The Impact of Stress on Prosocial Behaviour and Relevant Factors

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Abstract. Stress is a negative and overwhelming psychological feeling that always comes into a human's mind and bothers one's life. Prosocial behaviour is a voluntary act/behaviour that is intended to benefit others in society as a whole. According to recent studies, stress, especially acute stress, has shown a significant relationship with prosocial behaviour. This paper is looking deeper at their relationship and analyzing broader about relevant factors. After compiling the relative studies and investigations on this topic, gathering information regarding stress, acute stress and their relationship with prosocial behaviour, studies do suggest the correlation between prosocial behaviour with acute stress. Plus, this paper examined relevant factors that may have different effects on the results, such as kin relationship, empathy, and gender difference. The result indicates the importance of kin relationships, whereas people always care for a person they know more than strangers. It also emphasized how different levels of empathy affect people's prosocial behaviour and moreover, shows a great gender difference in prosocial behaviour under stress. This review can provide some suggestions to develop intervention programs that can facilitate genuine prosocial behaviours in individuals at risk.

Keywords: acute stress, prosocial behaviour, kin relationship, empathy, gender differences.

1. Introduction

Stress is a state of being overwhelmed by a sheer volume of work or responsibility and thus leads to a negative and subjective feeling. Consider being worried or with mental tension caused by a problematic situation [1]. Stress is commonly seen in everyone's daily life. Prosocial behaviour is a voluntary act/behaviour that is intended to benefit others in society as a whole. For example, helping others, prioritizing others' well-being in front of oneself. Prosocial behaviour has great benefit to society. Without prosocial behaviour in the current society, there wouldn't be any voluntary act in society by individuals. Everyone in this society would only care about themselves, may cause damage to the environment. Morover, people may develop over-compelling, hurting others for their own benefit and increasing the criming rate. It is crucial for people to understand prosocial behaviour. There can be so many incentives for prosocial behaviour. Different incentives can induce prosocial behaviour and they are inextricably linked with prosocial behaviour. When stress is linked with prosocial behaviour, people can extend on this and investigate more on relative factors. Real prosocial behaviour will help the government to improve the society of the country. That is also important for relative organizations to focus on the factors, in order to find more connection between human emotion and behaviour to promote more aspiring(heartfelt) prosocial behaviour.

Stress is considered a common emotion in human daily life, and it can also be divided into acute and chronic stress. With the depth growing in the investigating area in the mechanism of stress, it is to be found that both acute and chronic stress can affect cognitive function. Explain in detail of how stress affects the decision-making of risk and reward [2]. Stress triggers additional rewards salience (STARS) plays an important role. This means when individuals are under stress, they tend to have dopamine system at a higher level and induce them to make choice based on the STARS model, meaning the decision made in the meantime will be partially toward rewarding and learning options (positive) instead of any negative options. However, the main benefit or harm will depend on the specific condition. An example can be drug addiction. Stress can increase the dopamine level and amplify the reward of the drug in the drug dealer's mind and that ends up with resuscitation in drug

addiction. Therefore, in the condition with negative feedback, participants tend to perform worse than the condition with positive feedback. The difference in decision-making under stress was also shown between genders. Under acute stress, male is more likely to choose high benefit but high-risk option whereas female would choose relatively conservative choice. Overall, through different studies and findings, higher levels of dopamine system will be induced under stress, and it will affect one's decision-making. Moreover, high-risk decisions are more likely to be made under stress.

The study by Thomas and colleagues investigated prosocial behaviour and had put its main focus on the transformation of apathy into movement. Initially, the study discusses the target group that can transform their apathy into movement. This is the group that is at the higher position of the food chain, which makes them steady in a safe place and control a large scale of power, called "poisoning the consciences of the fortunate" and therefore discusses the possible emotional reaction (unfairness) from advantaged group to disadvantaged group and the possibility of the promoting of social equity that the emotion can make. Then talk about the different inclusiveness that can appear in advantaged groups to disadvantaged groups through category inclusion, category norms and category interest. Through group kindness, authority and group benefits to include all people in one group and to depreciate the inequality. Category inclusion can be realized by the sharing of similar emotions, similar emotions make people identify with each other. Category norms can be recognized by group responsibility and group guilt to change the identity and make it easier to take social action. Moreover, emotion will also influence the preference of group members such as guilt, it is the internalized value about right and wrong. When people in developed countries feel guilt toward countries still developing, it is helpful for people to have such feelings. Sympathy plays an even greater role in the transformation of apathy because it raises awareness of the plight of others as something that needs to be alleviated. Empathy can help with the perceived interchangeability between self and others. The other one is anger. It is a powerful catalyst for action to overcome low quality. Another aspect is to let the advantaged group observe their advantage and privileges and to find the vulnerable of the disadvantaged group, to amplify the potential for promoting social equality. Social cohesion and social change strategies are influenced by emotions, which are conceptualized to enhance prosocial behaviour to create social equality [3].

