The Effect of the Arousal of Pain on Risk-Taking Behavior

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The arousal of pain affects the human species in ways they could never predict. Physical pain induces aggression, fear responses, and can push people to make decisions which are not rational and extremely risky (Myers & Spencer, 2004). This is why it is not easy to foresee the repercussions pain brings to the lives of others. Risk-taking behaviors are commonly seen in populations where pain thresholds are high and pain is experienced often (Truscott & Fehr, 1986). Therefore when examining the effects of pain, one might expect high levels of risk-taking behaviors.

A study done by Truscott and Fehr (1986) studied risk-taking behaviors in 3 different groups of people: reducers, moderators and augmenters. These groups were formed after undergraduate students participated in the Kohler and Dinnerstein (KAE) task. The task consisted of estimating the width of a wooden block. Reducers tended to
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underestimate the size of the original block, augmenters tended to overestimate the size of the original block and moderators were most accurate (Truscott & Fehr, 1986).

Research conducted by Nettler (1982) suggests that reduction is a trait most characteristic of criminals (as cited in, Truscott & Fehr, 1986). Young offenders have a greater need for stimulation, display riskier behavior and have a higher tolerance for pain. These offenders also have the highest amount of self-inflicted pain displayed on their bodies. These findings were extremely interesting, which is why Truscott and Fehr tested undergraduate students in hope to see similar trends. After classifying students into reducers, augmenters and moderators they were then tested on the Behavior Prediction Scale (BPS), which assesses risky activity. They found that those classified as reducers were the most willing to participate in criminal acts.

Truscott and Fehr (1986) demonstrated that pain and risk are connected. Since reducers have a high pain tolerance, preferring pain to zero sensation and take the greatest risks, the connection is undeniable.

What happens to this connection if one studies people who suffer from chronic pain opposed to a population that can tolerate pain? Tang and Crane (2006) did just this. They wrote a review on patients who were suicidal; some attempted suicide and were unsuccessful while others suffered from suicidal ideation. Suicide is risky for two reasons; for one, attempting suicide without the goal of death can accidentally become ones fate. Secondly, if one's goal is death then the chance of not dying is not guaranteed. After all, the only thing worse than killing oneself is an unsuccessful attempt.
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All participants suffered from chronic non-malignant pain. They were three times more likely to suffer from suicide ideation and twice as likely to attempt suicide when compared to a population who did not suffer from chronic pain (Tang & Crane, 2006). More specifically, when comparing people who were pain free to those who had back and body pain, the latter experienced death by suicide more frequently. As well, those who suffered from migraines with aura compared to migraines without auras were more likely to experience suicide ideation and suicide attempts (Tang & Crane, 2006). Although these statistics are from a remote and rare sample, these results strengthen the connection between pain and risk.

There are several ways in which one could participate in a risk-taking behavior. A study performed by Griffith, Hart, Goodling, Kessler and Whitmire (2006) illustrates how physical risk-type behavior is affected by pain awareness. 134 base-jumpers were tested, whose experiences ranged from high to low. Base-jumping is a highly dangerous sport wherein people jump from fixed objects (Griffith et al., 2006). Base-jumpers use parachutes but, unlike skydivers, and do not carry a backup chute. As well, base-jumpers jump from lower altitudes thereby giving themselves less airspeed which is a major risk factor. The researchers approached 134 base-jumpers and asked them to fill out the Sports Inventory for Pain (SIP) questionnaire to assess coping responses.

Significant differences were found between the novice and expert jumpers. The expert jumpers did not use mental imagery when dealing with pain. They had lower cognitive and higher avoidance scores. The novice jumpers were found to have a higher pain threshold and would therefore ignore pain when jumping. This study has
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demonstrated that the arousal of pain is associated with greater risk taking. Although the experienced jumpers do not deal with the pain as well as the novice jumpers, they did jump more often (Griffith et al., 2006).

