Evaluating Changes in Student Attitudes and Beliefs in Hearing Health: Results from SLHS 3014, Hearing Loss Epidemiology

ASSETT Faculty Fellows Final Report

Rachael R. Baiduc, PhD, MPH
Faculty Fellow, AY2018-19 Cohort

Introduction

Hearing conservation awareness among college students is limited, yet youth engage in many at-risk behaviors such as attending sporting events, concerts, and nightclubs without hearing protective devices (HPD). This project was designed to build on the work of Balanay and Kearney (2015) who suggested that educating college students about hearing health may result in improved hearing health via reduced participation in noisy activities and/or increased use of HPDs. The project was designed to as a classroom-based research project with an emphasis on formative evaluation.

We hypothesized that this education *may* promote greater awareness of the permanence of sensorineural hearing loss caused by noise exposure (i.e., noise-induced hearing loss [NIHL]), increased likelihood to utilize hearing protection, and decreased involvement in risky recreational activities.

To this end, we asked whether or not attitudes toward noise and beliefs regarding hearing and use of hearing protection would change after taking SLHS 3014.

Methods

The investigator (Baiduc) independently designed and taught a new course, Hearing Loss Epidemiology (SLHS 3014). The course has now been taught twice (Spring 2018, 2019). The focus of the Faculty Fellows project was on the Spring 2019 offering. The course is an SLHS elective and is part of the Public Health Certificate program at CU Boulder. It draws SLHS majors and non-majors. Risk factors for hearing loss and strategies for health promotion and intervention are discussed. The course is taught in a seminar style, with a focus on reading and understanding scientific literature. There were no examinations, although there were 10 short quizzes based on the readings, an article presentation, final paper, and group project. There was also a hands-on experience wherein students had their tested by the course teaching assistant in my laboratory.

Quantitative and qualitative pre-post survey data were collected to characterize changes in attitudes, knowledge, and beliefs about hearing loss and noise exposure among SLHS 3014 students. The surveys drew upon existing health behavior and noise exposure surveys, specifically the adapted Youth Attitudes to Noise Scale (YANS) used by used by Balanay and Kearney (2015) and originally developed by Olsen-Widen and Erlandsson (2004). The surveys were a required part of the course and worth 10 and 15 points (pre- and post-survey, respectively). The surveys had no right or wrong answers and were graded on completeness. The project was IRB approved (# 18-0704).

Responses to quantitative questions were on a 10-point Likert scale from 1=strongly disagree to 5=strongly agree. Quantitative pre-post data were analyzed via paired samples *t* tests with a significance level of $p \leq 0.05$. Data were analyzed using SPSS (v. 25). Responses to

open-ended questions were themed. Each individual response was placed into a category and subsequent similar responses grouped together.

Results

Twenty students were enrolled in the course and all twenty completed both pre- and post-surveys. Three (15%) reported being SLHS majors and the remainder were non-majors (e.g., IPHY [35%] and PSYCH [10%]). Students ranged from sophomore (30%) to senior (50%).

Previous Exposure to Hearing Conservation Training

Students were asked questions about previous exposure to hearing conservation programs and current noise exposure. Eighteen students (90%) reported no prior exposure to hearing conservation training. The two that had prior training reported the following: "*loud music/ noise exposure seminar in grade school*" and "*I think they provided information but it was mostly hearing testing*." It is thus clear that education regarding hearing health and prevention of NIHL was lacking in this cohort of students.

General Beliefs about Hearing

Table 1 provides a summary of pre-post survey results for general items related to hearing loss. Overall, student attitudes on these items changed little. Student disagreement with the following statement significantly increased: "people with hearing loss have intellectual limitations" on the post-survey than the pre-survey. There was also a significant increase in disagreement with this statement: "people with hearing loss have a lower quality of life than people with normal hearing."

Interestingly, although not statistically significant, students were more likely to disagree that "it would be difficult to live with hearing loss." Both pre- and post-course, students were apt to agree with the statement that "hearing loss can't kill me, so it shouldn't be among my top medical concerns."

Noise Exposure

The most commonly reported noise sources on the pre-survey were: personal listening devices (13 [65%]), parties (11 [55%]), concerts (11 [55%]), fitness classes (8 [40%]), sporting events (8 [40%]), and bars (6 [30%]). Only one student (5%) reported no frequent exposure to loud noise.

