"Are You Reading, or are You Actually Reading?":

Reading With Purpose, Inquiry, and Engagement Among Undergraduate Students With and Without Attention Deficit Hyperactivity Disorder

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Abstract

The challenges associated with Attention Deficit Hyperactivity Disorder (ADHD) are posing greater challenges for individuals with the disorder and who are pursuing higher education. This study explored the effects of implementing the Reading with Purpose method (MacKinnon, 2019) through an online self-guided approach. Participants (n = 47) completed demographic questions, the WURS, and were assigned to either a control or experimental condition. After reading a text, participants completed questions related to reading comprehension and level of engagement. Although the results of this study did not find any statistical differences between utilizing the Reading with Purpose method or not, these findings have important implications for future research, particularly for researchers interested in studying online and self-guided methods of inquiry training.

"Are You Reading, or are You Actually Reading?": Reading With Purpose, Inquiry, and Engagement Among Undergraduate Students With and Without ADHD

According to the DSM-5, Attention-Deficit/Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder characterized by difficulty sustaining focus, hyperactivity, and impulsivity (American Psychiatric Association, 2013). The disorder is estimated to be diagnosed in 5% of children and 2.5% of adults across many cultures (American Psychiatric Association, 2013). ADHD is characterized as patterns of inattention, hyperactivity, and impulsivity that disrupts a person's growth and their ability to participate in their daily life (American Psychiatric Association, 2013). Some individuals with ADHD have problems mainly with attention (ADHD - predominantly inattentive), while other people with ADHD present with hyperactivity or impulsivity (ADHD - predominantly hyperactive) (American Psychiatric Association, 2013). There are also people with ADHD who display both features (ADHD - predominantly combined) (American Psychiatric Association, 2013). Individuals with ADHD - predominantly inattentive, may be inattentive to details, struggle to complete tasks, follow directions, may appear not to be listening when addressed, dislike activities that require long periods of sustained focus, challenges with planning and organizing, and forget essential things (e.g;. homework, textbooks, work documents.) (American Psychiatric Association, 2013). People with ADHD - predominantly hyperactive, may appear restless, struggle to remain seated in settings "where remaining seated is expected", have a tendency to interrupt a person in a conversation, often answers questions before a question is fully relayed, is overly talkative, and is consistently "on the go" or "driven by a motor" (Swedo et al, 2013, p. 60). According to the DSM-5, males more often receive a diagnosis of ADHD "with a ratio of approximately 2:1 in children and 1.6:1 in

adults" It is also mentioned that females with ADHD more often present deficits in attention, (Swedo et al, 2017, p. 63).

ADHD and Attention

Attention is a critical component of humans' ability to function every day and in various situations. When a person's attention is impaired, executing tasks and participating in daily life is more challenging and can lead to lower academic achievement, social exclusion, and difficulties establishing employment (Swedo et al, 2013). Mind-wandering is deliberate or spontaneous and is frequently related to future events or current personal problems, which can interfere with thought processes and completing tasks, especially for those with ADHD (Bayard et al., 2020). Although an estimated 30-50 % of an average person's mental activity consists of mind-wandering (Bayard, et al, 2020), those with ADHD diagnosis appear to experience this (Mowlem et al. 2016; Biederman et al. 2017, 2019; Mowlem et al. 201, as cited in Bayard et al, 2020). One characteristic of a mind-wandering episode is a lack of pattern and which at times is abnormal (Asherson et al., 2016). Excessive mind-wandering and inattentive states disengages the individual from their immediate stimuli. Some studies have even shown how these states can have an adverse effect on task performance and the potential to put a person at risk of injury (e.g., operation of motor vehicles) (Dündar, 2015; He, Becic, Lee, & McCarley, 2011; Lerner, Baldwin, Higgins, Lee, & Schooler, 2015, as cited in Berberian et al. 2018).

ADHD and Self-Regulation

The ADHD presentations of hyperactivity, impulsivity, and inattention are argued to be the cause of underlying deficits of self-regulation, according to Barkley (2011). Barkley explains that the self-regulatory skills, which are possible through executive functions include "inhibition, resistance to distraction, self-awareness, working memory, emotional self-control, and even self-motivation" (Barkley,

2011, para 5). However, it is important to note that executive functions and self-regulation both have similar definitions, which according to Barkley, are nearly the same. Barkley argues that "...each executive functioning skill can be considered to be a type or special form of self-regulation – a specific class to actions that people direct at themselves to change their behavior so as to alter a future consequence or likelihood of attaining a goal" (Barkley, 2011, para 5). Researchers are also discovering that each individual has a limited amount of energy that can be devoted to self-regulation tasks, a phenomenon known as a "resource pool of effort" (Barkley, 2011, p. 426). A person's ability to engage in various self-regulatory skills for a prolonged period of time will gradually decrease (Barkley, 2011). Arguably, people diagnosed with ADHD experience exceptional rates of resource pool consumption, which causes enhanced challenges in their routine tasks. Given Barkley's theory that ADHD is a result of underlying deficits in executive functions and self-regulation, it would make sense that people with a diagnosis of ADHD would often experience declines in their "resource pool of effort" (Barkley, 2011, p. 426).

ADHD and Academic Challenges

Challenges in the cognitive foundational processes for learning pose numerous concerns for students. Executive functions and self-regulation are foundational mechanisms for learning, which leads to concerns regarding students with ADHD. According to Goldrich (2017), children diagnosed with ADHD have presented delays of up to 30% in executive functioning tasks, compared to children not diagnosed with the disorder. The heightened academic challenges students with ADHD experience can lead to increased frustration, anxiety, and fear of judgement, causing additional repercussions in students' performance (Goldrich, 2017). Research suggests that the population of emerging adults in higher education who have ADHD is increasing (Eagan et al., 2017; Weyandt & DuPaul, 2013, as cited in DuPaul 2021) despite that they are at a heightened risk of not receiving their credentials and obtaining lower grades than their peers

without ADHD (Weyandt & DuPaul, 2013, as cited in DuPaul et al. 2018). In a study conducted by DuPaul et al. (2018) students in their first-year of post-secondary education in the categories of ADHD, ADHD and Learning Disability, and Learning Disability all self-reported significant levels of disengagement in their academics compared to students with no diagnosis of ADHD or Learning Disability. However, students with exclusive ADHD and ADHD with Learning Disability self-reported higher levels of academic disengagement compared to students in the Learning Disability category (DuPaul et al, 2018). It has been suggested that one of the factors involved in these risks is the additional responsibilities students take on that require different executive functioning skills, which are impaired in individuals with ADHD (DuPaul et al, 2018).

ADHD and Mental Health Challenges Related to Academics

The DSM-5 lists other psychiatric disorders that are highly comorbid with ADHD in adults, such as learning disabilities, mood disorders, anxiety disorders, and personality disorders. (Swedo et al, 2017). This can pose challenges for adults pursuing higher education. Interestingly, researchers are observing that the population of students with an ADHD diagnosis in higher education is increasing, (Eagan et al, 2017; Weyandt & DuPaul, 2013, as cited in DuPaul et al, 2021) yet they more frequently experience challenges in comparison to their peers without ADHD, including lower GPA scores and not receiving their credentials (DuPaul et al, 2021). In a separate study, Anastopoulos et al. (2019) found a statistically significant difference in rates of mood disorders, anxiety disorders, and learning disabilities in participants with a diagnosis of ADHD compared to the non-ADHD comparison group (Anastopoulos et al, 2019). The disadvantages and risks this population experiences is incredibly distressing and leads to adverse effects in their opportunities for employment, socioeconomic status, and social life.