Sex is another variable that directly affects risk-taking behaviors. From an early age boys have demonstrated a greater willingness to take risks. Paul (1966) tested 735 boys and 312 girls whose ages ranged from 6 to 16. All participants were asked to take part in a decision-making game which assessed risk-taking. Results signified that these behaviors emerged between the ages of 9 and 11 and were more robust in males than females. Hudgens & Fatkin (2001) also tested sex differences in risk-taking studying military personnel students. There were 18 males and 18 females who participated with ages ranging from 18-23 years. The study consisted of two phases. In phase 1, all participants were asked to guess the likelihood that a tank could cross 100 minefields. After completion, in phase 2, participants were asked to determine whether or not to send a tank across any of the fields. Furthermore, Hudges & Fatkin (2001) confirmed that men were greater risk-takers than women. Overall, males sent more tanks across the minefields.

Past findings suggest that the arousal of pain influences one’s risk-taking behavior. As well, it was found that from a young age males are more risky than females. The goal of the present study is to test whether risk-taking behaviors are affected by the arousal of pain. As well, the difference of sex will be measured. Although previous research has demonstrated a strong connection between risk and pain, the populations measured have not been representative of the general population. The proposed study
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will test a more representative sample therefore furthering the implications of this research. Based on all past evidence it can be hypothesized that the arousal of pain will influence risk-taking.

Method

Participants

The participants in this study were 40 Ontario residents who are also current students the University of Western Ontario. All subjects were acquaintances of the researchers. Twenty females and twenty males participated in the study, and their ages ranged from 17-23. The subjects were chosen based on availability for participation at the specific time the study was being conducted.

Materials

The materials used in this study were consent forms, pain tolerance questionnaires, risk-taking questionnaires, quotation questionnaires and a short story. The consent form indicated the purpose of the experiment and the exact requirements of the participants. The approximate time for the completion of the experiment was fifteen minutes for each subject. The consent form also explained that participation was based on a voluntary basis. The pain tolerance questionnaire was a 10-point scale aimed to arouse physical pain sensation (refer to appendix A). There were 15 questions asking participants to rate a specific event according to perceived painfulness. The risk-taking questionnaire was a yes or no scale measuring physical risk type behavior (refer to appendix B). There were 15 statements; yes indicated risk and no indicated no risk. The
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were asked to keep the booklets in the researcher's line of sight until the study was completed. Upon completion, a debriefing form outlining the intentions of the study was provided to each participant.

Results

A 2x2 between subjects MANOVA was performed to examine the interaction and main effects of pain arousal and sex on two risk-taking behaviors: bodily harm and financial gain/loss. There was no significant main effect for sex (F (2,35) = 1.42, n.s.). As well, sex was not significantly related to bodily harm (F (1,36) = 2.9, n.s.) or financial gain/loss (F (1,36) = .27, n.s.). There was no significant main effect for pain arousal (F (2,35) = .53, n.s.). As well, pain arousal was not significantly related to bodily harm (F (1,36) = .98, n.s.) or financial gain/loss (F (1,36) = .27, n.s.).

Lastly, there was not a significant interaction effect of sex and pain (F (2,35) = .58, n.s.). As well, sex and pain was not significantly related to bodily harm (F (1,36) = .72, n.s.) or financial gain/loss (F (1,36) = .27, n.s.)

Discussion

The results from the present study do not support the hypothesis that the arousal of pain will affect risk-taking behaviors. These results were contrary to previous research which indicated that risk-taking and pain were strongly correlated. For example, Griffith et al. (2006) found that expert Base-Jumpers thought the most about physical pain and injury, while novice jumpers did not think about or visualize pain whatsoever. Therefore
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those who took the most risk were most cognitive about possible bodily harm. As well, Tang and Crane (2006) found that those who suffered from chronic non-malignant pain were most likely to attempt suicide or suffer from suicide ideation.

Past research also supported the hypothesis that males took more risks than females but this was not supported in our findings. Paul (1966) demonstrated that 9-year-old boys took bigger risks than girls and Hudges & Fatkin (2001) confirmed this finding in older males. However, the present study results indicated that males and females were equal in their risk-taking behaviors.

The results indicated no interaction between sex and pain on risk-taking behaviors. As well, there were no main effects of either sex or pain. There are several reasons as to why no significance was found. For example, although control was not a major issue, all participants were tested at different times of the day and in different locations. Therefore, testing was not consistent and may have damaged the reliability of the study. Another control issue is that the researcher was close in physical proximity when the test was being administered; thus participants may not have been honest because of potential embarrassment. In the future all participants should be tested in one room at the same time. The researcher should not be in the room to provide privacy thereby creating a safe environment where participants can be honest without feeling judged.