Students rated their level of concern with daily noise exposure as moderate (2.85 [SEM, 0.196]) pre-course and slightly higher 3.15 (SEM, 0.244) post-course. The increase in concern was not significant (p = 0.649; *data not shown*).

Table 2 provides a summary of pre-post data on items regarding noise exposure (e.g., at bars and sporting events). Attitudes on these items also changed minimally although there was a significant change on six items (yellow highlighted cells). Students were more likely to think it is necessary to use earplugs when at a bar, concert, or sporting event post-course compared to pre-course (p=0.001). There was also a significant increase in agreement with the statement that "sound level should be lowered at bars, concerts, and sporting events" (p=0.024). Last, level of agreement increased regarding the notion that "there should be more rules or

regulations for sound levels in society" (p=0.008). Responses to all items regarding noise exposure are shown in Table 2.

Hearing Protective Devices

Table 3 presents data attitudes and usage of HPDs. Student attitudes toward HPDs seemed to improve somewhat as evidenced by the significant changes in Table 3. Specifically, students were less likely to agree that "HPD have poor sound quality" and more likely to agree that "wearing HPD when around loud environments is important." Furthermore, there was a significant increase improvement in student knowledge of when to use HPD. The increase in knowledge regarding HPD may engender positive changes to peers. For example, post-course, students were more likely to agree with this statement: "If my peers asked me, I would be able to help them wear hearing protectors correctly." This is an interesting finding given that in the course, we discussed HPDs, but not specifically how to fit them in detail.

Although not significant, there was an increase in student reported likelihood to wearing HPD when at bars, concerts, or other loud venues (+0.25 unit change; Table 3).

Self-Efficacy

Table 4 presents student self-reported ability on elements required to be successful in the course (e.g., ability to read scientific literature). Note that these data were not collected pre-course, hence Table 4 displays only post-course results. Most students (60%) felt they had mastered having responsibility for part of a class project. Experience reading scientific literature was also high; 90% reported 'much experience' or 'mastery/extensive experience.' This is an important outcome as one of the goals of the course was to increase exposure to scientific literature and ability to comprehend scientific papers. Ability to explain auditory tests was lacking in some students; 10% reported 'no experience/feeling inexperienced.' This is likely due to the fact that most students were non-majors and had little, if any, background in audiology.

Qualitative Data

Students were asked the following questions: (1) What is one concept you learned from this class that can be applied to other courses? (2) In courses, instructors often think about "enduring understanding"-something you learned that will stay with you for weeks, months, or even years after taking a course. What is one concept you learned in this course that will stick with you?
(3) This course was designed to be an upper-level seminar style course. Hence, demonstration of knowledge was done through presentations and a final paper. Would you have preferred a more traditional format (e.g., with examinations) or alternative assignments?

Table 5 summarizes the themes identified from the open-ended survey questions. All individual student responses are presented. The most commonly reported concept that can be applied to other courses was the reading/dissecting of scientific papers. The “enduring understanding” most often reported by students was the association of hearing loss with other comorbidities (e.g., cognitive decline). Students also reported increased knowledge regarding prevention of NIHL.

The third question was designed to gain formative feedback regarding student satisfaction with the course design. The most commonly requested change to the class format was to have greater separation in due dates between the final paper and group projects (two ‘high stakes’ assignments).

Discussion

College students often lead risky lives when it comes to hearing health. Education regarding noise exposure and hearing protection is limited before college and aside from select majors, nonexistent during college. SLHS 3014 was developed, in part, to raise awareness about hearing loss, noise exposure, and comorbidities. Although not an explicit goal of the course, we hypothesized such education might promote changes in attitudes, beliefs, and even behaviors related to hearing health. Data from one iteration of the course were analyzed. The results suggest that students have improved ability to read scientific papers and awareness of NIHL. The results show in Table 2 also suggest improved awareness regarding the necessity of HPD during exposure to loud noise and greater awareness about the hazards of noise exposure in general.

Takeaways and Lessons Learned

The first offering of this course had a noticeably more engaged student body. In the second offering, the focus of the present report, the following lessons were gleaned based on (1) FCQ feedback and (2) feedback reported on the in-class post-survey. Overall feedback was positive although the ‘overall course’ rating fell from AY 2018 to AY 2019.

