION (WORTH 1.25% OF YOUR FINAL GRADE)

A newspaper headline reads, “Recession causes increase in dating violence”. Discuss whether you think this is an appropriate headline and why, using the critical tools you've learned about in this chapter. Use the table we created in the "Pitfalls of Research Section" which is recreated below and complete it with reference to the headline.

Pitfall	Alternative Explanation	Possible Resolution
Vague or limited operational definitions (Did the study provide specific enough operational definitions? Were there other operational definitions that might have changed the results?)		
Non-random assignment (Did the study randomly assign participants across conditions to control for possible confounds?)		
Mismatch between the type of study/conclusions (Is the study claiming causation appropriately?)		
Was there participant bias? (When the participant's expectations influence their behaviour; can often result in the placebo effect)		
Is there External validity to the study (i.e., are the results generalizeable to other samples, situations etc. beyond the lab		

Which pitfalls would a study with this headline likely have exhibited? What alternative explanations are there? How could you create a study that would test this hypothesis? Ensure you have reviewed further instructions and grading criteria in the course syllabus. When you are ready to join the conversation select “Discussions” at the top of your MyLS webpage.

LESSON 6

INTRODUCTION

When we refer to ourselves as "conscious", we are referring to our awareness of both internal and external stimuli. But, can you have one without the other? Can you be conscious yet unaware, or, aware but not conscious? The answer to both these questions, is possibly, yes. "Mindwandering" (where you have thoughts unrelated to a task or you find yourself working on “auto pilot”) is a prime example of being conscious but not aware of the task at hand. Can you think of times when you've done this?

Activity (aligned with Learning outcome 1): Using information from your textbook and from your own personal experience, detail in your study notes the nature of consciousness and list some of instances where you have engaged in mindwandering and then click below to see some of mine:

- Driving home on the highway and I forget to take my exit (shh, don't tell)
- Daydreaming in the middle of reading a chapter
- Tuning out my sister and thinking about what I have to do the next day

LESSON 6

CIRCADIAN RHYTHMS

Humans respond to light and dark signals in their environment. These signals combined with genetic makeup results in Circadian rhythms which reflect a 24-hour cycle. Even without these external stimuli telling us a day is 24 hours long, our bodies adhere to them, albeit, a little longer (24.2 hours approximately). This "biological clock" boils down to a chain of events where the light hits receptors in your eyes (retinal receptors) which is sent to the suprachiasmatic nucleus (SCN) of the hypothalamus, in turn to the pineal gland, which in turn tells melatonin () to be secreted. Melatonin is “a hormone secreted by the pineal gland in inverse proportion to the amount of light received by the retina, important in the regulation of biorhythms” (Dictionary.com).

To learn more about how this “biological clock” works watch this (supplementary) ***What Makes You Tick: Circadian Rhythms*** YouTube (2:33 min.)

Memory tip: Think of melatonin as the 'Dracula hormone'--it comes out at night.

