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Medical Illustrations, Patient Education Materials, and Health Literacy in Late Adolescents

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ABSTRACT

The purpose of the study was to evaluate how patient education materials should be illustrated in order to improve comprehension, a foundational component of health literacy, among late adolescents in Pennsylvania. Despite plentiful research on the effects of patient education materials and health literacy in adults, there exists a gap in research concerning late adolescent health literacy, medical illustration, and patient education materials. As a vulnerable demographic, it is pertinent that late adolescents exhibit sufficient levels of health literacy to be able to navigate complicated healthcare systems and maintain wellbeing. This study utilized an experimental method in which participants were presented with different styles of medical illustrations or no illustration at all and were later evaluated for their comprehension of the patient education material. Ultimately, the difference in scores on the comprehension assessment was not statistically significant, indicating no notable difference in comprehension between the presence and style of medical illustration among late adolescents in Pennsylvania. However, the study contained several limitations, including a relatively small sample size that lacked diversity. Given the potential applications for similar research, it is recommended that this study be repeated with an expanded range of topics and styles of medical illustration, as well as a more diverse sample of participants.

Keywords: health literacy, patient education materials, adolescent health, medical illustrations

INTRODUCTION

"A picture is worth a thousand words."

This common saying, popularized by English illustrator Fred R. Bernard in the early 20th century, conveys an idea that is central to boosting health literacy, a crucial skill that 9 out of 10 adults in America struggle with (Network of the National Library of Medicine). This vast majority becomes particularly alarming when considering health literacy as defined by the World Health Organization: "being able to access, understand, appraise and use information and services in ways that promote and maintain good health and well-being." Furthermore, according to the Center for Health Care Strategies (CHCS), limited health literacy can result in "medication errors, difficulty understanding and following care plans, reduced use of preventative services, longer hospital stays, increased hospital readmissions…[and] higher mortality."

In the case of Sherry, a 65-year-old individual without a high school diploma who received a list of medications following her hospital stay, she admitted at a follow-up appointment that she had not been taking her medication but had been "too embarrassed to tell the hospital staff that she couldn't read

well and didn't understand the instructions" (Center for Health Care Strategies, 2024). The CHCS establishes health literacy not only as the responsibility of the individual, but as an organizational and health system issue. It claims that organizations that "do not prioritize health literacy will face challenges providing high-quality, equitable care." Therefore, health organizations must take steps in ensuring that their systems both improve health literacy and remain accessible for all, regardless of individual status.

The Center for Disease Control defines organizational health literacy, one of the two main categories of health literacy along with personal health literacy, as "the degree to which organizations equitably enable individuals to find, understand, and use information and services to inform health-related decisions and actions for themselves and others" (CDC, 2024). One of the ways in which organizations provide individuals with information and services is through patient education materials (PEM). According to MedLinePlus, a website of the National Institute of Health, these materials can include "brochures or other printed materials, podcasts, YouTube videos… PowerPoint presentations, posters or charts, models or props…" They are designed to inform patients about specific conditions, diagnoses, treatment plans, and self-care (Purdue University). There are also certain guidelines that PEM should follow, including being written in a clear, understandable way with short words and phrases, large fonts, and limited jargon (Agency for Healthcare Research and Quality). PEM often includes illustrations along with text to enhance their effectiveness. According to Dr. Danielle Schubbe, of the Coproduction Laboratory at the Dartmouth Institute, these illustrations improve knowledge, understanding, and recall, with a larger positive effect for those with lower health literacy (Schubbe, et al.)

While numerous studies exploring the effect of illustrations in PEMs on patient understanding and investigating which styles of illustration are most effective have been conducted, there is a notable gap in research concerning which style of PEM illustration is most effective in boosting comprehension for late adolescents in Pennsylvania. The late adolescent demographic, defined in this study as adolescents grades 11 and 12 at High School X between the ages of 16 and 18, is a particularly important one to study when it comes to health literacy and patient understanding because they are at a critical period of development during which they are especially susceptible to health issues such as anxiety, depression, eating disorders, sexually transmitted illnesses, and ADHD (CDC, 2024). Additionally, late adolescents are experiencing or will soon experience what is known as transition: "a process wherein adolescents gradually prepare for and shift towards care in the adult system" (Lara-Macaraeg, 2023).

This process calls for a developed understanding of the healthcare system and its resources, a sense of responsibility and independence, and the skills to make well-informed health decisions; in other words, health literacy. Combining these factors of susceptibility and fast-approaching independence, boosting health literacy among adolescents is a vital cause.