- Spend more time in the beginning of the semester going over basic concepts related to audiology and hearing health. Some of the non-SLHS majors reported feeling “clueless” or “behind” in this regard.
- Space out major assignments (final paper and group project). Both were due around the same time (end of semester). In the next offering, the group project deadline will be moved up by approximately one month.
- Parse the final paper into smaller more manageable chunks. Have these chunks (e.g., introduction, figure/table, reference list) be due throughout the semester and provide

points for their submission. Offer students a chance to get points for responding to an initial revision of their draft manuscript. This goal of these changes is to improve quality of final papers and avoid situations where poor quality (e.g., D or F) papers cause major drops in student course grades.
- Maintain hands-on experience and maybe add an additional experience.
- Maintain guest speaker and add 1-2 more.
- Mix up the daily routine. We spent the semester dissecting research papers in a rather systematic way. It seems students would prefer additional in-class activities. This is something I will have to consider in more depth.

Reflection

The initial offering of this course was rated high by students (5.12 FCQ; Spring 2018). The Spring 2019 section was rated much lower at 4.24. Based on student feedback from Spring 2018, I added quizzes on the readings and offered optional draft submissions of in-progress papers. The course also gained a teaching assistant in Spring 2019. At this time, I am unable to explain the drop in overall course rating although I speculate that it has to do with the student dynamics and specific cohort enrolled in the course. Ten short quizzes may also have been too many, although none of the students expressed specific dissatisfaction with this element. Next year, I plan to do a mid-course interview to ensure my pedagogical changes are having the desired approach in student satisfaction and learning.

There are some limitations to this study. The report is limited as it evaluated only one section of the course (n=20). In addition, due to the use ordinal Likert scale data, a more robust statistical approach might have been to use Mann Whitney U test for pre-post comparisons. However, the observed pre-post differences were slight, and it is unlikely we would arrive at a different conclusion had a different statistical approach been used. An additional limitation is that student reported ability regarding the items shown in Table 4 were not included on the pre-survey. This was an oversight and future iterations of the pre-survey will include those items so that improvement can be measured.

Limited pre-post changes were observed. This may be, in part, due to ceiling effects. For example, pre-course, students already strongly agreed that it would “be a big deal to lose their hearing” (Table 3) and there was little room for further agreement.

Our work can be related to that of Balany and Kearney (2015) who carried out a similar study using the YANS and collected data on hearing symptoms in 2151 college students. The majority (83%) of their students were involved in at least one noisy activity. Our data are similar; all but one student reported frequent exposure to loud noise (e.g., bars, concerts, fitness classes, etc.). The Balanay and Kearney study had a much larger sample size (> 2000) and used specific subscale factors of the YANS, e.g., antinoise and concentration. Subscale analysis was not conducted here but might be considered in future analyses. Furthermore, they did not conduct a pre-post evaluation so such changes cannot be examined in the present report.

Educating youth about noise exposure and NIHL may lead to reduced participation in hazardous activities or increased use of HPDs during exposure. Data are needed from more SLHS 3014 cohorts to draw conclusions regarding the efficacy of the course in reaching such goals. In the long-term, this line of research may address risk aversion and its association with risky behavior in regard to hearing health by analyzing multiple classes of data and long-term gains.

References

Balanay JAG, Kearney GD. Attitudes toward noise, perceived hearing symptoms, and reported use of hearing protection among college students: Influence of youth culture. Noise Health 2015;17(79),394-405.

Olsen-Widen SE, Erlandsson SI. Self-reported tinnitus and noise sensitivity among adolescents in Sweden. Noise Health 2004;7:29-40.