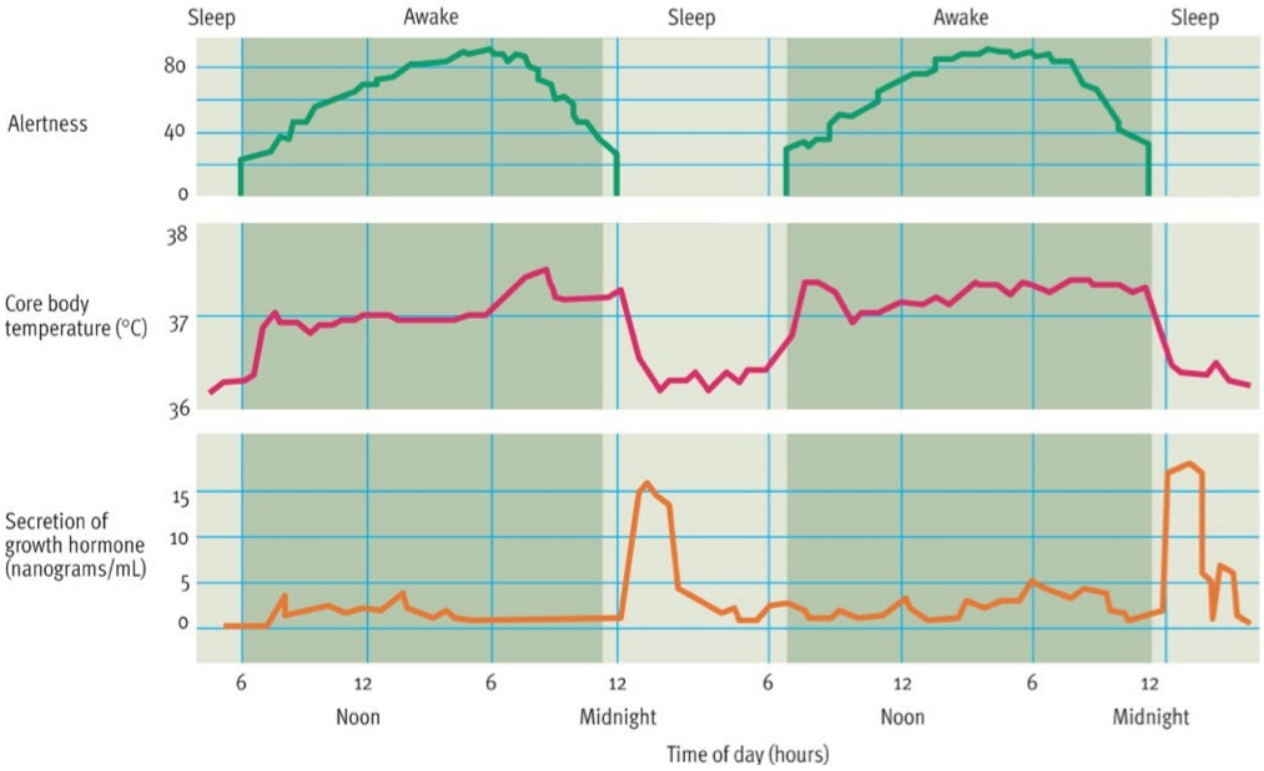
Whether melatonin is helpful for jetlag is still debatable in the research. Jetlag is “a temporary disruption of the body's normal biological rhythms after high-speed air travel through several time zones” (Dictionary.com) Even though we don’t know if jetlag is influenced by melatonin we certainly do know that it is impacted by circadian rhythms. We do know however, that melatonin is released later in older adolescents. You'll notice that adolescents like to go to bed later, but sleep later. This is why many schools are moving to later start times; check out this article on "No more sleepless in Seattle" and then complete the following learning activity.

Activity (aligned with Learning outcome 2, as well as Learning outcome 1 in Lessons 2, 3): Read the study on which the Seattle decision was based, and identify the following:

- The independent variable?
- The dependent variable?
- Is there an alternative explanation for the results other than a later start time

led to more sleep?

independent variable	school start time
dependent variable	hours of sleep
alternative explanation	The two groups were assessed at two different points in time (2016, 2017), rather than taking two groups at the same point in time, with two different school start times to assess differences in sleep. We cannot rule out that something else was happening in 2017 which led to better sleep rather than the different school start time.