Reading and Engagement

Reading, Metacognition, and E-Learning

According to Burin et al. (2020), metacognition involves various self-regulatory strategies. "In the reading comprehension literature, metacognition encompasses setting a reading task goal and planning towards it, ongoing monitoring to adapt reading behavior, and enacting strategies to support comprehension (Afflerbach et al. 2017; Cromley & Azevedo 2011, as cited in Burin et al, 2020). When readers actively reflect on their own reading and learning process through reading strategies, learners are likely to experience superior levels of engagement and reading comprehension (Cromley & Azevedo, as cited in Burin et al, 2020).

According to Wolf (2019) the comparison between physical books and e-books differentiates significantly in terms of the readers' awareness. When reading physical books, readers are physically interacting with the text (e.g; holding the book, flipping pages, bookmarking pages). While e-books allow learners to scroll through pages, save texts in our computers' hardware, as well as highlight and select important sections, we are not receiving the same physical feedback as when we interact with physical books (Wolf, 2019). Furthermore, the easily accessible resources accompanied by e-books, such as hyperlinked resources, is argued to lead learners to becoming "distracted readers" (Wolf & Barzillai, 2009, p. 34).

Developing a Biliterate Brain

Maryanne Wolf's (2019) novel *Reader Come Home: The Reading Brain in a Digital World,* discusses the processes involved in the reading circuit, and the prerequisites needed to develop our reading skills. According to Wolf (2019), reading is not an innate ability; there are various neuronal mechanisms and processes that take part in our ability to read and interpret

information. Further, Wolf discusses the importance of deep reading processes, which are crucial for learners. Briefly, the deep reading processes Wolf discusses in her novel involve making connections through the appreciation and reflection of others' perspectives, actively engaging in one's learning by analyzing what they currently know and setting goals, as well as reflecting one's learning by applying new knowledge to various contexts (Wolf, 2019). Wolf also argues that the proliferation of e-texts is potentially endangering the deep reading processes that occur in our reading circuit (Wolf, 2019). She continues to explain that the decrease in people reading physical books is leading to a decline of use of readers' deep reading processes, because reading a screen promotes more "skimming" (Wolf, 2019, p. 77). Wolf's proposal is that our generation begin to foster "the biliterate brain" (Wolf, 2019, p. 168-170), which simply means transferring deep reading processes between physical books and e-books (Wolf, 2019, p. 178). Developing the biliterate brain involves developing metacognitive strategies to apply while reading and learning, which involves time and practice, that the current generation guides the younger and future generations (Wolf, 2019).

Reading With Purpose: Prepping for Understanding and Discussion with Questions

The Reading With Purpose method (Mackinnon, 2019), an adaptation of the Question Formulation Technique (Rothstein and Santana, 2011), is a reading tool aimed to help learners enhance their reading comprehension, engagement, as well as prepare them for group discussions based on what they learned. In the Question Formulation Technique, learners begin the questioning process based on a given or chosen topic. In contrast, the RWP method is a six step exercise, in which readers must ask questions as they are reading, as well as to identify answered questions. At the end, readers are to write about what they learned from the text, as well as

identify any remaining questions they have, which were not answered and to prioritize them based on the learner's goals. Any remaining inquiries can be topics for essays, projects, class discussions, and further inquiry. The steps involved in the RWP method, that involves learners to continuously ask questions that lead to answers, could have the potential to involve the metacognitive awareness which are necessary for readers to maintain focus (Burin et al. 2020).

The Current Study

Given the rise in the number of students diagnosed with ADHD who are enrolling in university and requiring academic accommodations and new forms of reading modalities (i.e.., online vs. print), it is important to investigate ways of helping such students achieve a successful academic experience and overall learning. The purpose of this study is to initially explore the effectiveness of the Reading with Purpose method on assimilating written material and the level of engagement of learners when using this method. It is hoped the results of this study will inform future researchers who wish to study the RwP method who wish to collect data on a larger scale.

Hypothesis

Previous research (DuPaul et al, 2017) has suggested that students with ADHD experience less engagement in the classroom and in their independent studies. The Reading with Purpose Method is a reading tool used to help enhance learners' engagement and reading comprehension by implementing methods of inquiry (Reading with Purpose, MacKinnon, 2019). There are two hypotheses for this study:

Hypothesis 1

Participants assigned to the experimental condition (Reading with Purpose) will a) obtain greater reading scores than the control group (reading as normal), and b) report higher levels of engagement.

Hypothesis 2

Participants with a diagnosis of ADHD would a) obtain similar reading scores than non-ADHD participants and b) report higher levels of engagement when using the Reading with Purpose method.

Method

Participants

Undergraduate students from the University of Prince Edward Island were recruited to participate in an online study. There were 47.8% of participants who completed the study to the end. Of this sample, there were a total of 47 participants (38 female, 8 male, and 1 who preferred not to answer) with a mean age of 21.1. The majority of participants were first-year students (60.9%) and second year students (23.9%), while the other participants were in their third, fourth, and fifth year of undergraduate school. Over half of participants (57.4%) reported English as their primary language, while 18 participants (38.3%) who reported that their main language is English, but that they speak other languages. Interestingly, 4.3% of participants did not report that they spoke English, despite their participation in the current study. Due to their ability to answer, it can be assumed that either they did not understand the question or that they believed that the ability to speak English was implied. One of the purposes of this study was to determine whether or not the RwP method was equally beneficial for students with ADHD and students with no diagnosis of ADHD. For this reason, we attempted to recruit students diagnosed

with ADHD, or who experience symptoms related to ADHD. The study revealed that 9 participants with self-identified formal diagnosis of ADHD, while 17 participants reported that they often experience symptoms of ADHD. Students who reported that they have a diagnosis of ADHD were ADHD - Inattentive (n = 2), ADHD - Hyperactive (n = 1), ADHD - Combined (n = 1), and ADHD with no specified form form (n = 5).