TABLES

		MEAN	SD	SEM	P-Value
Hearing loss is common	Pre	4.4	0.503	0.112	0.3
	Post	4.7	0.47016	0.10513	
Only old people have hearing loss	Pre	1.55	0.759	0.17	0.419
	Post	1.4	0.50262	0.11239	
There are different types of hearing loss	Pre	4.75	0.444	0.099	0.33
	Post	4.85	0.36635	0.08192	
NIHL is preventable	Pre	4.4	0.598	0.134	0.789
	Post	4.35	0.58714	0.13129	
NIHL is reversible	Pre	1.95	1.05	0.235	0.249
	Post	1.65	0.81273	0.18173	
If I could prevent the possibility of developing noise induced hearing loss, I would be motivated take measurable action to stop it	Pre	4	0.795	0.178	0.297
	Post	4.2	0.61559	0.13765	
People with hearing loss have intellectual limitations	Pre	1.85	1.089	0.244	0.023
	Post	2.55	1.39454	0.31183	
People with hearing loss are not successful	Pre	1.35	0.587	0.131	0.541
	Post	1.45	0.60481	0.13524	
People with hearing loss don't have many friends	Pre	1.4	0.598	0.134	0.666
	Post	1.45	0.60481	0.13524	
People with hearing loss have a lower quality of life than people with normal hearing	Pre	2.25	1.118	0.25	<0.001
	Post	3.05	1.14593	0.25624	

It would be difficult to live with hearing loss	Pre	3.8	0.894	0.2	0.11
	Post	4.15	0.58714	0.13129	
There is nothing you can do to help reduce the impact of hearing loss	Pre	1.45	0.51	0.114	0.666
	Post	1.4	0.50262	0.11239	
Only people with serious hearing loss need hearing aids	Pre	1.85	1.04	0.233	0.494
	Post	1.65	0.81273	0.18173	
Hearing aids can restore hearing back to normal	Pre	2.21	0.713	0.164	0.069
	Post	2.5789	1.07061	0.24561	
Hearing loss is hereditary	Pre	3.55	0.826	0.185	0.330
	Post	3.4	0.68056	0.15218	
Hearing loss can always be fixed with surgery	Pre	1.65	0.813	0.182	0.505
	Post	1.5	0.76089	0.17014	
Hearing loss can't kill me, so it shouldn't be among my top medical concerns	Pre	1.45	0.51	0.114	0.428
	Post	1.35	0.48936	0.10942	
I'd rather deal with hearing loss than wear hearing aids	Pre	1.8	0.834	0.186	1
	Post	1.8	0.95145	0.21275	
I clearly don't have hearing loss or someone would have noticed and told me already	Pre	2.35	1.137	0.254	0.038
	Post	1.85	1.08942	0.2436	
Having hearing loss is shameful	Pre	1.45	0.759	0.17	0.666
	Post	1.55	0.88704	0.19835	
Someone I love has hearing loss	Pre	4.1	1.294	0.289	0.772
	Post	4	1.33771	0.29912	

Table 1. Mean (SD, SEM) pre- and post-survey scores. *P*-values obtained via paired samples *t* tests. Highlighted cells indicate significance at $p < 0.05$. Rating scale is from strongly disagree (1) to strongly agree (5).

		MEAN	**SD**	**SEM**	**P-Value**
I think that the sound level at bars, concerts and sporting events, in general, is too loud.	Pre	4.2	1.005	0.225	0.772
	Post	4.15	0.9333	0.20869	
Listening to music while doing homework helps me concentrate.	Pre	3.2	1.361	0.304	0.705
	Post	3.3	1.26074	0.28191	
I am prepared to do something to make the school environment quieter.	Pre	3.45	0.759	0.17	0.096
	Post	3.7	0.97872	0.21885	
I consider leaving a bar, concert, or sporting event if the sound level is too loud.	Pre	2.9	1.252	0.28	0.110
	Post	3.25	1.51744	0.33931	

I can concentrate even if there are many different sounds around me.	Pre	2.2	1.24	0.277	0.320
	Post	2.55	1.05006	0.2348	
I think it is unnecessary to use earplugs when I am at a bar, concert, or sporting event.	Pre	2.85	1.182	0.264	0.001
	Post	1.9	0.71818	0.16059	
It is important for me to make my sounds environment more comfortable.	Pre	3.8	0.768	0.172	0.049
	Post	4.15	0.87509	0.19568	
I don't like when it is quiet around me	Pre	2.8	1.105	0.247	1.000
	Post	2.8	1.05631	0.2362	
The sound level at bars, concerts or sporting events is not a problem.	Pre	2.45	1.191	0.266	0.258
	Post	2.05	1.09904	0.24575	
Noise and loud sounds are natural parts of our society.	Pre	3.6	0.754	0.169	0.056
	Post	3.1	1.29371	0.28928	
Traffic noise is not disturbing to me.	Pre	3	1.106	0.254	0.047
	Post	2.4737	1.21876	0.2796	
The sound level should be lowered at bars, concerts, or sporting events.	Pre	3.4	1.142	0.255	0.024
	Post	4	0.72548	0.16222	
I think it should be quiet and calm in the classroom.	Pre	4	0.795	0.178	0.234
	Post	4.25	0.63867	0.14281	
Sounds from fans, refrigerators, computers, etc., do not disturb me.	Pre	3.55	1.276	0.285	0.273
	Post	3.2	1.43637	0.32118	