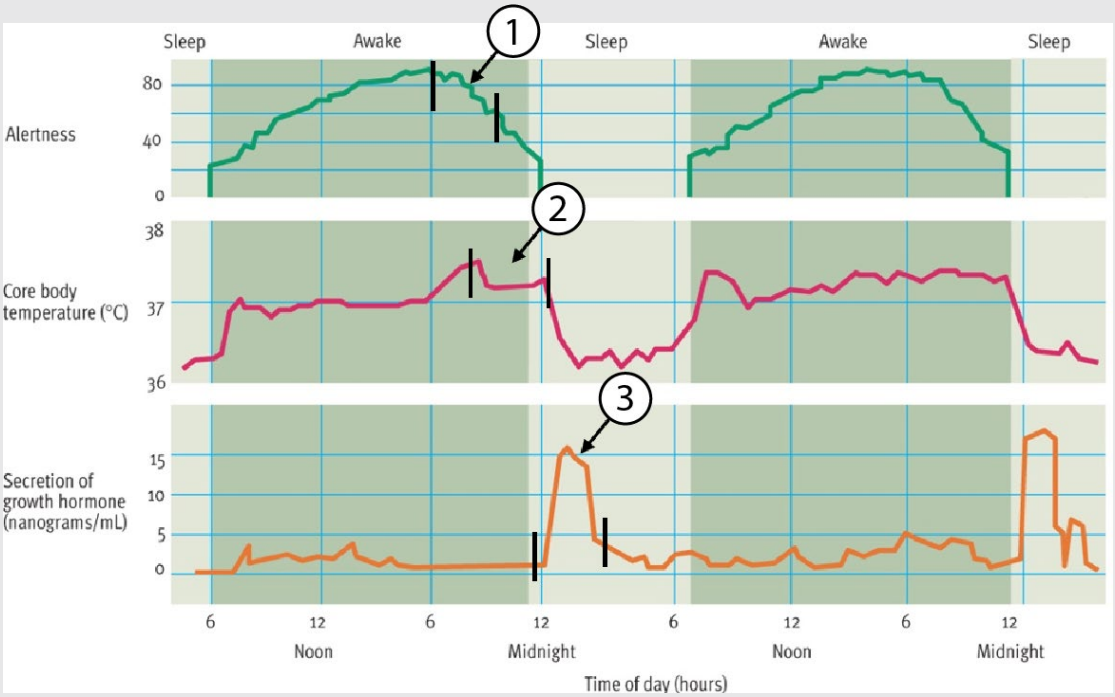


Patterns of various hormones throughout the day. Weiten & McCann (2013). Psychology: Themes and Variations. 3rd Canadian Edition. Used under fair dealing.

This image shows just a few of our biological rhythms that work in concert with our Circadian rhythms.

Point to ponder: Can you identify why?

- Night classes may not be such a good idea? (hint: look at the Alertness panel)
- Why sleep researchers tell us to take hot baths if we're having trouble falling asleep? (hint: look at the Core body temperature panel)
- Why you should not be pulling an all-nighter to study? (hint: look at the growth hormone panel)



Patterns of various hormones throughout the day. Weiten & McCann (2013). Psychology: Themes and Variations. 3rd Canadian Edition. Used under fair dealing.

Arrow 1: Typical times for night classes correspond to the hours in which your alertness is declining!

Arrow 2: This the first point at which your body temperature beings to decrease, which promotes sleep. Hot baths can quicken this process

because they cause body temperature to drop quicker.

Arrow 3: Growth hormone is spiked during these hours; if you're up studying, you're not letting your muscles heal and regenerate!

We have looked at many rhythms that are part of our 24-hour clock. Let’s look at some very specific rhythms that occur when we sleep.

LESSON 6

ULTRADIAN RHYTHMS

Now let's turn to shorter rhythms, Ultradian rhythms, are short rhythms which occur in 90-120 minute cycles. These are known as our sleep cycles. Using the image below you can see that sleep cycles are quite complex with as many as 5 different phases in the sleep cycle. We measure sleep using electroencephalogram (EEG) measures. EEG's give us wave patterns.

