

# KAYLEIGH KORTRIGHT

“OH NO, I HAVE TO DO MATH IN MED SCHOOL?!”

## KEY ATTRIBUTES

- **Didn't take statistics during undergrad**
- **Little research background**
- **Not a 'math person'**  
Compared to other subjects, math is difficult to learn/understand  
Not that interested in developing better quantitative skills

## PERSONAL PROFILE

Kayleigh has wanted to become a doctor ever since she began watching Grey's Anatomy in high school. She decided to pursue a bachelor's degree (BSc Honours) in Life Sciences at Queen's University, as this program would provide her all the requisite coursework/knowledge to write the MCAT: she completed coursework in biology, chemistry, anatomy and physiology, microbiology, biochemistry, and physics; she also took a single mathematics course (differential and integral calculus). She graduated with a cGPA of 3.95. While she is above average in intelligence, most of her 'smarts' come from her uncanny ability to memorize vast quantities of information in relatively short periods of time. She found her introductory calculus course to be one of the most challenging as she couldn't rely on memorization alone to succeed; similarly, she found some of her upper-level science courses challenging as they required more critical thinking and application of knowledge than regurgitation of information and execution of procedure. During undergrad, she also volunteered in a physiology wet lab for one semester to help beef up her CV. From that experience, she learned that doing research was not to her taste (she wasn't expecting it to be), though she began to appreciate role of research in the advancement of medicine and clinical practice; however, since her experience was limited, she didn't gain a complete understanding of what research entails (in particular, analysis and interpretation of data). She was so excited when she got in to her first-choice medical school, U of T!

Now 18 weeks into her first year of med school, she finds herself extremely busy with coursework, though everything is going relatively smoothly. She is a few weeks into a component of CPC1, Health Science Research (HSR), which she is slowly realizing will present her with learning challenges she may have difficulty overcoming. Not only does this course seem to be about math and applications thereof (which she had trouble with in undergrad), but it also has nothing to do with her other coursework, which is all centered around weekly themes (e.g. blood). For these reasons, she feels both intimidated and relatively unmotivated to learn HSR material. However, she does attend mandatory HSR lectures and she does complete the required readings and e-learning modules at home to the best of her ability (which varies depending on how busy she is with other, more interesting and seemingly more relevant coursework). She hopes that she can get through the HSR content by relying on her 'strengths' in mathematics: memorizing and applying formulas. For her Mastery Exercises, she hopes her performance on other types of questions (not covering HSR content) will make up for her likely poor performance on the HSR questions.



## PERSONAL INFO

**Age:** 21 years

**Occupation:** first year undergraduate medical student @ U of T

**Location:** downtown Toronto  
Lives with roommates  
Belongs to Wightman-Berris academy

**Status:** single

## GOALS

### Uses the tool to:

Become familiar with course content before she attends lectures and/or review course content after lectures if she finds herself struggling with the material

Study/prepare for HSR questions that appear on the Mastery Exercises, including solving practice problems

### Overarching goals:

Do well on Mastery Exercises

Prioritize/focus energy on coursework that seems the most relevant or is more highly represented in evaluations (Mastery Exercises)

*Try to get by by "getting the most out of doing the least work possible" for coursework that seems less relevant or is less frequently represented in evaluations (not challenge herself more than the minimum necessary to succeed)*

## CONTEXT SCENARIO

Kayleigh is entering her 6th week of HSR and is about to start Topic 4: Describing and Summarizing Data in quantitative research. She notices in her HSR schedule, for the first time since HSR began, that she is to complete an e-learning module for this topic, whose content will be covered in the upcoming CPC1 Mastery Exercise for Dermatology. Since she's never taken statistics and she isn't feeling completely swamped with her other coursework, she decides to take half an hour at home the evening before Topic 4 lecture to go through the e-module and familiarize herself with the content it covers.

She opens her laptop, logs in to Elantra, navigates the HSR course page, and loads the learning tool available for Topic 4.

On the main page, she sees that she can navigate to e-modules, to a decision-making tool, and to practice problems. She selects the e-modules. She then sees she can choose a module for variables or a module for distributions. A small notification pops up, suggesting she start with variables if this is her first time seeing the material – so she clicks on variables.

At the beginning of the module, she receives a notification explaining that she will be exploring a research scenario to learning about variables. She has the option to tailor the research scenario to a specific field of research/sub-specialty of medicine if she wants. Since the rest of her current coursework is on the Dermatology theme, she chooses dermatology.

On the next page, she is presented a research scenario about dermatological condition X (DCX), which she learned about a few days earlier in another one of her courses. She's glad that the context scenario is centred around a topic she's already been learning about!

She is prompted to identify the outcome that was measured and the factors that would influence the measured outcome in the research scenario. She selects buttons that correspond to what she believes are the correct answers.

On the next page, she learns that the outcome and the influencing factors (covariates) are variables. She learns about independent vs. dependent variables through the examples in the research scenario.