I am prepared to give up activities where the sound level is too loud.	Pre	2.55	0.945	0.211	0.287
	Post	2.8	1.23969	0.2772	
The sound level at my school is comfortable.	Pre	3.55	0.945	0.211	0.847
	Post	3.5	1.19208	0.26656	
It is easy for me to ignore traffic noise.	Pre	3.2	1.105	0.247	0.049
	Post	2.6	1.31389	0.2938	
There should be more rules or regulations for the sound levels in society.	Pre	3.58	0.769	0.176	0.008
	Post	4.1053	0.65784	0.15092	
When I cannot get rid of sounds that bother me, I feel helpless.	Pre	3.35	1.089	0.244	0.083
	Post	3.8	0.95145	0.21275	

Table 2. Mean (SD, SEM) pre- and post-survey scores on items related to noise exposure. P-values obtained via paired samples *t* tests. Highlighted cells indicate significance at $p < 0.05$. Rating scale is from strongly disagree (1) to strongly agree (5).

		MEAN	STD	SEM	P-Value
Earmuffs are uncomfortable	Pre	3.1	1.021	0.228	0.789
	Post	3.05	0.88704	0.19835	
Insert earplugs are uncomfortable	Pre	3.4	1.046	0.234	0.748
	Post	3.3	0.8645	0.19331	
HPD are not fashionable	Pre	3.35	1.04	0.233	0.666
	Post	3.25	1.06992	0.23924	
HPD have poor sound quality	Pre	3.4	0.94	0.21	0.019
	Post	2.75	0.91047	0.20359	
HPD have poor sound protection	Pre	2.1	0.718	0.161	0.481
	Post	2.25	0.71635	0.16018	
HPD are too expensive	Pre	2.79	1.316	0.302	0.306
	Post	2.3684	1.01163	0.23208	
I am more likely to use basic foam earplugs than custom ear-plugs in noisy listening environments.	Pre	3.15	1.226	0.274	0.412
	Post	3.4	1.27321	0.2847	
I am more likely to use custom ear-plugs than basic foam earplugs in noisy listening environments	Pre	2.9	1.021	0.228	0.825
	Post	2.95	1.23438	0.27601	
I know how to fit and wear earplugs	Pre	3.2	1.056	0.236	0.505
	Post	3.35	1.1821	0.26433	
I do not wear HPD when I am around loud tools or equipment	Pre	3.05	1.191	0.266	0.629
	Post	2.95	1.35627	0.30327	
My peers wear hearing protection	Pre	1.85	0.813	0.182	0.716
	Post	1.9	0.91191	0.20391	
I would wear hearing protection even if my peers do not	Pre	3.4	1.231	0.275	0.137
	Post	3.7	1.17429	0.26258	
I can be around loud noises without it hurting my ears	Pre	2.75	1.251	0.28	0.246
	Post	2.4	1.23117	0.2753	

Wearing hearing protection when I am around loud environments is important	Pre	3.7	1.031	0.231	0.008
	Post	4.1	0.96791	0.21643	
I believe my ears can eventually 'get toughened' to noise, so they are less likely to be damaged by it	Pre	1.65	0.875	0.196	0.055
	Post	1.35	0.48936	0.10942	
I know when I should use hearing protection	Pre	3.2	1.105	0.247	0.002
	Post	4	0.72548	0.16222	
I think it will be hard to hear warning signals if I am wearing HPD.	Pre	2.8	1.152	0.258	0.425
	Post	2.55	1.19097	0.26631	
I believe exposure to loud noise can hurt my hearing.	Pre	4.7	0.47	0.105	0.577
	Post	4.65	0.48936	0.10942	
I can prevent hearing loss by wearing HPD whenever I work in loud noise.	Pre	4.05	0.999	0.223	0.741
	Post	4.15	0.74516	0.16662	
Wearing HPD is annoying	Pre	3.3	0.865	0.193	0.545
	Post	3.15	1.13671	0.25418	
Most of my peers think it is a good idea to wear hearing protectors in hazardous noise.	Pre	2.25	1.02	0.228	0.367
	Post	2	0.97333	0.21764	
If my peers asked me, I would be able to help them wear hearing protectors correctly.	Pre	2.8	1.322	0.296	0.005
	Post	3.75	1.11803	0.25	
I don't think I have to wear hearing protectors every time I am working in noise.	Pre	2.26	0.991	0.227	0.287
	Post	2	0.74536	0.171	
I think it would be a big problem if I lost my hearing.	Pre	4.7	0.47	0.105	0.666
	Post	4.75	0.44426	0.09934	