Procedure

Researchers were given approval by the research ethics board at the University of Prince Edward Island to conduct the current study. Undergraduate students were recruited through Accessibility Services, the Psychology Department, and through online posts to the University of Prince Edward Island's Psychology Society group page. The informed consent, survey questions, instructions on RwP, reading material, and debriefing form were all administered through LimeSurvey, an online platform. The intervention was completely self-guided and there was no time limit to complete the study, but encouraged to contact the researchers if any questions aroseParticipants were asked to respond to a socio-demographics information questionnaire and two other questionnaires; one regarding the participants' overall attitude towards their academics, and an ADHD scale questionnaire, which was based on a modified version of the Wender-Utah Ratings Scale (WURS). In order to randomly assign students to conditions, they were asked if the date of their birth was odd or even. For example if they were born on June 22nd, they would respond as even (22 is an even number). The same applied for odd-numbered birthdates. It was hoped that in this way there would be a random assignment of participants to each condition. Participants who responded "even" were assigned to the control condition (N = 28) and participants who answered "odd" were placed in the experimental condition (N = 19). Participants in both conditions were directed to read a piece of literature titled "Correlates of

Food Insecurity Among Undergraduate Students" (Bottoroff et al., 2020). Participants in the experimental condition, however, were instructed to read the reading intervention guidelines (See appendix I), and were directed to implement the intervention as they were reading the text. Individuals in the control condition were asked to read the article and were not exposed to the reading strategy. Following the reading, participants in the experimental condition were asked to share the questions they had accumulated based on their reading as instructed in the RwP method. They were also asked to rank their questions by priority..

Both conditions were then asked to complete a reading comprehension quiz, that consisted of eight multiple choice questions. The questions formulated by the researchers and based on the main themes and findings of the article. Two undergraduate students who were not involved in the study were asked to read the article, and to complete the reading comprehension quiz. The students provided feedback based on readability, accuracy, and difficulty of questions. The feedback was incorporated into the questions. After participants in the control condition completed the quiz, they were asked to list any questions they had about the article. Individuals in the experimental group were asked to rate their experience and thoughts regarding the reading strategy. Lastly, both conditions were asked to reflect on their experience reading the article and to answer questions related to engagement.

Instruments

Socio-demographic Items

Participants were asked a variety of questions, such as their age, gender, language(s) spoken, first language(s) in which they learned how to read and write, marital status, ethnicity,

income, employment, student status, year of study, as well as their overall GPA. For the purposes of this study, it was important to learn if participants had a diagnosis of ADHD. We also asked participants who reported having a diagnosis of ADHD to specify the type of ADHD they were diagnosed with (e.g, Inattentive, Hyperactive, Combined). We also asked students if they were registered through Accessibility Services. Additionally, participants were asked if they suspected having an ADHD diagnosis but had not yet completed a formal assessment. We hoped that by doing this we might also capture an important segment of the university population who perceived themselves as presenting with some symptoms of ADHD. The socio-demographic information gathered are valuable to consider when evaluating attention, engagement, and reading scores.

Predictor Variables

Wender Utah Rating Scale (WURS), (Ward, Wender, & Reimherr, 1993)

The WURS Scale is a 61 item-scale that measures challenges with attention, hyperactivity, impulsivity, and mood, relative to the patient's childhood. For the purposes of this study, the researchers chose to use the questions that were related to ADHD only (n = 17).. These items were rated on a scale of 1 - 5 where 1 = "completely disagree" and 5 = "completely agree". included issues related to academic challenges, social life, attention, hyperactivity, and impulsivity. Participants were asked to rate themselves on statements such as "I was shy and sensitive," "I had trouble sitting still for long periods of time," and "I had trouble making friends." Other questions administered from the WURS were related academic challenges as a child. Participants were asked to rate themselves on statements such as "I struggled with mathematics and numbers," "I had trouble learning how to read," and "I was slow to learn" (see

appendix G). No items needed to be reversed scored and a total mean score was calculated. Cronbach's α for ADHD scores was 0.82.

Outcome Variables

Reading Score

Participants were instructed to read an article titled "Correlates of Food Insecurity Among Undergraduate Students" (Bottoroff et al., 2020) and answer a reading comprehension quiz based on the text. This article was chosen for three reasons. Firstly, researchers wanted participants to read an article that students could relate to the topic. "Correlates of Food Insecurity Among Undergraduate Students" (Bottoroff et al., 2020) address the issue of food insecurity among students, as well as common factors related to food insecurity. Secondly, researchers wanted to replicate the reading difficulty of assigned readings participants read for their classes. The assigned reading is an academic article and eight pages in length. The readability score of the article was analyzed by calculating the Flesch Reading Ease Score, which was 32.5. This score indicates the article's reading range is at a college level.Lastly, to further replicate reading material participants are assigned in their classes, researchers chose an article that is not particularly exciting or sensationalist, but could be educational and offer opportunities for students to engage in critical thinking and inquiry. Participants had no maximum time limit to complete the reading or the quiz.

Engagement Score

One of the main purposes of this study was to determine participants' level of engagement while reading the article researchers administered. After participants completed the article and reading comprehension quiz, they were asked to rate their levels of engagement, focus, and interest while reading the article. Participants could rate their levels of engagement on

a scale from 1 1 (strongly disagree) to 5 (completely agree) on items such as “I was interested in the article,” “I was focused while reading the article,” and “I felt engaged while reading the article.” (see appendix K). Engagement scores were calculated based on the mean score of three items related to engagement (interest in reading the article, self-reported level of focus, and self-reported level of engagement). Cronbach’s alpha for total engagement was 0.83.

Results

Descriptive Analysis

Means, standard deviations, and frequencies were completed on demographic, predictor and outcome variables. A correlation matrix of descriptive, predictor and outcome variables was completed. The variables included age, gender, socioeconomic status, employment, marital status, year of study, students status, ADHD scores, engagement score, and reading score. A positive correlation was found between participants who reported that they enjoy reading with reports of keen interests in learning(r[45]) = .61, $p < .001$). A negative correlation was found between participants who reported having trouble in school as a child and their interest in class discussions (r[45] = -.30, p = .04). There was also a negative correlation found between participants who reported trouble in school as a child and completing assigned readings (r[45] = -.34, p = .02). A positive correlation between self-reported interest in learning and self-reported enjoyment of class discussions was found (r[45] = .81, $p < .001$). There was a positive correlation found between participants who enjoy class discussions and participants who frequently ask their instructors questions (r[45] = .49, $p < .001$). A negative correlation was found between ADHD scores with frequency of completing assigned readings (r[45] = -.38, p = .01). Also, a negative correlation was found between ADHD mean scores and the total time spent to complete the current study (r[45] = -.38, p = .01).

You'll need to include the Means of Engagement and reading scores for control and experimental groups somewhere in hypothesis 1.

Hypothesis 1: Participants assigned to the experimental condition would obtain greater reading scores and report higher levels of engagement.

An independent t-test was used to compare the experimental and control group with engagement and reading scores. There was no significant difference between RwP (M = 5.36, SD = 1.18) and the control group (M = 5.12, SD = 1.56) on reading scores (t[45] = -.059, p = .55). No no significant difference was found between RwP (M = 2.92, SD = 0.75) and the control group (M = 2.49, SD = 1.02) on reading engagement scores (t[45] = -1.62, p = .11). We were not able to find statically significant findings, the null hypothesis is supported.

Hypothesis 2: Participants with a diagnosis of ADHD and individuals with no diagnosis would experience equal benefits of engagement and reading comprehension scores from the Reading with Purpose strategy.

There were only two participants who had a diagnosis of ADHD and were in the Because of the insufficient number, we did not perform any statistical analysis.

Exploratory Analyses

Further exploratory analysis was conducted to identify any notable pattern of responses or relationships among variables.