For the purposes of this study, comprehension of patient education materials is treated as a foundational component of health literacy rather than as a complete measure of health literacy itself. It is widely agreed upon that PEM can improve health literacy, and a better understanding of said PEM may therefore contribute to health literacy. Additionally, PEM's ability to simplify complex information, provide actionable instruction, and its accessibility (Stilling, et al.) strengthens this assumption. Therefore, the question that this research aims to answer is: "How does illustration style in patient education materials affect comprehension among late adolescents in Pennsylvania?"

LITERATURE REVIEW

Despite the existing gap in the body of research concerning the topic of this study, in

order to understand its purpose and significance, one must explore existing research on similar topics. These topics include: the benefits of illustrations in PEM, styles of medical illustration, health literacy in American adolescents, and general guidelines on how PEM should be illustrated. Understanding these topics will help contextualize the methods, results, and conclusions that follow.

Sasha A. Fleary and Patrece Joseph, of the Eliot-Pearson Department of Child Study and Human Development at Tufts University, conducted a study in 2020 titled "Adolescents' Health Literacy and Decision-making: A Qualitative Study." Before delving into adolescents' use of health literacy in their health decision making, this study established the importance of health literacy, stating that "In adults, low functional HL [health literacy] is related to poor preventative health behaviors, increased use of emergency services, low involvement in health decision making, and lower satisfaction with disease status and healthcare" (Fleary and Joseph, 2020). Additionally, the Fleary and Joseph claim that adolescents are expected to assume significant responsibility for their health and are "gaining rights to interact with healthcare providers without parental consent or notification via minor consent laws." Though this provides increased freedom and privacy, it also means that adolescents are increasingly vulnerable to making poor healthcare decisions and subsequently succumbing to poor health status and wellbeing. The study also acknowledges the gap in research concerning health literacy in adolescents. To address this gap, Fleary and Joseph considered six focus groups comprised of students from local high schools and evaluated their functional health literacy by administering the Newest Vital Signs, a six-item interview and asking open-ended questions during focus group sessions. The analysis found that, when asked what health literacy meant to them, adolescents described health literacy (HL) in two distinct ways: active HL engagement and passive HL engagement. Active HL engagement involved the intentional use of skills, encompassing actions such as reading nutrition labels, researching health topics, and making decisions using critical thinking skills. Passive HL engagement "may happen subconsciously" (Fleary and Joseph, 2020). The study also identified certain trends that influenced adolescents' use of HL, including personal characteristics such as motivation, self-control, and risk perception. Potential barriers to adolescents using HL to make decisions included environmental factors such as poor provider communication, lack of access to information and resources, lack of parental health literacy, and adolescents' confidence in their own HL skills. Together, these findings establish why adolescent health literacy is important while also showing that comprehension is only one part of the broader process of using health information to make decisions.

Similarly, a 2024 narrative comprehensive review titled "Integrating Digital and Interactive Approaches in Adolescent Health Literacy: A Comprehensive Review" by Mancone et al. also establishes adolescent health literacy as "critical for navigating the complex landscape of modern healthcare and making informed decisions that influence long-term health outcomes." Like Fleary and Joseph, Mancone et al. acknowledges the current gap in research on adolescent HL, but unlike the previous study, Mancone et al. focuses on digital technology, interactive learning, mental health literacy, and social media, rather than decision making. To explore these aspects of adolescent HL, the authors conducted a literature search across databases such as PubMed, Scopus, and PsycINFO focusing on studies focused on adolescents, published in English, and evaluated for quality from 2005 to 2024. This search and review found that digital technologies were extremely effective in health literacy initiatives and "not only facilitate the dissemination of health information but also enable interactive personalize learning experiences" (Mancone, et al.) Similarly, interactive learning

methodologies like problem-based learning and simulation-based activities "have been extensively documented for their efficacy…," facilitating discussion and encouraging critical thinking. Together, Fleary and Joseph and Mancone et al. establish that adolescent health literacy involves more than simply receiving information: it also involves engaging with information and using it to make decisions. This distinction provides an important context for the present study, which focuses specifically on the comprehension component of health literacy.

To address and understand the second distinct factor in this study, it is pertinent to explore the use and styles of illustrations in patient education materials. A 2024 overview by Maa Illustrations identifies several styles of medical illustration used in patient education, including realistic, schematic or diagrammatic, figurative cross-section, digital, infographic, watercolor, pen and ink, animation, and storyboarding. More directly relevant to the present study, a 2019 study conducted by Alina Krasnoryadtseva, et al. aimed to "explore how the addition of a medical illustration and its style affected information comprehension, perception of educational material, and illness beliefs." To accomplish this, 204 people were recruited from a supermarket, shown one of four leaflets (with either a different style of illustration or no illustration at all) about gout, and evaluated on their ability to identify the correct treatment for gout. The study also spotlighted the specific style of illustration that proved most effective in boosting comprehension. It found that "only the cartoon was better than text in conveying information about treatment," while "the anatomical image was seen as more helpful for understanding of the illness than the cartoon", suggesting that "simpler illustrations conveyed information more effectively" (Krasnoryadtseva, et al).