I wear hearing protection when I am near loud noises	Pre	2.42	1.216	0.279	0.285
	Post	2.7368	1.28418	0.29461	
I seldom wear hearing protectors when I work around loud noises.	Pre	3	1.214	0.271	0.871
	Post	2.95	1.2763	0.28539	
I wear hearing protection at bars, concerts, or other loud venues	Pre	2.3	1.261	0.282	0.449
	Post	2.55	1.14593	0.25624	

Table 3. Mean (SD, SEM) pre- and post-survey scores on items related to use of HPDs. *P*-values obtained via paired samples *t* tests. Highlighted cells indicate significance at $p < 0.05$. Rating scale is from strongly disagree (1) to strongly agree (5).

	No experience or feel inexperienced (1)	Little experience (2)	Some experience (3)	Much experience (4)	Extensive experience or mastered this element (5)	N/A or prefer not to answer (6)
Responsibility for part of a project.	0 (0)	0 (0)	0 (0)	8 (40)	12 (60)	0 (0)
Present data in a presentation.	0 (0)	0 (0)	2 (10)	11 (55)	7 (35)	0 (0)
Read primary scientific literature (scientific research articles).	0 (0)	0 (0)	2 (10)	9 (45)	9 45)	0 (0)
Write a paper.	0 (0)	1 (5)	2 (10)	9 (45)	8 (40)	0 (0)
Lead a discussion of a scientific paper.	0 (0)	0 (0)	6 (30)	8 (40)	6 (30)	0 (0)
Identify an epidemiological study design.	1 (5)	1 (5)	5 (25)	9 (45)	4 (20)	0 (0)
Identify the main takeaways of a research article.	0 (0)	0 (0)	1 (5)	14 (70)	5 (25)	0 (0)
Explain tests of auditory function.	2 (10)	0 (0)	6 (30)	5 (25)	7 (35)	0 (0)

Table 4. Count (percent) student self-efficacy on elements covered in this course. Data are from the post-survey; no pre-survey data were collected for this topic. Gray highlighted cells indicate the majority response.

Prompt	Themes	Quotes
What is one concept you learned from this class that can be applied to other courses?	Reading/dissecting scientific papers (12)	"Read Scientific Papers! Also writing scientific papers and I am much more comfortable with contributing in discussions (I was nervous at the beginning but I feel better now)." How to read a scientific study and find important information. How to write a strong research paper using many research papers. I learned how to effectively read scientific papers and be able to pull out the important information I had read scientific literature before but I really feel like I grasped how to go about them greatly in this class which I can us in future class and grad school. Learning to critically read scientific papers. The method of reading scientific papers. Focus on key points from objectives, methods, conclusions, and genera; take aways from the paper. This skill is/cam be applied to other courses. I learned many strategies for reading journal articles, both through the class and through practice because of the class. I feel much more comfortable when I'm handed a jounal article to read and report Research paper dissection-beneficial to all of my courses Learning how to read a journal article to the max. There is a huge influence of younger people (us) when it comes to chronic diseases. This can be incorporated in other classes that involve health, like anatomy, psychology Breaking down dense articles and being able to discern the important elements of the research/public health implications. I learned how to effectively and efficiently read scientific papers. This is important to me because I am an IPHY major which is very science-based How to read scientific papers and take away key concepts.
	Association between hearing loss and cognitive decline (3)	I learned a to more about potential risk factors for noise exposure (such as diet and smoking). This will help. Me in my future courses about hearing loss. How you can loose hearing from drugs such as NSAIDS. Hearing loss isn't just genetic, environmental exposure is a huge factor.
	Other (1)	Just having a better understanding of how easily hearing loss can be caused can apply to other SLHS classes Hearing loss' effect on cognitive decline and depression was also talked about thoroughly in my abnormal psychology class this semester. Hearing loss is associated with depression and dementia, so hearing and inner ear health are important elements to consider in neurological and neuroscience education.