An independent t-test was used to compare self-identified ADHD and non-ADHD groups with engagement and reading scores. There were no statistically significant differences between participants with and without ADHD and their reading scores (t[45] = -0.24 , p = .81). However,

there was a statistically significant difference found between participants with and without ADHD and total engagement scores. It was found that participants with a self-reported diagnosis of ADHD had a lower total engagement score (M =2.11, SD =.55) (t[45]= 2.19, p<.03) compared to participants who did not self-report a diagnosis of ADHD (M= 2.83, SD= .94).

Further inspection of the data revealed that there were 6 participants who did not submit questions in the Reading with Purpose section. Further analysis revealed a statistically significant difference (F[2, 19] = 11.3, p < .001) in the total time each participant took to complete the survey. The control group completed the survey with a mean of 1038 (SD = 567) seconds, those assigned to the experimental condition who did submit questions completed the survey with a mean of 1896 (SD = 807) seconds, and those assigned the experimental condition who did not submit questions completed the survey with a mean of 707 (SD = 267). Based on the mean time of the experimental group who did not submit their questions, we can assume that they did not properly complete the study. Given these findings, a One-Way ANOVA was conducted to explore reading and engagement scores among the three groups. After running a One-Way ANOVA to compare the reading and engagement scores between the three groups, no statistically significant differences were found between the groups and the reading (F[2, 21] = 2.79, p = .084) and engagement scores (F[2, 16] = 1.05, p = .586).

After additional analysis of the data, it was found that participants who reported not having ADHD, but experienced symptoms of the disorder, appeared to have a higher ADHD mean when compared with the no self-report ADHD group. A new variable was created, to analyze participants who self-reported a diagnosis of ADHD, participants who did not report a diagnosis of the disorder, and participants did not report a diagnosis, but reported that they experience symptoms of ADHD. A One-Way ANOVA was conducted and a statistically

significant difference was found between the ADHD Diagnosis group (N = 9) , ADHD no diagnosis group (N = 21), and Symptomatic group (N = 17) ($F[2, 23]= 21.7$, $p < .001$). A Shapiro-Wilk test was conducted to check for normality and revealed that the groups are not statistically significant ($W[2, 23] = .98$, $p = .71$). Based on this finding, researchers ran an ANOVA to compare participants in the conditions who self-reported ADHD, participants who did not report a diagnosis, and participants who reported symptoms of ADHD, but no diagnosis. No significant findings were found between groups and reading scores ($F[2,22] = 2.20$, $p = .13$), however, there was a statistically significant difference between the groups and engagement scores ($F[2,27] = 4.93$, $p = 0.02$).

Discussion

The purpose of this study was to explore the relationship between the Reading with Purpose method, reading comprehension, and engagement in undergraduate students with and without ADHD. The results showed that there were no significant differences on reading scores and engagement level between those who completed a self-directed online Reading with Purpose method and those who did not.. Based on the findings of this study, it is uncertain if a self-directed, online version of the Reading with Purpose method increases reading comprehension scores or engagement scores, nor can it concluded that the online and self-directed Reading with Purpose strategy is more or less effective for participants with a self-reported diagnosis of ADHD.

Metacognition is an important factor when focusing on reading comprehension (Burin et al, 2020), but our findings did not indicate a relationship between the reading intervention and reading comprehension within an online self-guided method. It is important to note that because

this study was conducted entirely online, this likely affected the results of reading comprehension scores and engagement scores typically found in the literature (Burin et al, 2020). This is important because the nature of online learning might require new methods and approaches to learning.

Although more data is needed, it is important to note that a self-guided approach may not favor inquiry based-learning in the format that we presented although there might be some benefit to exploring the RwP approach with those who identify with ADHD symptoms or diagnosis, our study found the opposite:

ADHD groups (symptomatic or diagnosis) reported lower engagement scores than a non-ADHD-group. The difference in engagement scores between the ADHD groups is consistent with previous research that suggests students with ADHD experience higher disengagement scores than their peers without ADHD in higher education (DuPaul et al, 2018).

Participants completed the study and read the administered article online. It is important to consider that previous research has suggested that learners' experience reading a physical book versus an e-book is different in terms of the readers' awareness and attention (Wolf, 2019).Wolf argues that the proliferation of readers turning to online resources leads to a decline in readers' comprehension and attention. Research suggests that online reading contains more opportunities for distractions, leading to less information intake and reading comprehension than reading a physical book (Wolf & Barzillai, 2009). This might have been the case for our study. Reading online promotes "skimming" and searching for keywords (Wolf, 2019). Although technological advances are likely to continue, especially in online reading and learning contexts, we can adapt to our changing society and adjust *how* we read.

Limitations and Future Research

One of the limitations of this research is that the sample size is relatively small and does not provide an accurate representation of students with a diagnosis of ADHD in post-secondary schools across Canada. The majority of participants in this study were in first-year and second-year of their university degrees, and were females. However, it is important to note that there are differences in ADHD presentation between males and females for the future recruitment of studies of ADHD. For example, according to the DSM-5 it states that more females than males with ADHD will present inattentiveness (American Psychiatric Association, 2013). if future research studies recruited more male and female participants, the differences in ADHD presentation should be considered. Although there was an adequate attempt to recruit individuals diagnosed with ADHD, this sample size is small. Although, further exploratory analysis revealed that participants who reported a possibility of having an ADHD diagnosis or perceived themselves as having symptoms ofADHD, also reported a higher ADHD mean score on the WURS ADHD items. This is important because it reveals that there might be a segment of the student population that is underserved. These students who report symptoms may have not received a formal assessment which could access student services. This is important to consider because ADHD assessment can be expensive. One limitation of our study is that we asked students about current socioeconomic status, but inquiring about participants' family of origin's socioeconomic status might reveal more pertinent information regarding service and access.

It would be noted that over half of our participants began, but did finalize the study (and thus were eliminated from analysis). This study occurred during a global pandemic and while most participants are completing their studies online. The study was conducted online, which may have created issues of reliability and validity. Furthermore, the procedure took a

considerable amount of time to complete, which may have discouraged participants from finishing the study. The control group and the experimental group's range of time to finish the study was 17 minutes and 30 minutes.

Furthermore, participants did not have a time limit to complete the study. This, compounded with the self-directed and online nature of the data collection made so that some important parts of the RwP were not completed. For example, the final step of the Reading with Purpose strategy is to discuss questions with peers. The discussion at the end of the process might enhance learner engagement, especially in learners with ADHD in future studies.

In this study we did not ask if participants had previous experience using a similar reading intervention or practicing questioning methods. Some students might have had some experiences while others did not. Achieving a metacognitive reading strategy might require a long period of training. For example students might have required more training to engage in a metacognitive reading strategy. Future studies may consider administering additional instructions in reading strategies before the test phase, explore the use of teaching this strategy online, but with a live instructor, and/or lead students to practice this strategy at many time intervals. Future studies should include questions regarding participants' past experience with inquiry-based learning and reading interventions.

It is also important to mention that this study did not ask participants with a diagnosis of ADHD about their treatment method, specifically whether they were receiving pharmaceutical treatment, which could possibly contribute to more average results in our study. individual results. Future studies should ask participants with ADHD if they are being treated with medication and the strategis they implement in which they find success coping with ADHD.