Diogo Guerra, a medical illustrator with a background in veterinary medicine, takes this notion a step further by specifying that "simple medical illustrations – both schematic and realistic – may be more easily understood by audiences, particularly lay audiences" but more realistic illustrations "may be more appropriate for individuals with higher health literacy or for medical professionals." Despite the differences in style, the study found that illustrations did indeed boost the understanding of health information and increased visual appeal. Likewise, Hyung-Son Won, et al. of the Korean Pain Society asserts the importance and benefits of using illustrations for patient education, claiming that "Good medical illustrations can improve the quality of a research paper by efficiently conveying content to the readers." The authors assert that medical illustrations have been used for more than 1,500 years and that "accurate and intuitive illustrations are most effective for conveying information in various disciplines rooted in medicine…" (Hyung-Son Won, et al.) This paper implores the Korean Pain Society, Korea's representative society leading the development of pain medicine, to utilize medical illustrations in its works in order to improve patient understanding.

Thus, both Krasnoryadtseva, et al. and Diogo Guerra identify benefits associated with medical illustrations while also acknowledging that certain styles may be more effective than others. Together, these findings establish a basis for comparing specific illustration styles in a controlled setting, particularly because the previous research was not focused specifically on late adolescents in Pennsylvania.

MATERIALS & METHODS

Rationale

This study utilized an experimental research design to determine how the illustration style in patient education materials (PEMs) affects comprehension, an essential component of health literacy, among late adolescents in Pennsylvania. An experimental method was best suited to the purpose of this study due to the need for a controlled environment in which a single variable can be isolated and other factors can be held constant. An experimental method allows the researcher to

do so, providing a strategy for reliable data collection.

Alternative methods, such as qualitative interviews and content analysis, were also considered but ultimately rejected. While qualitative interviews could have provided insight into how adolescents view PEM and its illustrations, this method would have complicated the objectivity of the data, due to the difficulty in coding data and ensuring that differences could be attributed solely to illustrations. Additionally, although there exists research investigating medical illustrations and health literacy in teens, there is a lack of preexisting research specifically positioned at the intersection of medical illustrations in PEMs and health literacy in late adolescents in Pennsylvania. Thus, a content analysis methodology was rejected, and an experimental methodology was chosen.

Variables

The two variables observed in this experiment were the variety of PEM presented to each participant and the participants' performance on the following comprehension questions. The independent variable was the type of PEM presented to participants and took the form of either a PEM containing a semi-realistic medical illustration, a PEM containing a cartoon-style medical illustration, or a PEM containing no illustration. These conditions were designed to reflect common styles in current PEM to ensure relativity to participants.

The dependent variable in this study was participants' performance on the comprehension survey administered following the presentation of PEMs. This comprehension survey was designed to evaluate participants' short-term understanding of the material. For the purposes of this study, this measure was treated as an indicator of comprehension, which is a foundational component of health literacy, rather than as a complete measure of overall health literacy.

Materials

The first materials used in this study were the patient education materials of different varieties presented to participants. The text included in the three types of PEM presented to the three groups did not differ and was as follows:

- Asthma is a chronic disease that affects the lungs
- People who have asthma can experience wheezing and shortness of breath
- Asthma affects over 28 million Americans
- Many people use inhalers to manage their asthma
- A normal airway has smooth muscles, but during an asthma attack, these muscles tighten up (constrict) and allow less air through.
- During an asthma attack, the body produces excess mucus and airway walls become inflamed and thickened. This makes breathing difficult.

Each item was listed as a bullet point to ensure that differing levels of reading comprehension were not a significant factor in survey performance. This choice is supported by Amic G. Ho at the Hong Kong Metropolitan University, who asserts that bullet points "provide a logical and organised way to present information" and allow readers to "quickly access the key points and better understand the purpose of the information."

Asthma was chosen as the overarching topic across all PEM due to the fact that one in ten children in Pennsylvania currently have asthma (Commonwealth of Pennsylvania). Thus, asthma was selected because it is a prevalent health condition among children and adolescents in Pennsylvania and therefore represents a realistic and relevant topic for patient education.