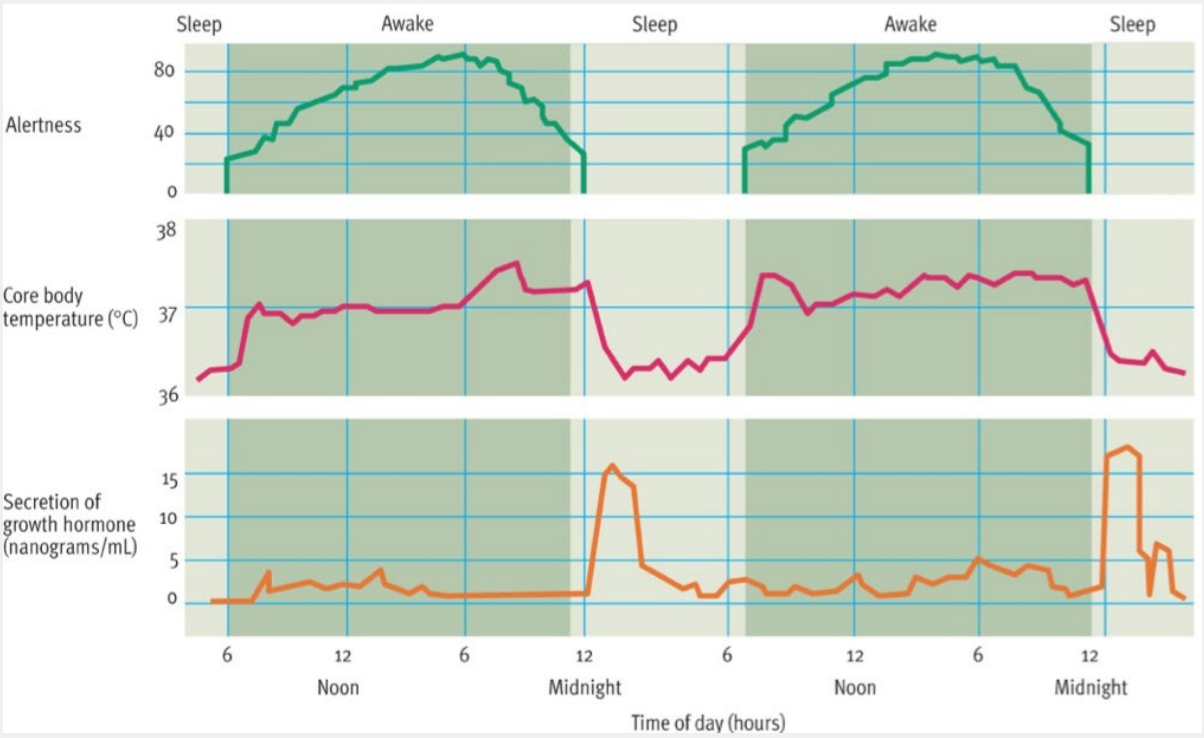


Image of electroencephalogram brain waves. Weiten & McCann (2013). Psychology: Themes and Variations. 3rd Canadian Edition. Used under fair dealing.

1. **Awake:** Low-voltage, high-frequency beta waves.

   Beta waves (Memory tip: think "Busy" waves) is the most inconsistent pattern; not surprising given all that's going on when you are awake

2. **Drowsy:** Alpha waves prominent.

   Alpha waves occur during drowsiness, relaxation and meditation. Notice they are more rhythmic waves.

3. **Stage 1 sleep:** Theta waves prominent

   Stage 1 is characterized by that feeling of drifting, but you are still easily awakened. Heart rate, breathing slows. This is where you have that, 'feel like you're falling' feeling due to jerking muscles. Lucid dreams happen here, and you spend more time in this stage as you age

4. **Stage 2 sleep:** Sleeps spindles and mixed EEG activity

   Sleep spindles may help us to learn by moving information from our hippocampus (limited space for memory) to our pre-frontal cortex, thereby allowing more room for more information. So, if you pull an all-nighter, you're preventing yourself from learning. (Mander et al., 2011). This is the stage where if you are woken, you don't remember being asleep. Insomniacs and alcoholics have trouble moving past this stage.

5. **Slow-wave sleep (stage 3 and 4 sleep):** Progressively more delta waves

   During slow wave sleep, you are deeply breathing, muscles are relaxed, and it's hard to wake you; if woken you feel disoriented. This is where sleep walking can occur as the paralysis hormone has not yet been released.

6. **REM sleep:** Low voltage, high frequency waves

   Notice how REM (Rapid Eye Movement) sleep's EEG waves look like your Awake waves (beta waves). This shows that during REM, your brain activity is like being awake. Your heart rate and blood pressure rise, your eyes make REM movements, your genitals are active (wet dreams) and the body produces chemicals that cause you to have “sleep paralysis” so that you cannot act out your dreams. Babies spend more time in REM sleep than adults. Indeed, if babies get more REM sleep, perhaps it's important to growth.