Another possible limitation is the reading level of the article given to participants. Although the article was considered to be at a college reading level, it is important to consider that over half of the participants were in their first year of their undergraduate degree-- a level that might have been advanced for this group. Future studies may wish to explore different reading levels for a similar age group, but also at different age groups and their corresponding reading levels. Young learners might benefit from this type of approach.

Conclusions

This study proposed to explore the relationship between the Reading with Purpose method (MacKinnon, 2019), reading comprehension, and engagement in undergraduate students with and without ADHD. While the results did not support our hypothesis, more research is needed to provide additional information regarding readers' engagement and reading

comprehension scores while practicing the Reading with Purpose strategy, especially within the framework of exploring more guided, online, and presidential studies. These results have several implications especially in an era in which there is a rise of self-paced and self-guided online learning. If this is the case, how effective is learning critical skills for reading online? While this study did not mitigate online learning from self-guided learning, this will be an important question for future researchers who study the application of inquiry to learning.

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Appendices

Appendix A

Hello,

Thank you for your interest in the study "Exploring Reading and Engagement in Post-Secondary Students." We are conducting a research study about attention, retention, and engagement through reading. This study is being conducted by Psychology Honours Student Hannah Bowley, under the supervision of Dr. Raquel Hoersting in the Psychology Department at UPEI.

This study will be held online and will require the use of a computer, laptop, or tablet, and reliable internet access. Your participation would involve answering a questionnaire, reading a piece of literature that we would provide, and answering short answer questions about the given text. Your participation will be completely voluntary and all information you provide will be kept confidential. Participation in this study can earn students in PSY 1020 a 1% bonus mark towards their final grade. Students enrolled in PSY 1020 and who do not wish to participate in the study have the option of completing a written essay to receive a 1% bonus mark towards their final grade. Also, p Participants not enrolled in PSY 1020 and who do not receive the 1% bonus mark can be entered into a draw for a chance to win a $25.00 Indigo gift card. The total time required to participate in this study would be 60 - 105 minutes.

If you are interested in participating in this study, please contact Hannah at hbowley@upei.ca. If you have any questions or concerns with regards to the ethics of this study, you may consult with Dr. Raquel Hoersting at rhoersting@upei.ca, Dr. Tracy Doucette, Chair of the Psychology Department tdoucette@upei.ca, or the UPEI REB at researcherportal@upei.ca or 902-620-5104. Thank you for your interest.

Sincerely,

[redacted]

Appendix B

Honours Student Research Confidentiality Statement

As an Honours Student in the Department of Psychology and with approved research by the Research Ethics Board at the University of Prince Edward Island and under the supervision of Dr. Raquel Hoersting, I understand that I may have access to confidential information such as participants' personal information, participants' data, and similar privileged participant information. I understand that performing research in the Department of Psychology and approved by the Research Ethics Board means that I must accept responsibility to preserve the confidentiality of this participant information. I also understand that breaking confidentiality can result in the termination of my current and future research.

I have read the above research confidentiality statement and understand and accept the responsibility to preserve the confidentiality of privileged information.

I confirm that I am eligible to apply to the Canadian Research Ethics Board for approval.

Honours Student Name Hannah Bowley
(please print)

Honours Student Signature [redacted]

Supervisor / Staff signature [redacted]

Psychology
Thesis Supervisor

Date: March 22, 2021

Appendix C

Participant Information Sheet

You have been invited to participate in a research project titled "Exploring Reading and Engagement in Post-Secondary Students." This study is being conducted by Honours Student Hannah Bowley under the supervision of Dr. Raquel Hoersting in the Department of Psychology at the University of Prince Edward Island. Purpose of the Study: The purpose of this study is to learn more about students' attention, retention, and engagement with reading materials in post-secondary programs. We are also interested to learn about students' who have Attention Deficit Hyperactivity Disorder (ADHD) and their attention, retention and engagement with reading materials. Participants will include first to fourth-year undergraduate students from various faculties and will comprise of students diagnosed with ADHD and students with no diagnosis. This study will contribute to our understanding of cognitive functions and reading comprehension in higher education and further contribute to the literature on ADHD, higher education, and strategies that can improve students' academic experiences and successes.

What Will I Be Asked To Do?

You will be asked to respond to two questionnaires that will take approximately 25-40 minutes to complete in total. The questionnaires will ask you to identify general information about yourself, as well as your level of attentiveness and overall attitude towards academics. You will then be asked to read a piece of literature that will be provided to you, which will take approximately 15-30 minutes to read. Following the reading, you will be asked to list questions that you may have after completing the reading. You will then be asked to complete a short multiple-choice quiz which will take no more than 15 minutes to finish. Finally, we will ask you to complete a second questionnaire that will ask questions regarding your thoughts and attitudes towards the reading. All materials must be completed online.

What Personal Information Will I Be Asked?

You will be asked to provide some basic information about yourself, such as your approximate age, gender, level of study, and ethnicity. You will also be asked if you have a diagnosis of ADHD. If you are enrolled in PSY 1020, you must provide your student ID# to receive the 1% bonus credit towards your final grade. You will also be asked a series of questions related to your overall attentiveness and anxiety levels. All of your information will be kept separate from your

data, and any quotes used will be given a random participant number to further avoid identification.

What Happens to the Information I Provide?

Participation is entirely voluntary. You are free to discontinue participation at any time during the study. No one except the researchers will see any of the answers to the questionnaires in Participant Information this study. Only group data will be summarized for any presentation or publication of results. Any quotes used will be given a random participant number to further avoid identification. Once downloaded, however, the anonymous data will be stored in encrypted form on a computer in a locked office in the Psychology Department. This anonymous data will be stored for five years at the University of Prince Edward Island in a locked office.

Are There Any Risks or Benefits if I Participate?

We do not believe there are any direct risks associated with your participation in this study. However, because we are asking about a number of dimensions regarding attentiveness, anxiety, and academics, it may be that your responses might cause you to become more aware of the potentially challenging nature of your current situation. If you find that you would like to discuss any of the personal issues that you reflect upon while completing this study, we strongly encourage you to contact the Student Services office. The Student Services office is located on the fifth floor of Dalton Hall. You can contact them via phone (902-566-0488) or by email (studentserv@upei.ca) to book an appointment. A detailed list of academic resources available to you on campus and in the community is also available at the end of the study. Your decision to participate or not to participate or to withdraw from the study will have no impact whatsoever on your standing in any of your classes. Participants who are enrolled in PSY 1020 will receive a 1% bonus mark to their final grade for participating in the study. Participants who are not enrolled in PSY 1020 will be entered into a draw for a $25.00 Indigo gift card.

Indication of Consent:

At any time, you may decline from or stop participating in this study. Once you have clicked "Submit" at the end of the survey, your data can no longer be deleted. Clicking "Submit" indicates your consent to have your data added to the collection for analysis.

Questions/Concerns:

If you have any questions or concerns about this study, you may contact Dr. Raquel Hoersting rhoersting@upei.ca or Hannah Bowley hbowley@upei.ca .