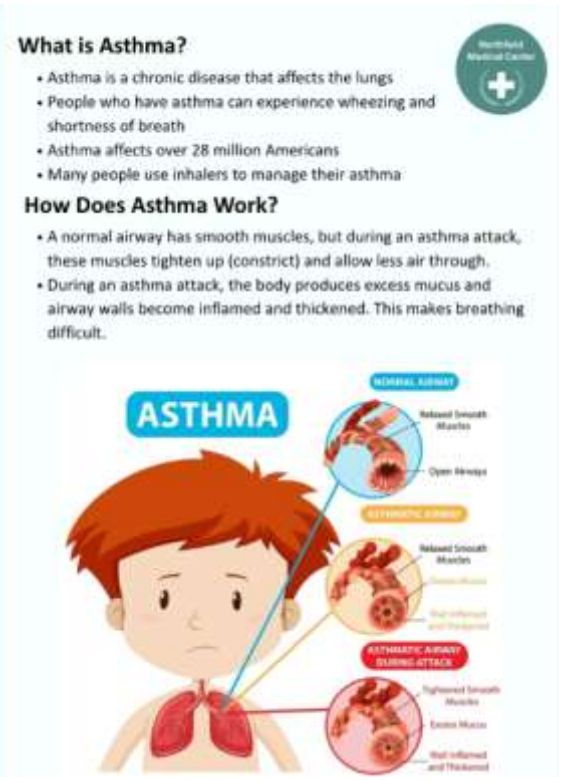
Each PEM was designed to simulate one that a participant may receive in a real clinical setting. Consistency was achieved through the use of the same background color, ##f7ffff, and similar layouts with two paragraphs and titles for each. Additionally, a faux medical center logo was created to

boost realism and placed at the top right corner of each PEM. The only difference between each of the three was the presence and style of illustration.

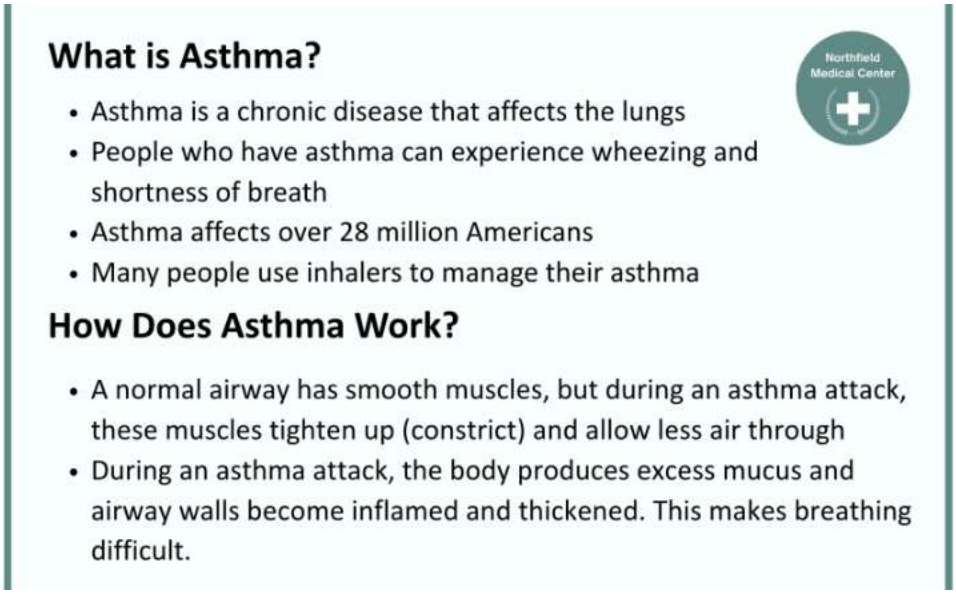
The following PEMs were used for the study:

Group 1:

Group 2:



Group 3:



The second material used for this study was the comprehension survey developed by the researcher. The survey included six questions designed to both determine the demographics of participants and to

assess comprehension of previously presented PEM.

All questions on the comprehension survey could be answered simply by reading the text to ensure fairness to Group 3, whose PEM did not include an image. The purpose of the images included for groups 1 and 2 was to reiterate the concepts described in the text and provide a visual aid.

The comprehension survey contained the following questions:

1. What grade are you in?
2. Which of the following images was included in the patient education material you were presented with?

a. 

b. 

c. No image was included in the material I saw.

3. Which of the following occurs during an asthma attack?

a. Airways close completely, stopping airflow
b. Airways lose lubricating mucus, allowing less airflow
c. Airways constrict, allowing less airflow
d. Airways expand, pushing against vital organs and restricting airflow

4. Which of the following is a correct comparison between a normal airway and an asthmatic airway?

a. Normal airways contain more mucus to trap oxygen; asthmatic airways lack mucus
b. Normal airways have thick, strong walls for insulation; asthmatic airways have thin, weak walls
c. Normal airways contain alveoli; asthmatic airways do not
d. Normal airways have relaxed muscles; asthmatic airways have tense muscles

5. Which combination of symptoms best describes an asthmatic attack?

a. Constricted airways, excess mucus
b. Weakened airways, lack of mucus
c. Constricted airways, lack of mucus
d. Weakened airways, excess mucus

6. Which of the following is used to describe non-asthmatic airway muscles (not during an asthma attack)?

a. Smooth
b. Loose
c. Thick
d. Rough

Additionally, the following statement was included in the description section of the survey:

"This assessment is designed to evaluate your understanding of asthma after being presented with a patient education material. Please answer the following questions to the best of your ability. Your responses will remain anonymous, and you may stop at any time without consequence. All of the following questions have been approved by the Institutional Review Board."

