

**CRITICAL THINKING EXERCISE 4.2****Stress and Healing**

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**CONCEPT**

Stress is not only associated with an increased risk for getting sick; stress is also associated with the time it takes to heal from injury. In this research study, Marucha et al. (1998) looked at whether experiencing high levels of stress increases the likelihood that a person will heal more slowly from a wound. The purpose for this activity is to help students accomplish the following:

- APA National Standards (Health standard area): 1.3 Explain physiological and psychological consequences of stress for health and wellness
- Evaluate and understand the independent, dependent variables of the study, critique the study, and determine whether the hypothesis was supported.

**MATERIALS**

- *Stress and Wound Healing Worksheet*

**INSTRUCTIONS**

- This activity takes 20-30 minutes to complete.
- Have students read the summary of the research study titled *Mucosal Wound Healing is Impaired by Examination Stress* (Marucha et al., 1998).
- Students will answer and discuss the questions following the summary.

## STRESS AND WOUND HEALING WORKSHEET

## Mucosal Wound Healing is Impaired by Examination Stress

Authors: Marucha, P. T., Kiecolt-Glaser, J. K., & Favagehi, M. (1998)

**Brief Article Summary:** Marucha et al. (1998) were interested in the effect of a commonplace stressor on healing from a wound and on immune function. They chose to use exam stress as the commonplace stressor and observed healing from small wounds made to the hard palate (the roof of the mouth). Specifically, they used announcements placed in mailboxes to recruit 11 students (nine men and two women) in dental school and gave each participant a punch biopsy to one side of the hard palate at the end of summer vacation (categorized by the authors as a low stress period) and then again to the other side of the hard palate three days before the first exam of the school year (categorized as a high stress period). To verify the categorization of summer vacation as low stress and the exam period as high stress was consistent with the participants' experiences, the researchers administered the 10-item Perceived Stress Scale at the time of each biopsy and again three days later. They measured healing with daily photographs and wound response to hydrogen peroxide (hydrogen peroxide foams on unhealed wounds), and they measured immune function as production of interleukin 1 $\beta$  (IL-1 $\beta$ ) messenger RNA (mRNA). Wounds inflicted prior to the exam took an average of three days (40%) longer to heal than wounds inflicted at the end of summer vacation, and IL-1 $\beta$  mRNA production was 68% lower on the day the wound was inflicted prior to the exam than the day the wound was inflicted at the end of summer vacation. The authors suggest that commonplace stressors, like exams, can impact the healing of even small wounds.

Please answer the following questions after reading the research summary:

**What type of research is being conducted and how do you know?**

**What was the hypothesis?**

**How were the participants selected?**

**What was the independent variable?**

**What was the dependent variable?**

**What was the control group?**

**What was the experimental group? Were there multiple conditions?**

**Was the hypothesis confirmed?**

**Can these results be generalized to a larger population? How do you know?**

**What are some criticisms of the study?**

## ANSWERS

### What type of research is being conducted and how do you know?

A repeated measures experiment. I know because each participant experiences both levels (conditions) of the independent variable.

### What was the hypothesis?

The authors did not state a hypothesis. The research question is whether commonplace stressors impact the time it takes a wound to heal.

### How were the participants selected?

Participants were recruited through an announcement placed in their mailboxes. This is an example of convenience sampling (not random sampling).

### What was the independent variable?

Stress level

### What was the dependent variable?

There were two dependent variables. One was the time it took the wounds to heal and the other was production of IL-1 $\beta$  mRNA.

### What was the control group?

The participants served as their own controls.

### What was the experimental group? Were there multiple conditions?

There were two conditions. One was low stress (the end of summer vacation) and the other was high stress (the days around an exam).

### Was the hypothesis confirmed?

The researchers answered their question - commonplace stressors lengthen the time it takes to heal a small wound.

### Can these results be generalized to a larger population? How do you know?

The generalizability of these results to a larger population is questionable because the sample was recruited using convenience sampling rather than random sampling. The students who volunteered to participate in the study might have differed in important ways from the students who did not volunteer to be in the study.

### What are some criticisms of the study?

The authors did not discuss any potential limitations of the study.

There are considerably more male than female participants. Also, gender is measured as a binary (male/female) variable. It is important to provide participants with all gender identity options.

It is possible that, after experiencing the first punch biopsy, anticipation of the second biopsy might have been a stressor and the stress of anticipation, rather than exam stress, might have impacted wound healing and immune function. The possibility could be studied by recruiting another group of participants and reversing the order of stressors (high/exam then low/summer vacation).

### Source:

Marucha, P. T., Kiecolt-Glaser, J. K., & Favagehi, M. (1998). Mucosal wound healing is impaired by examination stress. *Psychosomatic Medicine*, 60, 362-365. <https://doi.org/10.1097/00006842-199805000-00025>