Appendix D

Participant Consent

You have been invited to participate in a study titled "Exploring Reading and Engagement in Post-Secondary Students." This study is being conducted by Dr. Raquel Hoersting in the Psychology Department at the University of Prince Edward Island. The purpose of this study is to explore student engagement and reading comprehension in post-secondary students.

By clicking submit, I agree that I understand:

I can contact the UPEI Research Ethics Board at (902) 620-5104 or by email at reb@upei.ca researcherportal@upei.ca if I have any concerns about the ethics of this study.

I have the freedom to withdraw from this study at any time and/or not answer any question without any repercussions.

I can print and keep a copy of this consent form.

My information will be kept confidential within the limits of the law.

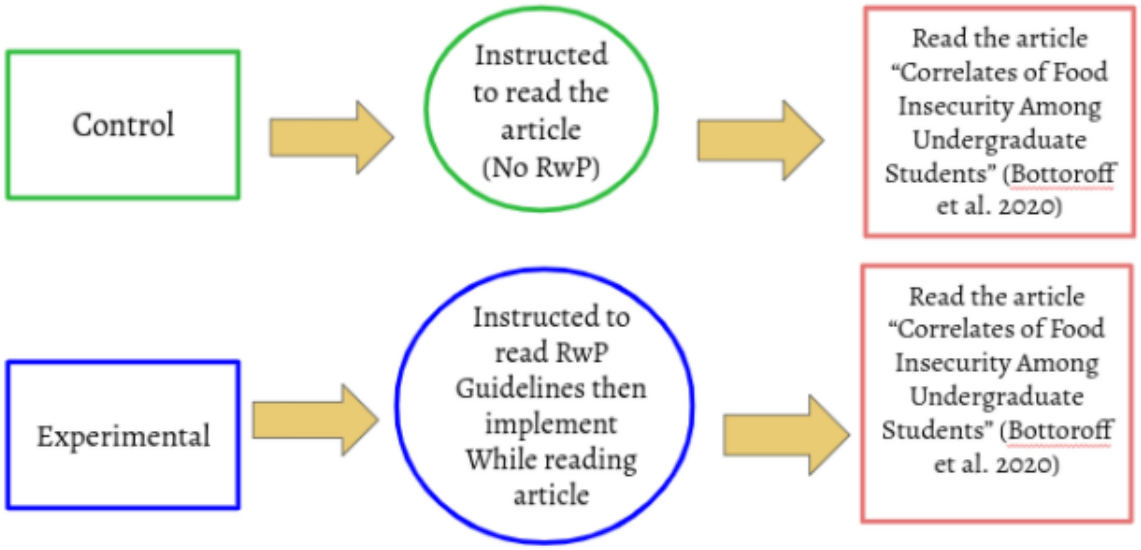
YES NO I agree that quotes from my data may be used provided they will be identified with a randomized participant number.

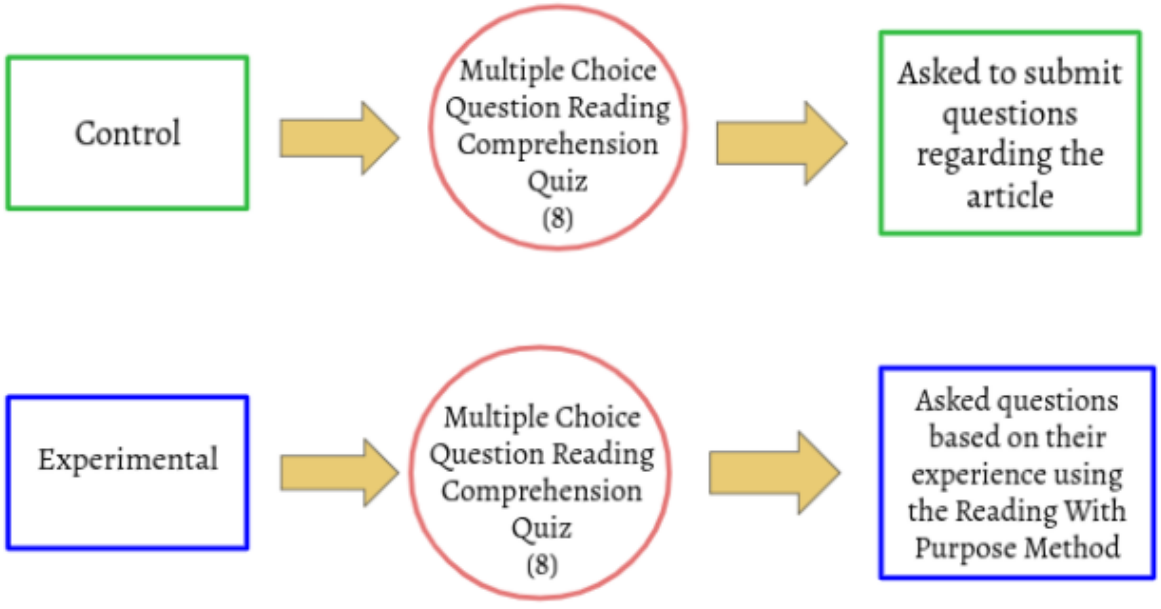
If you have any questions with regard to this study, you may consult with:

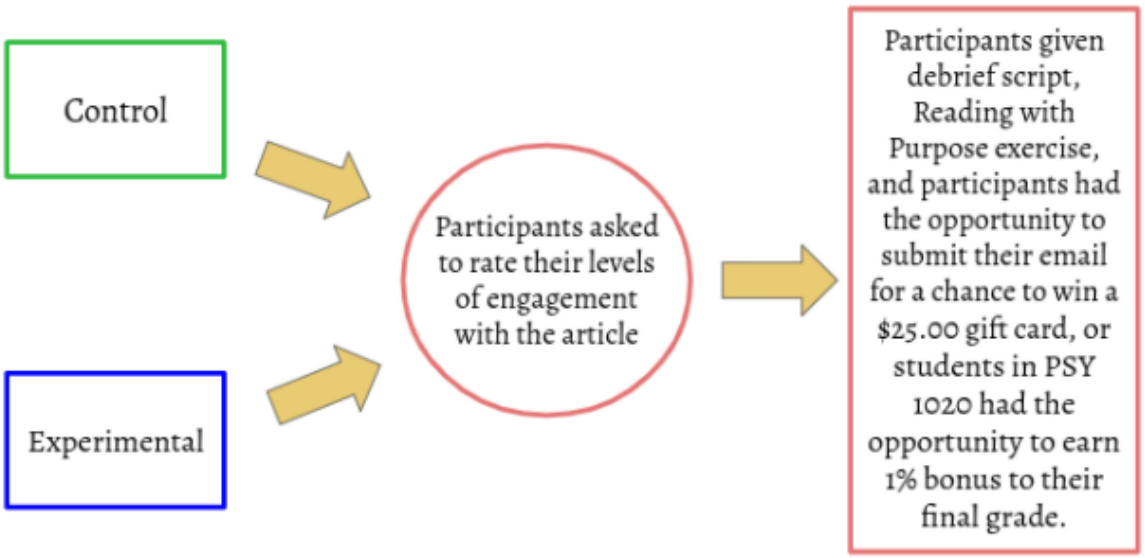
Dr. Raquel Hoersting rhoersting@upei.ca or Hannah Bowley hbowley@upei.ca

