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Head Injuries and the Hearing Screening Inventory

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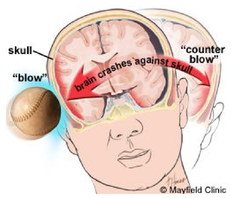
Summary

Head trauma can lead to problems with the ear and auditory pathway. These problems can involve tympanic membrane perforation, fragments in squamous epithelium, damage to the ossicles, or ischemia of the cochlear nerve. It is common for behavioral checklists, for concussion or head injuries, to include an item about hearing difficulty. In the present study, 152 introductory psychology students completed a survey in which they indicated if they had ever had a concussion or sustained a head injury. Approximately one-third (35.53%) of the sample had a history of head trauma. The Hearing Screening Inventory was also part of the survey. Overall, participants who had a previous head injury reported more hearing difficulties than participants with no previous head injury ($t(150) = 2.15$, $p < .02$). Although this difference had a moderate effect size ($d = .37$), it suggests that hearing difficulties may linger since participation was not limited to those having a recent head injury but was open to anyone who had a head injury at any point in time. An examination of specific hearing difficulties revealed that the difference between the two groups was based almost exclusively on their ability to distinguish target sounds from background noises. Specifically, the ability to understand words in music ($t(150) = 2.36$, $p < .01$; $d = .40$) and to isolate an individual speaking from background conversations ($t(150) = 2.44$, $p < .01$; $d = .41$) differentiated the two groups. This finding is consistent with Hoover, Souza and Gallun (2017) who also found that head injury can impair target and noise processing.



Physical symptoms of a concussion:

- Dizziness
- Problems with balance
- Nausea and/or vomiting
- Balance problems
- Sensitivity to noise
- Sensitivity to light
- Blurred vision
- Headache
- Low energy level
- Unequal pupils
- Seeing flashing lights

Mental symptoms of a concussion:

- Difficulty remembering
- Confusion
- Inability to concentrate
- Inability to think clearly
- Mental fogginess
- Inability to remember new information
- Trouble paying attention
- Loss of focus

Sleep symptoms of a concussion:

- Sleeping more than usual
- Unable to fall asleep
- Sleeping less than usual

Emotional symptoms of a concussion:

- Easily angered or upset
- Feeling nervous or anxious
- Feelings of sadness
- Crying more than usual
- Lack of interest in usual activities
- Depression

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STEP 2: SYMPTOM EVALUATION

The athlete should be given the symptom form and asked to read this instruction paragraph out loud then complete the symptom scale. For the baseline assessment, the athlete should rate his/her symptoms based on how he/she typically feels and for the post-injury assessment the athlete should rate their symptoms at this point in time.

Please Check: ☐ **Baseline** ☐ **Post-Injury**

Please hand the form to the athlete

	none	mild		moderate		severe
Headache	0	1	2	3	4	5	6
"Pressure in head"	0	1	2	3	4	5	6
Neck Pain	0	1	2	3	4	5	6
Nausea or vomiting	0	1	2	3	4	5	6
Dizziness	0	1	2	3	4	5	6
Blurred vision	0	1	2	3	4	5	6
Balance problems	0	1	2	3	4	5	6
Sensitivity to light	0	1	2	3	4	5	6
Sensitivity to noise	0	1	2	3	4	5	6
Feeling slowed down	0	1	2	3	4	5	6
Feeling like "in a fog"	0	1	2	3	4	5	6
"Don't feel right"	0	1	2	3	4	5	6
Difficulty concentrating	0	1	2	3	4	5	6
Difficulty remembering	0	1	2	3	4	5	6
Fatigue or low energy	0	1	2	3	4	5	6
Confusion	0	1	2	3	4	5	6
Drowsiness	0	1	2	3	4	5	6
More emotional	0	1	2	3	4	5	6
Irritability	0	1	2	3	4	5	6
Sadness	0	1	2	3	4	5	6
Nervous or Anxious	0	1	2	3	4	5	6
Trouble falling asleep (if applicable)	0	1	2	3	4	5	6
Total number of symptoms:							of 22
Symptom severity score:							of 132
Do your symptoms get worse with physical activity?						Y	N
Do your symptoms get worse with mental activity?						Y	N
If 100% is feeling perfectly normal, what percent of normal do you feel?							