Each multiple-choice question had only one correct answer and answers were determined to be as follows:

3. c
4. d
5. a
6. a

Only four questions evaluating comprehension were included because of the limited nature of the textual portion of each PEM, from which the questions were derived. Additionally, the researcher intended each question to be answered to the best of the participant's ability and according to Ye Li, an assistant professor of management at the University of California Riverside, asking too many similar questions in a survey can reduce the quality of the data collection. This is due to the phenomenon of survey fatigue, when respondents being paying less attention to detail and begin giving more uniform answers. Thus, to avoid this effect, the researcher used a limited number of questions and ensured each question was distinct.

Statistical Analysis

Participant responses were scored by assigning one point for each correct answer on the four comprehension-evaluating questions on the survey. The maximum possible score that could be achieved was four. Individual scores were then collected and sorted by group to calculate the mean scores across each group. These scores were then used to identify patterns and trends in comprehension across different illustration styles.

Descriptive statistics were used to summarize patterns in comprehension across the three groups. Because the study compared three independent groups, a one-way ANOVA was also used during the discussion of results to determine whether the observed differences in mean comprehension scores were statistically significant. These analyses address differences in comprehension; they do not provide a direct measure of overall health literacy.

RESULTS

Overall, the study included 35 participants and received a total of 35 responses for the Comprehension Assessment Survey. Group 1, the group that received the semi-realistic medical illustration along with the standardized patient education material (PEM), contained 12 participants and received 12 responses. Group 2, the group that received the cartoon-style medical illustration along with the PEM also contained 12 participants and received 12 responses. Group 3, the group that received no illustration along with the PEM, contained 11 participants and received 11 responses.

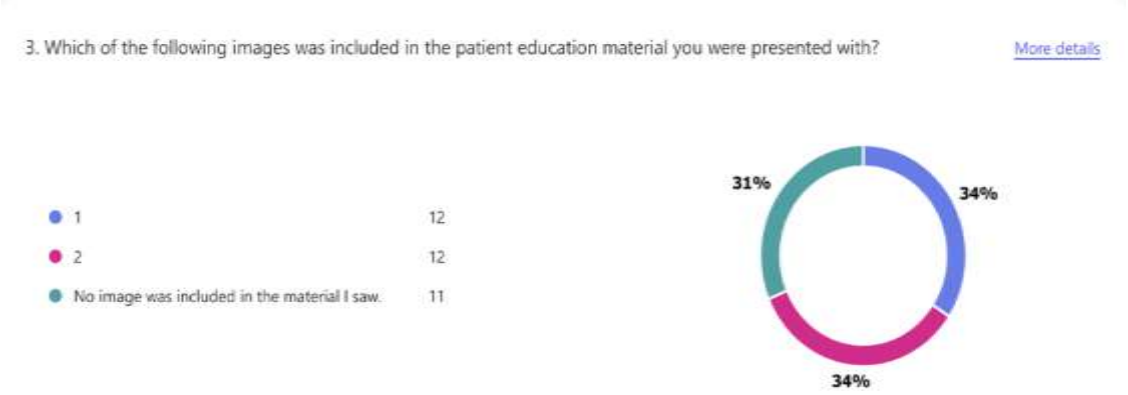


Figure 1. Distribution of Groups

All participants were in either grade 11 or 12 and fell between the ages of 16 and 18. While exact ages were not collected, most participants were in the 11th grade and fell between the ages of 16 and 17.

Figure 1.1 Distribution of Grades

After all responses were collected and organized in Excel, the researcher sorted responses by group number to allow for convenient analysis of data. Afterwards, the researcher derived descriptive statistics based on the scores of each group, procuring the arithmetic mean, standard deviation, and range of scores. The researcher neglected to include median scores after considering the fairly small size and closely spaced nature of each sample. On the contrary, it was decided that the ability of other descriptive statistics such as arithmetic mean, standard deviation, and range to exhibit general accuracy and variability would provide an adequate summary of the data and allow the researcher to draw valid conclusions.