Her attention is then drawn to different features of the outcome and covariate variables, including visual features, which ultimately leads to the naming of different variable types.

After explanation of key features and naming of a variable type, she is challenged to come up with (select) other outcomes or covariates of the same variable type that could be measured in this scenario (optional). When she selects a correct answer, she receives a brief confirmation of why it is correct, using visualizations if possible. If she selects an incorrect answer, she receives feedback on why it is incorrect, showing visual comparisons when possible. Kayleigh enjoys these little activities because they let her test/apply her new knowledge right away.

On some of the questions, she is forced to give a wrong answer or to select "none of the above" – this enables presentation of new variable types, until all variable types have been presented.

Having completed the module, she has the option to complete post-module quiz activities, to continue to the distributions module, or to return to the main menu. She chooses to continue to the distributions module.

## BUSINESS GOALS

### Stakeholders want Kayleigh to:

Become familiar with course content before lecture so that she can get the most out of class time

*Have the opportunity to ask informed questions, participate in the class (if applicable)*

Study/prepare for HSR questions that appear on the Mastery Exercises

Gain a conceptual understanding of HSR content

Identify and apply research evidence to the care of patients, populations, health systems and policy (consumer of research)

## CONTEXT SCENARIO (CONT.)

At the beginning of the distributions module, she is re-presented the same research scenario she just in the variables module and is reminded of the variable types that were determined for the outcome and covariates.

She is then introduced to the concept of distributions and is shown visualizations of the possible distribution(s) the research scenario outcome could follow. Key visual features are made explicit, and side-by-side comparisons are made when possible.

Several days later, Kayleigh is reviewing for the Mastery Exercise on the dermatology theme. She is feeling pretty good about the HSR content on this evaluation (Topic 4), as she completed the e-module before lecture and had the opportunity to ask questions during class time. She remembers that the Topic 4 learning tool had practice problems listed in its main menu, so decides to try some to test her knowledge and practice for the exam.

She opens her laptop, logs on to Elantra, navigates to the course page, then launches the tool. On the main menu, she selects the practice problems option.

She is presented with a menu that prompts her to select what type of practice problems she wants to try. The categories she can choose from are: variables, distributions, and analyses. She will try out both the variables and distributions questions in turn.

Each question is based off a research publication. She must select a multiple choice answer, and one of the options being "I don't know." There is also a "help" button, which gives her the option to initiate a guided problem-solving process OR to go back to a relevant e-module.

If she selects a correct answer, she receives a brief confirmation of why it is correct

If she selects an incorrect answer, she receives information about why it is wrong

If she clicks "I don't know," she can choose to go back to a relevant e-module OR initiate a guided problem-solving process\*

# JON LAU

"I FEEL PREPARED FOR HSR, BUT IT'S BEEN A WHILE SINCE I'VE SEEN SOME OF THIS STUFF!"

## KEY ATTRIBUTES

- Took courses in statistics, epidemiology, and critical appraisal during undergrad
- Not a 'math person' but is naturally curious and inclined to learn/push himself when it comes to math

## PERSONAL PROFILE

Jon has always been interested in medicine, since both of his parents are doctors. With hopes of applying to medical school afterward, he completed a bachelor's degree (BSc Honours) in Health Science at McMaster University. Through several of his compulsory courses (i.e. epidemiology, critical appraisal) he became familiar with clinical epidemiology and evidence-based medicine and gained a true appreciation for the role of research in the advancement of medicine and clinical practice; he also gained a clear understanding of the role that analysis and interpretation of data have in research and how they can impact the way medicine and clinical practice advance. During his undergrad, he also completed coursework in statistics and carried out a thesis-based research project on genetic determinants of osteoporosis. He didn't love his statistics course as he was never a fan of math, but he was motivated to work hard to understand the concepts that didn't come easily to him. His research experience helped him gain an appreciation for the scientific method and gave him the opportunity to apply his statistics knowledge to data he collected himself. He graduated with a cGPA of 3.97 and was accepted to U of T Medical School. However, he decided to defer his entry one year, so he could backpack around the world.

Now 18 weeks into his first year of med school, he finds himself extremely busy with coursework, though everything is going relatively smoothly. He is a few weeks into a component of CPC1, Health Science Research (HSR), and he is pleasantly surprised to find that he is somewhat familiar with this content. He's relieved to find that HSR is mostly a review of things he has already learned in undergrad but has forgotten over his gap year – in comparison to his other courses, he doesn't have to work as hard to understand the material, though he still does have to make a bit of effort in his learning, especially for the math-centric bits. He finds it odd that HSR content has nothing to do with his other coursework, which is centered around weekly themes (e.g. blood); it feels disjointed to him. He attends mandatory HSR lectures and completes the required readings and e-learning modules at home. He is motivated to challenge himself and gain a deep understanding of the HSR content because he knows its importance in research and the advancement of clinical practice; however, the amount of time he has to study HSR varies depending on how busy he is with other, more demanding coursework.