If not 100%, why?

Please hand form back to examiner

Method

Participants

152 introductory psychology students participated in the study for class credit. Participants were asked whether they had ever had a concussion or sustained a head injury. Approximately one-third (35.53%) of the sample had a history of head trauma. Of those who had a TBI (n=54), 29 were female and 25 were male. Those who had not experienced a TBI were predominantly female (n=73). Therefore, males were more likely to have had a TBI than females (χ^2=6.82, p<.01).

Measure

In addition to the demographic information, participants completed the hearing screening inventory (Coren and Hakstian, 1992).

Procedure

Participants completed the demographic information followed by the hearing screening.

Instructions:
This questionnaire deals with a number of common situations. For each question you should select the response that describes ***you*** and your behaviors best. You can select from the following alternatives:

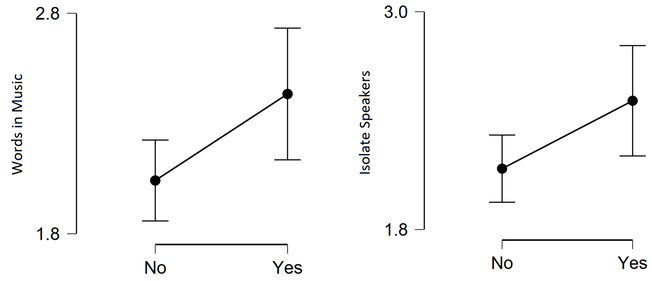
Never (or almost never) **Seldom** **Occasionally** **Frequently** **Always** (or almost always)

	Never	Seldom	Occasionally	Frequently	Always
1) Are you ever bothered by feelings that your hearing is poor?					
2) Is your reading or studying easily interrupted by noises in nearby rooms?					
3) Can you hear the telephone ring when you re in the same room in which it is located?					
4) Can you hear the telephone ring when you are in the room next door?					
5) Do you find it difficult to make out the words in recordings of popular songs?					
6) When several people are talking in a room, do you have difficulty hearing an individual conversation?					
7) Can you hear the water boiling in a pot when you are in the kitchen?					
8) Can you follow the conversation when you are at a large dinner table?					
For the last four questions use these labels as your answers	**Good**	**Average**	**Slightly Below Average**	**Poor**	**Very Poor**
9) Overall, I would judge my hearing in my **right** ear to be…					
10) Overall, I would judge my hearing in my **left** ear to be…					
11) Overall, I would judge my ability to make out speech or conversation to be …					
12) Overall, I would judge my ability to judge the location of things by the sound they are making alone to be…					

Results & Discussion

Participants with a previous TBI had higher hearing screening scores than those with no previous head injury ($t(150) = 2.15$, $p < .02$). Although this difference had a moderate effect size ($d = .37$), it suggests that hearing difficulties may linger after head trauma since participation was not limited to those having a recent head injury but was open to anyone who had a head injury at any point in time. An examination of specific hearing difficulties revealed that the difference between the two groups was based almost exclusively on their ability to distinguish target sounds from background noises. Specifically, the ability to understand words in music ($t(150) = 2.36$, $p < .01$; $d = .40$) and to isolate an individual speaking from background conversations ($t(150) = 2.44$, $p < .01$; $d = .41$) differentiated the two groups.

Item	TBI	M	SD	-SE	+SE
Words in music	No	2.04	0.90	1.95	2.13
	Yes	2.43	1.08	2.28	2.58
Isolate speakers	No	2.11	0.92	2.02	2.20
	Yes	2.52	1.09	2.37	2.67
Total	No	32.28	3.71	31.91	32.66
	Yes	33.7	4.23	33.12	34.28



This finding is consistent with Souza and Gallun (2017) who also found that head injury can impair target and noise processing. Given the time between head injury and time of testing in the present study, additional research needs to more closely examine the time course of hearing (and balance) impairment and recovery after head trauma.

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