Below are statistics relevant to the data collected:

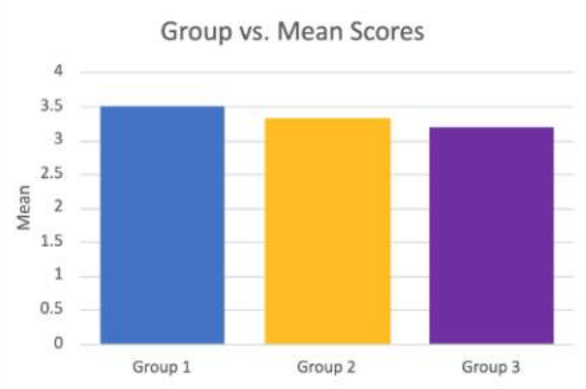


Figure 1.3 Group vs. Means

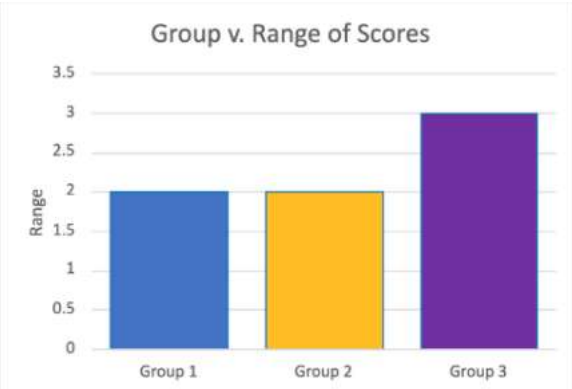


Figure 1.4 Group vs. Ranges

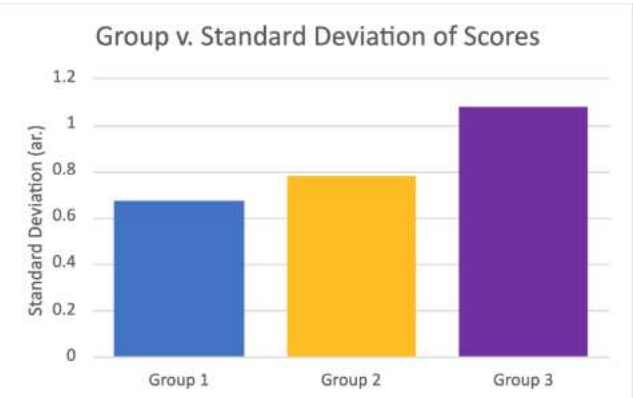


Figure 1.5 Group v. Standard Deviations

Additionally, the researcher collected the number of correct answers for each question organized by group, along with the accuracy of answers for each question across all groups.

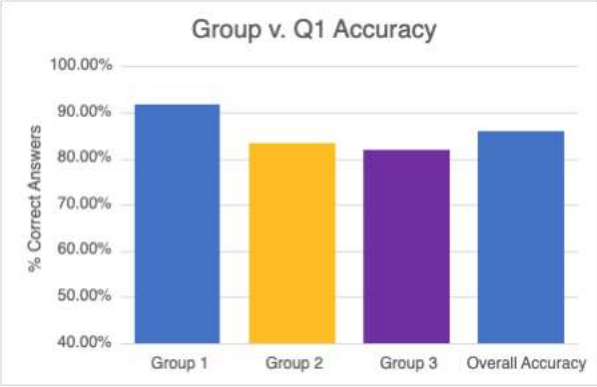


Figure 1.6 Group v. Accuracy (Q1)

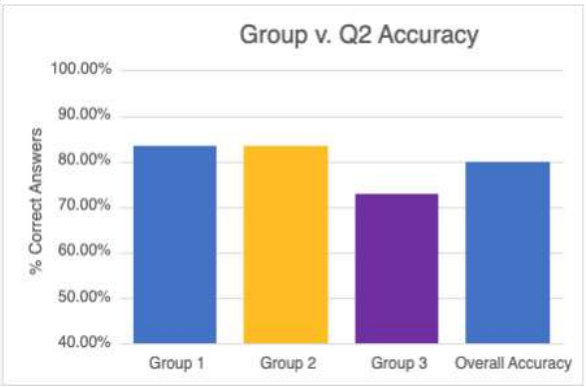


Figure 1.7 Group v. Accuracy (Q2)

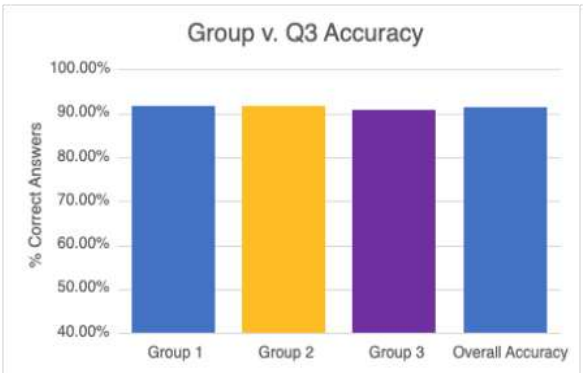


Figure 1.8 Group v. Accuracy (Q3)