		The general public health implications are applicable to other classes. HL can come along with a wide range of other health problems.
In courses, instructors often think about "enduring understanding"-something you learned that will stay with you for weeks, months, or even years after taking a course. What is one concept you learned in this course that will stick with you?	Reading Scientific literature (4)	Honestly, how to read, analyze, and understand scientific research papers will stick with me. I've already seem am improvement in how I read scientific research in some of my other classes. I learned how to read and pick out important information from a scientific paper and believe I will remember this for as long as I can remember. Also I learned how to write a scientific paper which was challenging but very helpful. Understanding Epidemiological papers. The prevalence of different types of HL, and research paper dissection
	Prevention of noise-induced hearing loss (7)	Noise Induced hearing loss is common I learned to be conscious of my environment and the sound levels and think about wearing hearing protection in loud environments. I learned that protecting our ears (by wearing earplugs r eve standing further away from speakers) can reduce noise exposure/NIHL. Hearing loss is widespread, caused by a multitude of things and is irreversible. I have been more inclined to protect my hearing with all of this knowledge. What levels of dB SPL are damaging at what level of exposure Noise-induced hearing loss due to loud music, concerts, ear buds I learned that the majority of hearing loss is preventable and I need to be taking steps now to protect my hearing.
	Hearing loss as a public health concern and association with other comorbidities (8)	Hearing loss is a public health issue, and the health descrepencies in terms of what causes it still need more awareness. This will stick as it wasn't something I knew or was aware of. And know certain things (that are?) putting me more at risk is a concern Hearing loss is associated to general health and cognition. It's associated with depression, dementia, and literacy and manu drugs harm the iner ear to reduce hearing. Hearing loss isn't just a medical condition. The expense of hearing aids can be debilitating as well. The connection between HL and Dementia. Not only does smoking cigarettes can cause hearing loss, but living with someone who smokes cigarettes can cause hearing loss One thing that will stick with me is how this problem can lead to other health issues and how some health issues will lead to hearing loss Hearing loss is one of the most preventable precursors/exacerbators of cognitive decline.
	Miscellaneous (1)	The correlation between hearing loss and cognitive decline. Information surrounding hearing loss]
This course was designed to be an upper-level seminar style course. Hence, demonstration of	Separate paper and group project assignment (7)	I think spreading out the paper from the group project would be nice. Just maybe have paper due mid April instead.

knowledge was done through presentations and a final paper. Would you have preferred a more traditional format (e.g., with examinations) or alternative assignments.	Mix up style of daily discussions (4)	I liked the paper and presentation lay out but it was a lot to get done at the very end of the semester. Maybe you could consider moving one of them to the middle of the semester as more of a midterm. I think it would be beneficial to have group presentation spaced out through out the semester. For example dedicating some time to work on the presentation and then present in March/April. No test! But making the due dates between final paper and final project would be way less stressful!! Presentation were great! If the paper was split into 2 smaller papers, I think it would've been more manageable I liked the format, but I think that we should have the project due before spring break and then the papers due by finals. I think having presentations is a good idea but having more of a fishbowl thinking. Class was more "fun" or interesting when everyone but in opinions and ideas. It gets dry and boring sometimes. I like how there isnt a final. I liked the final paper and presentations instead of exams, but the daily class was a bit repetitive with the readings and discussions I would prefer to keep the course in a seminar style. I am horrible with exams and essays. One think that would be better is not doing the same thing every day maybe mix it up more than just scientific paper discussions. I would like a little variation in the course, maybe more lectures or activities to avoid doing the same thing ever day.
	Like as is (1)	I liked papers and presentations. This allows for more freedom of creativity. No Exams!
	Prefer examination or hybrid style (2)	I am more used to taking exams, I think I would prefer an exam over the 10 page paper, but other than that, I don't have a preference. A hybrid of the two I think would be better

Table 5. Questions from the post-survey, themes identified in responses (*N*), and student quotes.