The biggest problem with the study was the stimulus. Since the stimulus was not tested for reliability or validity one cannot be sure if pain was aroused or risk-taking was assessed properly. For example, it is unknown if risk-taking affecting bodily harm was
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appropriately measured. Each of the 15 items measured were not previously tested or assessed to indicate how risky each item was. As a result, the items used may have been too risky or even too precarious. In the future each item should be pre-tested and rated to create high internal consistency.

The largest potential confound in the study is whether or not pain was aroused. Participants read 15 painful items and were asked to indicate how painful each event was or could be. More recently, there has been a great deal research on the arousal of pain and different methods to successfully stimulate it. For example, in the future instead of reading a list of painful experiences, participants could watch clips of painful experiences. Ditto, Pizarro, Epstein, Jacobson and Macdonald (2006) studied visceral influences on risk-taking behavior. Male participants were either given a script or a movie clip to watch which illustrated a young couple deciding whether or not to have sex with a condom. Those who watched the movie clip expressed a greater desire to have sex without a condom than the group who read a script. Although this study did not arouse pain, it demonstrated how visual stimuli successfully aroused and effected risk-taking behaviors.

Another successful way to arouse pain is to physically induce it. Lewis, Fishbain, Sipes, Asfour, Cole, Cutler, Rosomoff, R. and Rosomoff, H. (2006) tested the reliability and validity of a pain apparatus. They tested thirty-six healthy subjects and ten patients who suffered from chronic back pain. Both groups were given an experimental apparatus which induced pain. They were then assessed for pain tolerance and pain threshold. It was found that the apparatus used was reliable and internally consistent in establishing
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experimental pain. Although these methods are more intrusive they guarantee successful results.

Lastly, it has been established that autobiographical memories have excellent recall in both physical and emotional realms. Rachman and Lopatka (1990) tested this theory. Twenty-five females were asked to rate the level of pain during their menstrual cycle, once during pain and once when pain free. At that time all subjects were asked to reveal stories in their past. After completion, participants were later asked about these past experiences. Results demonstrated that the impact of pain influenced autobiographical memory. Negative past experiences were better remembered when pain was experienced and positive past experiences were better remembered when pain was not experienced. Hence, one's own physically painful experiences can elicit other painful memories. Therefore, in the future a good way to arouse pain is to ask participants to write about their own past painful histories.

The effect of the arousal of pain on risk-behavior is an understudied and under-researched field. This field is extremely interesting and important in practice. It is important to know what type of people take the biggest risk and why. As well, it demonstrates how influential certain stimulus is on society. It has already confirmed that movie clips can induce risky behaviors, but the question still remains, how risky?

The results in the present experiment did not support the original hypothesis. Future studies are still necessary to reveal more about the relationship between pain and risk.
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References


Appendix A

Pain Tolerance Questionnaire

Please read through each question and circle one number (1 through 10) which best describes how painful an event is to you. If you have never encountered any of the events asked then imagine the amount of pain you would feel.

1 = very little pain
10 = extremely painful

1. Stub your toe
   1 2 3 4 5 6 7 8 9 10

2. Twist your ankle
   1 2 3 4 5 6 7 8 9 10

3. Getting a needle
   1 2 3 4 5 6 7 8 9 10

4. Falling on ice
   1 2 3 4 5 6 7 8 9 10

5. Breaking a bone
   1 2 3 4 5 6 7 8 9 10

6. Getting a tooth pulled
   1 2 3 4 5 6 7 8 9 10

7. Ear infection
   1 2 3 4 5 6 7 8 9 10

8. Dislocating a bone
   1 2 3 4 5 6 7 8 9 10

9. Bruising your body
   1 2 3 4 5 6 7 8 9 10

10. Breaking a nail
    1 2 3 4 5 6 7 8 9 10

11. Cutting yourself with a razor when shaving
    1 2 3 4 5 6 7 8 9 10

12. Pink eye
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13. Getting waxed
1 2 3 4 5 6 7 8 9 10

14. Back pain
1 2 3 4 5 6 7 8 9 10

15. Belly flop in water
1 2 3 4 5 6 7 8 9 10
Appendix B
Risk Assessment Questionnaire

Please read through each question and indicate if you would take part in the activity asked by circling Y for yes OR N for no. If you have already participated in an event asked about please answer Y to the question.