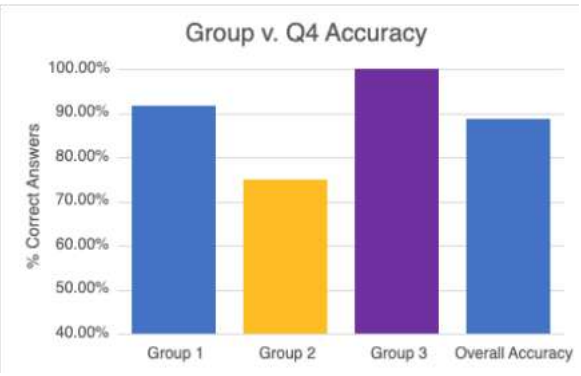


Figure 1.9 Group v. Accuracy (Q4)

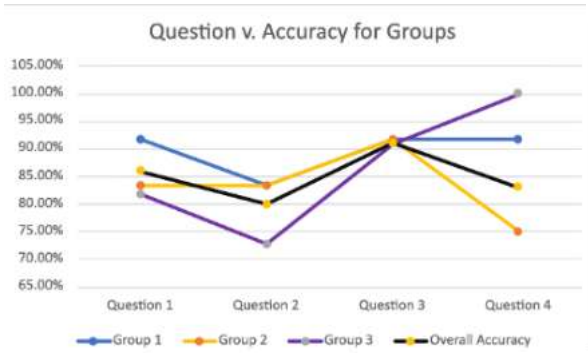


Figure 2. Question v. Accuracy (All Groups)

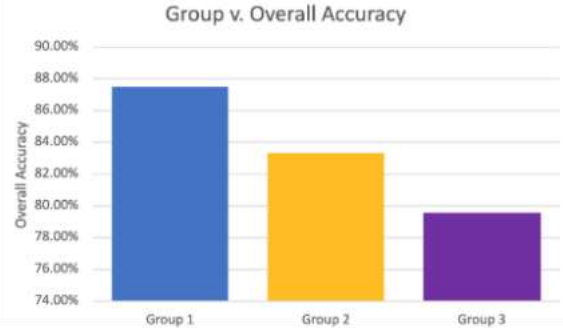


Figure 2.1 Group v. Overall Accuracy

The average accuracy score on the assessment across all groups was 83.57%, obtained by dividing the number of correct answers among participants (117) by the total number of answers (140). The average accuracy score of Groups 1, 2, and 3 was respectively 87.50% (42/48), 83.33% (40/48), and 79.55% (35/44). As such, Group 1, the group that received the semi-realistic medical illustration in their PEM, had the highest overall accuracy, while Group 3, the group that received no medical illustration in the PEM, had the lowest overall accuracy. This descriptive pattern suggests a possible relationship between illustration condition and comprehension, but it does not by itself establish that the differences would be observed in the larger population. Additionally, Group 1 had the lowest standard deviation of scores, with a SD of 0.6742, and Group 3 had the highest standard deviation of scores, with a SD of 1.087, indicating that the scores of Group 3 were the most diverse.

Due to the small number of questions, the researcher was able to analyze scores question by question. Question 3, which asked "Which combination of symptoms best describes an asthmatic attack?" had the highest accuracy across all 3 groups, with an accuracy percentage of 91.42%. Question 2, which asked "Which of the following is a correct comparison between a normal airway and an asthmatic airway?" had the lowest accuracy of 79.80%.

DISCUSSION

Analysis

The overarching purpose of this study was to determine how patient education materials should be illustrated in order to boost comprehension of PEM, an essential component of health literacy, among late adolescents in Pennsylvania. To determine whether the results of this experiment were statistically significant, the researcher used a one-way ANOVA (Analysis of Variance) and obtained a p-value of ~0.67.

As seen in Figure 1, Group 1, semi-realistic medical illustration, had the highest mean of scores on the comprehension survey out of the three groups and Group 3, no medical illustration, had the lowest mean of scores, with Group 2, cartoon-style illustrations, falling somewhere in between. This descriptive pattern is consistent with the possibility that medical illustrations in PEM may aid patient comprehension, although the statistical test does not establish a significant difference among the groups. On the other hand, as asserted by Diogo Guerra in a 2025 study, more realistic illustrations, such as the semi-realistic illustration presented in the study, may be preferable to those with higher health literacy and medical professionals, while simpler illustrations, such as the cartoon-style illustration, are more easily understood by "lay audiences." As the demographic of adolescents has historically been understood to have inadequate levels of health literacy (Jafari, et al.), Group 1's better descriptive performance is not fully consistent with the findings of other researchers. Potential reasons for this discrepancy include different processing systems in adolescents versus adults, and the use of varying types of illustrations within the cartoon-style category in this study versus previous studies.