Activity: Before we learn about atypical sleep patterns, let's test your knowledge about sleep. Based on your personal experience, below are some myths and facts about sleep--can you tell which is which? Answer True or False.

Question 2 of 5

My brain is at rest when I'm sleeping.

- ○ **a.** True
- ◉ **b.** False

Correct! False. As you'll learn below there is much happening in your brain during the stages of sleep.

Submit Answer | Previous Question | Next Question

So, what happens when you don't get enough sleep overall? Let's turn now to the kinds of sleep deprivation and disorders that can occur.

LESSON 6

SLEEP DEPRIVATION & DISORDERS

Partial sleep deprivation(sleep restriction) occurs when you don't get enough hours of sleep and can result in:

- Cognitive deficits
- Your amygdala activity increases while pre-frontal cortex decreases. Given you've just finished the chapter on the Brain, can you think of what this pattern may lead to?

The amygdala is about fear/emotion, while the pre-frontal cortex houses your ability to reason and self-regulate. So, without sleep your emotionality increases and your ability to control it declines.

- Cortisol, your stress hormone, is sustained. With too much cortisol in your body, your organs begin to decline, as does the immune system. Your hunger increases, eventually if you respond to this cue, it could lead to obesity.

Are you sleep deprived? Ask yourself the following questions and give yourself a point every time you say yes.

Do you often fall asleep…

- Watching TV?
- During boring meetings or lectures?
- After heavy meals or small amount of alcohol?
- While relaxing after dinner?

- Within 5 minutes of getting to bed?

In the morning do you generally….

- Need an alarm clock to wake up at the right time?
- Struggle to get out of bed?
- Hit the snooze button several times?

During the day do you….

- Feel tired, irritable, stressed out?
- Have trouble concentrating or remembering?
- Feel slow when it comes to critical thinking, problem solving, being creative?
- Need a nap during the day?
- Feel drowsy while driving?

If you have THREE or more points, you need more sleep!

Selective sleep deprivationis when you don't get enough REM sleep in particular. Several facts suggest that REM sleep is an important requirement in our functioning:

- REM sleep gets longer and longer through the night and babies spend more time in REM sleep than adults. Sometimes this is called REM rebound as we seem to need more REM when it has been absent
- People remember less when REM-deprived than deprived of sleep at other stages, suggesting it's important for memory (Stickgold & Walker, 2005)
- We make up for REM deprived sleep by spending more time in it the next night, suggesting our bodies demand REM sleep (Achermann & Borbely, 2011)

Perhaps the most well-known sleep disorder is ***Insomnia***. But there are different types. When we are young, we tend to experience it as a difficulty falling asleep. The older we get it's harder to stay asleep, and we become early risers. What causes insomnia? Many things: depression, anxiety, pain, some of us are prone to hyperarousal (heightened heart rates, body temperatures, brain patterns).

Treatments for insomnia often include sedatives, which work to increase our inhibitory neurotransmitters, but there are carry-over effects (e.g., you’re sleepier the next day),

decreasing impact of the drug over time and decreases in the deep-sleep stages. Better treatments include Cognitive Behavioral Therapy, which can help you achieve better sleep hygiene (restricting time in bed to only when you're tired, hot baths right before bed, and making sure the bedroom is only associated with sleep (i.e., no screen technologies)!

Watch the following video 5 Tips for Falling Asleep YouTube (5.23)]

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Additional sleep disorders include sleep apnea (breathing problems during sleep), the rare but dangerous, narcolepsy (a sudden onset of sleep during wakefulness), somnambulism (sleep walking), which can be influenced by genetics, and increased by drugs/alcohol and stress/fatigue. Night terrors (different from your average nightmare that awakens you from REM sleep) occur when the person appears to be screaming, in panic, but then stares into space. This most often occurs in children, who tend to grow out of it.