## PERSONAL INFO

**Age:** 23 years

**Occupation:** first year undergraduate medical student @ U of T

**Location:** Mississauga  
Lives with family  
Belongs to Mississauga academy

**Status:** single

## GOALS

### Uses the tool to:

Guide his decision-making regarding analysis for his Practicum Exercise (2nd year)

Review course content as necessary

### Overarching goals:

Do well on Mastery Exercises

Do well on Practicum Exercise (2nd year)

Gain a deep understanding of HSR content

Become a consumer of research, i.e. take evidence from literature and apply it to patient care

Prioritize/focus energy on coursework that is more highly represented in evaluations

## CONTEXT SCENARIO

Jon is breezing through first-year HSR. While it's been a year since he last saw most of the material, it comes back to him easily when he listens to his professors speak in mandatory HSR lectures. He feels comfortable enough with the material that he chooses not to complete the suggested e-modules – he would prefer to focus his study time on more challenging courses. He hasn't neglected HSR, though! He is already thinking/working ahead on the Practicum Exercise he will complete in his second year.

He has already chosen what his Practicum Exercise will be about: investigating the effects of different treatments on tumour size in invasive ductal carcinoma. He feels confident about writing most of the assignment, except for the analysis part, about which he is not sure. He remembers Dr. Guimond mentioning that there is a new tool available on Elantra that supports decision-making for the Analysis section, so he decides to check it out.

He opens his laptop, logs in to Elantra, navigates the HSR course page, and loads the tool on analyses, distributions, and variables.

On the main page, he sees that he can navigate to e-modules (on variables and distributions), to a decision-making tool, and to practice problems. He selects the decision-making tool.

Upon entering the tool, he is prompted to select his outcome variable type. He presses the "continuous" button, because he's pretty sure tumour size is a continuous variable. He then sees a page that gives him a bit of summary information on, and toggle-able visual examples of, continuous variables, which helps him confirm that he's made the correct choice. He confirms this is correct by pressing a button to that effect, which allows him to advance to the next page.

On the next page, he is prompted to select his covariate variable type. He's not totally sure what type of covariate he has, so he guesses by pressing the "ordinal" button. Reviewing the confirmation page that follows (containing summary info and visual examples), he realizes "ordinal" is not the correct variable type for his covariate of treatment type. Since he's not sure what other variable type it could be, he decides to try out the guided problem-solving option to help him figure it out.

He is posed a series of questions that guide his evaluation of his covariate variable. The answer to each question helps him narrow down the variable type. Ex:

Question 1: is your covariate numerical or categorical?

Answer 1: categorical

Question 2: is there an order to the categories?

Answer 2: no

As he provides answers, names/buttons of incompatible variables types dim on screen. At the end of questions, he is left with a single illuminated name/button, his answer. There is also a summary of the key features of the variable type revealed by the Q/A processes, for his reference. He clicks the single illuminated name/button to select that variable type and advance to the next page.

On the next page, he is prompted to select the distribution type of his outcome variable. Each listed distribution is accompanied by an exemplar visualization. He notices that he is only presented with options that are possible given his outcome variable, which he appreciates – it reduces the likelihood he'll select the wrong one, saving him time in the long run!

## BUSINESS GOALS

### Stakeholders want Jon to:

Become familiar with course content before lecture so that she can get the most out of class time

*Have the opportunity to ask informed questions, participate in the class (if applicable)*

Study/prepare for HSR questions that appear on the Mastery Exercises

Gain a conceptual understanding of HSR content

Identify and apply research evidence to the care of patients, populations, health systems and policy (consumer of research)

## CONTEXT SCENARIO

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● Off the bat, he is not 100% sure what distribution type he has – the accompanying visualizations help him narrow down his options some, but not enough to make a decision. The remaining options look similar to him, and he's not sure what distinguishing factors to look for... he selects the two remaining options and then clicks the "What's the difference" button.

● On the next page, he sees the two options superimposed on one another and sees a list of key differing features. As he hovers each listed feature, it is highlighted in the corresponding visualization. Using this comparison feature, he is able to tell the difference between the two options very easily and is able to identify which one corresponds to his distribution for the Practicum Exercise.

● He navigates back to the distribution selection page and selects the one he believes to be correct. This again directs him to a confirmation page, including summary information on, and toggle-able visual examples of, the distribution he chose, which helps him confirm that he's made the correct choice. He confirms the selection.

● Finally, he arrives at a page that presents the appropriate analysis type(s) for his combination of variables and distribution: t-test or ANOVA. Because there is more than one option presented, he decides to learn a bit more about each by clicking on each in turn. When he clicks, he is directed to external learning resources. He reads this material and decides the ANOVA is more appropriate from his case.

● To check his choice, he uses the guided problem-solving function one last time. He is posed a series of questions that helps him narrow down which analysis is likely correct. Turns out he was right!