Appendix E


Participants clicked on link
Demographic Questions ADHD Questions (WURS)
Participants randomly assigned to conditions (birthdates)
Control
Experimental


Control
Instructed to read the article (No RwP)
Read the article "Correlates of Food Insecurity Among Undergraduate Students" (Bottoroff et al. 2020)
Experimental
Instructed to read RwP Guidelines then implement While reading article
Read the article "Correlates of Food Insecurity Among Undergraduate Students" (Bottoroff et al. 2020)


Control
Multiple Choice Question Reading Comprehension Quiz (8)
Asked to submit questions regarding the article
Experimental
Multiple Choice Question Reading Comprehension Quiz (8)
Asked questions based on their experience using the Reading With Purpose Method



Appendix F

Questionnaire 1

Part 1 Demographics

1. How old are you?

A. Under 18
B. 19-24
C. 24-30
D. 30-39
E. 40+

2. What is your gender?
    A. Male
    B. Female
    C. Transgender Male
    D. Transgender Female
    E. Gender Variant/Non-Conforming
    F. Other:
    G. Prefer not to answer

3. Which languages do you speak?

4. Which languages did you first learn to read and write?

5. What is your marital status?
    A. Single
    B. Married
    C. Common-law
    D. Divorced
    E. Widowed

6. Please describe your ethnicity

7. Please tell us your country of origin and how long you have resided in that country. *Example: China, 15 years* ***or*** *Canada, 21 years.*

8. What is your total household income per year?
    A. Less than $20,000
    B. $20,000 - $50,000
    C. $50,000 - $80,000
    D. $80,000 - $110,000
    E. $110,000 - $130,000
    F. Greater than $130,000

9. Please indicate your employment status
    A. Employed full-time
    B. Employed part-time
    C. Employed casual
    D. Internship
    E. Seasonal worker
    F. Unemployed - Looking for work
    G. Unemployed - Not looking for work
    H. Retired

10. Are you a part-time or full-time student?
    A. Part-Time
    B. Full-Time

11. Do you have a diagnosis of ADHD? If "yes," please indicate what type.

    A. No
    B. Yes
        a. ADHD - predominantly hyperactive
        b. ADHD - predominantly inattentive
        c. ADHD - mixed
        d. I don't know
        e. I was not formally diagnosed with ADHD

12. Are you currently registered with Accessibility Services at UPEI?
    A. Yes, for ADHD
    B. Yes, but for something other than ADHD
    C. No

Part 2 Academics

13. What is your year of study?
    1st year
    2nd year
    3rd year
    4th year
    5th year +

14. What program are you currently enrolled in? *Example BA **or** BSc*

15. What is your current GPA?

Please indicate your level of confidence in the following

1	2	3	4	5
Very insecure		Neither insecure of confident		Very Confident

16. Reading English
17. Speaking English

Please indicate how much you agree or disagree with the following statements

1	2	3	4	5
Completely disagree		Neither disagree/agree		Completely agree

18. I am a good student.
19. I enjoy learning new things.
20. I take pride in my studies.
21. I am engaged with my classes.
22. I enjoy taking responsibility for my education.
23. I often participate in class discussions.
24. I ask my professor questions in class.
25. I ask my professor questions outside of class.
26. I always complete the assigned readings before class.
27. Overall, I enjoy reading.
28. I never ask questions.
29. I have difficulty completing readings before class
30. I have difficulty prioritizing my classes
31. I don't feel comfortable participating in class discussions
32. I am organized
33. I am often overwhelmed by my studies.
34. I enjoy reading
35. I often read books for pleasure

Part 3 Attention, Anxiety, Depression

Please indicate how frequently you experience the following

1	2	3	4
Never	Sometimes	Often	Daily

36. I have trouble multitasking
37. I struggle with beginning tasks
38. I have trouble completing tasks
39. I often forget/misplace things I need on a regular basis (e.g; wallet, textbook, important papers).
40. I prefer activities that are fast-paced
41. I interrupt other people
42. I am easily distracted
43. I find myself talking too much in social settings

Part 4 Engagement In School

Please indicate your attitude regarding the following

1	2	3	4	5
Disinterested	Slightly interested	Interested	Excited	Very Excited

61. Reading for school
62. Reading for pleasure
63. Class discussions
64. Small group discussions
65. Learning/study strategies
66. Learning something new
67. Reading a physical book
68. Reading text on your computer, laptop, or smartphone

Information for Students in PSY 1020

If you are a student currently enrolled in PSY 1020 and wish to receive the additional bonus mark towards your final grade, please provide the following information. Your information will be used strictly to give you your 1% credit towards your final grade and will **not** be included in this study.

69. First name
70. Last name
71. Student ID

Appendix G

Wender Utah Rating Scale

The following questions are concerning your childhood. Thinking back to when you were a child, indicate how much you agree or disagree with the following statements

1	2	3	4	5
Completely disagree		Neither disagree/agree		Completely agree

44. I was shy and sensitive
45. I had lots of friends
46. I had trouble sitting still for long periods of time
47. I had a good self-esteem
48. I was stubborn

49. I was easily distracted
50. I was afraid to try new things
51. I had trouble making friends
52. I would have been considered immature
53. I had a short temper
54. I was outgoing
55. I had trouble learning how to read
56. I struggled with mathematics and numbers
57. I was a fast learner
58. I was a good reader, but reading didn't interest me.
59. I was a slow reader
60. I was slow to learn

Appendix H

Reading with Purpose: Prepping for Understanding and Discussion with Questions

(Mackinnon, 2019)

As you read through the article/chapter, write down the questions it raises for you as you go

- Things that need clarification
- Need another example
- Issues with content
- Assumptions being made
- "extra ideas"

- As those questions are answered, check them off
- At the end of your reading write down what you learned
- Review your list of remaining questions and prioritize them based on your needs. These can be used as the basis for thought papers, discussion participation, presentations, projects etc…

Appendix I

Please read these instructions carefully

READING WITH PURPOSE

Prepping for Understanding and Discussion with Questions

1. USE A PAPER, PENCIL/PEN TO WRITE DOWN QUESTIONS AS YOU READ THE ARTICLE LINKED BELOW

2. THINK ABOUT:
   - THINGS THAT NEED CLARIFICATION
   - AN EXAMPLE OR OTHER EXAMPLES
   - ISSUES WITH CONTENT
   - ASSUMPTIONS THAT ARE BEING MADE
   - "EXTRA IDEAS"

3. AS THOSE QUESTIONS ARE ANSWERED, CHECK THEM OFF

4. AT THE END OF YOUR READING WRITE DOWN WHAT YOU LEARNED

5. REVIEW YOUR LIST OF REMAINING QUESTIONS AND PRIORITIZE THEM BASED ON YOUR NEEDS. (*)

READY TO READ THE TEXT? CLICK HERE

ONCE YOU ARE DONE, RETURN TO THIS PAGE TO FINALIZE THE SURVEY.