1. Would you Sky Drive?
   Y   N

2. Would you go on a rollercoaster?
   Y   N

3. Would you like to drive fast?
   Y   N

4. Would you like to bungee jump?
   Y   N

5. Would you get plastic surgery?
   Y   N

6. Would you have sex without a condom?
   Y   N

7. Would you not wear a seatbelt when in car?
   Y   N

8. Would you drink alcohol while on medication?
   Y   N

9. Would you experiment with hard drugs?
   Y   N

10. Would you play with knives?
    Y   N

11. Would you own a gun?
    Y   N

12. Would you put your finger/hand in hot water to assess the temperature?
    Y   N
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13. Would you go cliff jumping?
   Y   N

14. Would you go white water rafting?
   Y   N

15. Do you wear sunscreen?
   Y   N
Appendix C
Quotation Questionnaire

Please read through each question and indicate whether or not you have heard the quote listed below by circling Y for yes OR N for no.

1. All is fair in love and war
   Y   N

2. 100% of the shots you don't take don't go in
   Y   N

3. An eye for eye only ends up making the whole world blind.
   Y   N

4. Whatever the mind can conceive and believe, the mind can achieve.
   Y   N

5. Neither a lofty degree of intelligence nor imagination nor both together go to the making of genius. Love, love, love, that is the soul of genius.
   Y   N

6. Keep away from people who try to belittle your ambitions. Small people always do that, but the really great make you feel that you, too, can become great.
   Y   N

7. Great works are performed, not by strength, but by perseverance.
   Y   N

8. Imagination is more important than knowledge.
   Y   N

9. If music be the food of love, play on.
   Y   N

10. The way to get started is to quit talking and begin doing.
    Y   N

11. Obstacles are those frightful things you see when you take your eyes off the goal.
    Y   N

12. The life which is unexamined is not worth living.
    Y   N
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13. Live as if you were to die tomorrow. Learn as if you were to live forever.
   Y   N

14. All that glisters is not gold.
   Y   N

15. Intellectuals solve problems; geniuses prevent them.
   Y   N
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Appendix D
Short Story

Please read the story below then answer the following questions.

Picture this:

You just turned 40 and your life has not exactly turned out the way you planned. Although you are married and have four beautiful children you have not "made it" financially. You have a job but it is not the one you planned on having when you were younger and more ambitious. You have money in the bank but not enough to send all of your children to university. So you have decided to take action! Although quick money isn't exactly reliable you do know someone who is starting a business that is promised to do well.

What do you do?

1. Do you offer all your money therefore giving the "new venture" the best chance possible?
2. Do you offer half of your money just incase the venture doesn't take off?
3. Do you offer nothing because it's too risky, leaving yourself with the little money you started with?
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Appendix E
Raw Data

### Males - Pain Tolerance Questionnaire

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### Males- No Pain Tolerance Questionnaire

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### Females- Pain Tolerance Questionnaire

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quotation questionnaire was a yes or no scale measuring the familiarity of sayings (refer to appendix C). There were 15 quotations; yes indicated familiarity and no indicated novelty. Lastly, there was a short story measuring financial risk (refer to appendix D). All participants were asked to read a short story and circle one of three choices indicating their risk levels.

The short story was used as a control to identify a potential confound in the study, the Hawthorne effect. The goal of the study was to arouse pain and therefore affect risk-taking behaviors to bodily harm. This control measures a different type of risk, financial risk; thus, if there is an arousal of pain, it would be accounted for by financial risk. As well, none of the measures used have been tested previously therefore are not reliable or valid.

There were a total of four conditions in this study. Participants were split by sex and the arousal of pain. The difference between groups is 20 participants will receive a pain tolerance questionnaire and 20 participants will receive a quotation questionnaire. Both groups will fill out the Risk Assessment Questionnaire and the Financial Risk story. Both females and males are required to fill out 10 booklets from the experimental and non-experimental conditions.

Procedure

Testing was performed over a one-day period. The experiment was conducted in various locations in and around the University of Western Ontario. There was little noise and few distractions during the experiment. All 40 participants were asked by the researcher to fill out a booklet immediately. Although no time limit was set, participants