However, it is important to note the large p-value of 0.67, which far exceeds the standard threshold of 0.05, suggests these observed differences could easily have been due to chance and are therefore not statistically significant. In addition to a true lack of a relationship, however, this p-value could also reflect a lack of statistical power or an insufficient sample size. Thus, the descriptive differences observed among the three groups are not sufficient to establish a systematic effect of illustration style on comprehension in the larger population. Ultimately, concrete conclusions about the effect of illustration style cannot be drawn from the results of this study.

Limitations

During the course of this study, there were several limitations with the potential to negatively impact the accuracy and applicability of its results. Firstly, the sample size of 35 individuals may not have been sufficient and therefore not representative of the larger population of late adolescents aged 16 to 18 in Pennsylvania. In the same vein, another limitation hindering the representativeness of the results is the fact that participants were drawn from a single high school, High School X.

Additionally, there was an uneven distribution of 11-12th graders amongst participants. 74% of participants were 11th graders, while 26% were 12th graders. As such, representation and diversity amongst the age group targeted for the study was insufficient.

This study also measured only short-term comprehension. While measuring short-term comprehension is a valid strategy for evaluating one component of health literacy, it does not encompass the other aspects of health literacy as defined by the Center for Disease Control (CDC). For example, the CDC asserts that an individual with an

adequate degree of health literacy should be able to "use information and services to inform health-related decisions for themselves and others." While this study explored the degree to which individuals could understand health information, one characteristic of the definition, it did not evaluate individuals' ability to use such information to "inform health-related decisions" (CDC). Therefore, while comprehension is an essential component of health literacy, it is not the sole indicator. The four comprehension questions also primarily measured immediate recall and understanding of information presented in the PEM, rather than deeper understanding, long-term retention, or the ability to apply the information to a health-related decision.

Finally, the survey used for the study did not account for the possibility that participants may have asthma. Because this factor was not taken into account, a participant with asthma with a disproportionate amount of background knowledge on the topic could have scored well on the comprehension survey without truly understanding the PEM, therefore skewing results.

Future Recommendations

Considering this study's vast potential for beneficial applications, it is suggested that this study be repeated to maximize validity and promote representation.

The researcher recommends that this study be repeated among a more diverse sample of participants. For example, aside from increasing the number of participants involved, the study could be conducted among a different age group, such as those from 13 to 15 years of age to apply useful findings with the capacity to boost comprehension of PEMs to the early adolescent population. In the same vein, this study could be repeated among those in different geographical locations (urban vs. rural settings), socioeconomic backgrounds, and baseline health literacy levels. Specifically, taking baseline health literacy levels into account could help differentiate between the styles of illustration most useful for adolescents with low versus high rates of health literacy and would allow professionals to further tailor PEM to maximize results.

As mentioned in the limitations section, this study measured only the short-term comprehension of participants. Therefore, a logical progression would be to measure the other aspects of health literacy moving forward. For example, the overall structure of this study could be manipulated to evaluate the long-term retention aspects of health literacy by administering the comprehension survey 1-2 weeks after participants are presented with PEM.

In regard to the PEM involved in the study, a potential next step would be to expand topics covered by the PEM. Instead of covering only asthma, a future similar study could combine multiple health topics into one PEM or simply utilize PEM covering a different topic prevalent among adolescents. In parallel, future studies could also investigate more medical illustration styles rather than wholly semi-realistic and cartoon-style images.

CONCLUSION

This study sought to determine how patient education materials should be illustrated to boost comprehension of PEMs, an essential component of health literacy, among late adolescents in Pennsylvania. While the comprehension survey administered yielded some intriguing results, such as the semi-realistic illustration group demonstrating the highest mean comprehension score and the no-illustration group demonstrating the lowest, the results were ultimately not statistically significant and thus, firm conclusions about the effect of illustration style on comprehension cannot be drawn by the researcher.

Overall, this research contributes to efforts to improve health literacy in late adolescents, specifically through medical illustration, while recognizing that the study measured only one component of health literacy. It addresses a previously underexplored intersection of adolescents who are transitioning toward greater independence in

healthcare, patient education materials that provide information about varying health topics and treatment plans, and medical illustrations that can improve the understanding of these materials. Further research with expanded scope and methodology is recommended to provide additional insight into which illustration style can most effectively support adolescent comprehension and, ultimately, broader aspects of health literacy.

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