As you read the text *Correlates of Food Insecurity Among Undergraduate Students*, implement the Reading With Purpose Strategy outlined above.

(*) These can be used as the basis for thought papers, discussion participation, presentations, projects etc

Appendix J

Reading Comprehension Quiz

Please complete the following questions based on the article you just read. Please do not google-search any questions, as we are interested in your overall understanding of this article. Each question has one correct answer. Please answer the questions using the most appropriate option.

1. What is food insecurity?
    a. Worrying that you will run out of food
    b. Not having a sufficient amount of food
    c. The inability to have or eat a proper diet
    d. All of the above

2. Please choose the most appropriate statement based on the article. The percentage of students who were classified as food insecure who sometimes worried and always worried was
    a. Between 15% and 25%
    b. Between 50% and 60%
    c. Between 40% and 50%
    d. The article did not indicate the percentage of students classified as food insecure.

3. How did researchers categorize participants' place of residence?
    a. Urban/Rural
    b. Urban/Suburban
    c. On-campus/off-campus
    d. The study was not interested ins participants' place of residence.

4. What group(s) did the study include as indicators of marginalization?
    a. Aboriginal Students, Visible Minorities, and students with diversabilities
    b. The LGBTQ2+ community and Visible Minorities
    c. Only Visible Minorities

d. LGBTQ2+ community, Visible Minorities, Aboriginal Students, and International students

5. Which population of participants were 2.5 times more likely to experience food insecurity?
    a. Students living off-campus
    b. Aboriginal students
    c. Graduate students
    d. Students who reported more than one form of marginalization

6. Please choose the correct statement based on the study's findings.
    a. Students living off-campus were more likely to experience food insecurity
    b. Students with one or more dependents were more likely to experience food insecurity
    c. Students living on-campus were more likely to experience food insecurity
    d. Students' living location and their number of dependents did not significantly predict food insecurity

7. True or false, more men than women in the study were considered food insecure.
    a. True
    b. False

8. Choose one of the following answers that BEST reflects a finding from the current study that was consistent with previous research.
    a. Females are more likely to be food insecure than males.
    b. International students are more likely to experience food insecurity.
    c. Students living off-campus are more likely to be food insecure
    d. A & B are correct
    e. B & C are correct

Appendix K

Control Group Questions Post-Reading

Reflecting on your experience reading the article, please indicate your answer to the following statements.

1	2	3	4	5
Strongly disagree		Neutral		Completely Agree

1. I felt engaged while reading the article.
2. I enjoyed reading the article.
3. I was distracted while reading the article.
4. I knew most of the answers on the reading comprehension quiz.
5. I felt excited about reading the article.
6. I thought the reading was boring.
7. I was focused while reading the article.
8. I was interested in the article.
9. I had a hard time paying attention to the article.
10. I felt confident while completing the reading comprehension quiz.

Reflecting on your experience reading the article, please respond to the following statements.

1	2	3	4	5
Not likely at all		Neutral		Very likely

1. I would feel comfortable discussing the article in a **small** group with other students who have read the article.
2. I would feel comfortable discussing the article in a **large** group with other students who read the article.

Appendix L

Experimental Group Questions Post-Reading

Reflecting on your experience reading the article and following the Reading with Purpose guide, please respond to the following statements.

1	2	3	4	5
Not likely at all		Neutral		Very likely

1. I would use the Reading with Purpose guide again.
2. I would recommend the Reading with Purpose guide to a classmate.
3. I knew most of the answers on the reading comprehension quiz.
4. I would feel comfortable discussing the article in a **small** group with other students who have read the article.
5. I would feel comfortable discussing the article in a **large** group with other students who read the article.
6. I felt confident while completing the reading comprehension quiz.

Reflecting on your experience reading the article and following the Reading with Purpose guide, please indicate your answer to the following statements.

1	2	3	4	5
Strongly disagree		Neutral		Completely Agree

1. I felt engaged while reading the article.
2. The Reading with Purpose guide enhanced my understanding of the article.
3. I enjoyed reading the article.
4. I was distracted while reading the article.
5. The Reading with Purpose article did not contribute to my reading comprehension.
6. I felt more excited about reading the article.
7. I thought the reading was boring.
8. I would incorporate the Reading with Purpose guide in my study routine.
9. I was focused while reading the article.
10. I was interested in the article.
11. I had a hard time paying attention to the article.
12. I would use the Reading with Purpose strategy again.

Appendix M

Debriefing Script

Thank you for your participation. We are interested in learning more about the effectiveness of question formulation on learners' attention, retention, and engagement with reading materials. This research is also interested in learning about the effectiveness of questioning methods on the attention, retention and engagement of learners with attention deficits. This research will contribute to the literature on ADHD and post-secondary education, promote student engagement and inquiry, and contribute to the ongoing development of academic coaching in higher education.

If you have any questions or concerns regarding this project, please consult with Dr. Raquel Hoersting rhoersting@upei.ca, Hannah Bowley hbowley@upei.ca, or Dr. Tracy Doucette, Chair of the Psychology Department tdoucette@upei.ca.

Below is a list of on-campus and off-campus resources if you wish to seek out support.

Student Affairs
5th floor, Dalton Hall
902-566-0488
studentserv@upei.ca

Writing Centre
Robertson Library, room 274
https://www.upei.ca/writing-centre
902-628-4320
jjpuiras@upei.ca

Tutoring
If you are interested in getting a tutor, log on to your MyUPEI account to access the tutor bank website.

Pathways to Academic Success (PAS)
5th floor, Dalton Hall
902-566-0488
pas@upei.ca

Mawi'omi Indigenous Student Centre
mawiomi@upei.ca

(902) 620-5125

Strongest Families Telehealth and ICAN Adult Anxiety Program (Telehealth)
1-866-833-5443

Mental Health Walk-In Clinics

Montague
Community Mental Health (for individuals 16 and older)
Telephone: (902) 838-0960
126 Douses Road
Thursday: 4 – 8 p.m.

Charlottetown
Richmond Centre (for individuals 16 and older)
Telephone: (902) 368-4430
1 Rochford Street
Tuesday: 10 a.m. – 6 p.m.
Thursday: 10 a.m. – 6 p.m.
Friday: 12 – 4 p.m.

McGill Centre (for individuals 16 and older)
Telephone: (902) 368-4911
55 McGill Avenue
Saturday: 1 – 5 p.m.
Sunday: 1 – 5 p.m.

Summerside
Prince County Hospital
Telephone: (902) 888-8180
65 Roy Boates Avenue
Monday: 9 a.m. – 5 p.m.
Wednesday: 9 a.m. – 5 p.m.

Lennox Island
Lennox Island Health Centre (for Lennox Island residents only)
Telephone: (902) 831-2711

15 Eagle Feather Trail
Monday: 1 – 4 p.m.

O'Leary
O'Leary Health Centre
Telephone: (902) 853-8670
14 MacKinnon Drive (adjacent to Community Hospital)
Wednesday: 9 a.m. – 3 p.m.

Elmsdale
Westisle High School (for students, age 16 and older at this school only)
39570 Western Road, Elmsdale
Thursday: 9 a.m. – 3 p.m.

Island Helpline
1-800-218-2885