Stress puts people under special conditions and determines the decision-making of humans. Prosocial behaviour is induced by different emotions and mechanisms. The consistency of prosocial behaviour depends on society's cohesion and the leading of emotion [3]. Both stress and prosocial behaviour have been studied deeply, however, the relationship between stress and prosocial behaviour is still a research gap and lacks attention by researchers. Considering its importance to society, it's still crucial for people to understand more about the relationship between stress and prosocial behaviour. With the current unstable relation. Since if stress is an induction of prosocial behaviour, then it won't be a consistent act that can appear in society. How can people avoid using stress as a reason for prosocial behaviour, make prosocial behaviour to be a long-term action. The following text would give a review of the relationship between stress and prosocial behaviour from different aspects and from different factors that may have effect on the correlation.

2. Types of Stress, Cognitive Control, and Prosocial Behaviour

The behaviours of people vary in different stress condtions. Under stress, people may show prosocial behaviour, to prioritize others' needs instead of theirs. In the study by Buchanan and Preston investigated how stress would affect decision-making and how stress is related to prosocial behaviour. Just as the physiological stress response is the enhancement of urgently needed functions by temporarily reducing long-term functions that are not immediately needed. This kind of concept is also fulfilling a role in causing prosocial behaviour in individuals [1]. Healthy young men exposed to the trier social stress task and prove the possibility of prosocial behaviour. The method this study used is to observe the stress resonance between individuals that would cause the prosocial aid by observer in the experiment when they observe stressed speaker. Physiological indicators (salivary

alpha-amylase and cortisol) were collected from individuals doing public speaking and mental arithmetic tasks. Contagious stress is letting people develop prosocial aid. They also investiged the relationship between decision-making and prosociality, shows when people are under stress, they make quicker decision, and their pro-sociality is higher. Through the study, it has suggested that prosocial behaviour can be induced by stress under the circumstance when the target is in a vulnerable and distressed situation. Result shows a relationship between vulnerable situation and prosocial behaviour.

The effect of acute stress on prosocial behaviour has always been an important aspect of the issue to discuss. Moreover, the effect of thought control ability on such relationships is also a factor to consider. One's thought control ability is a cognitive control process that helps regulate emotions and maintain a positive self-image. The study by Hensel and colleagues investigatedt the effect of acute stress on prosocial behaviour and their relationship to thought control ability. They try to find how individual acute stress will have an effect on prosocial behaviour [4]. Participants were gathered. With an average age around 24 years old. Participants do the thinking/no-thinking task (TNT) about memorize and linking cue words to measure their thought control ability, then collect three salivary cortidal samples a day for two consecutive days to measure current life stress and then do the TSST. After the task, participants were measured the prosocial motivation and measured their helping behaviour by taking procial relevant item and by following the stream of consciousness to write anything entered in participants' mind. The result shows that acute stress responses (e.g., negative emotions, alpha-amylase, cortisol) are positively correlated with pro-sociality. However, it only occurs when the overall stress level of the individual is low. Acute stress has shown a positive relationship with prosocial behaviour. Thought control ability will lead to individual's weaker acute stress response. It helps individuals recover from negative emotional thoughts, but overall, it doesn't connect with prosocial behaviour and moreover. It doesn't induce enough motive to actuate prosocial behaviour.

Both social stress and cognitive stress belong to acute stress. Social stress can be simply explained as the threats to one's social relationship and ones' uncomfort in a social environment. Cognitive stress is the feeling of overwhelming in people's mind and it can be considered psychological stress. Emotional stress is associated with exposure to highly negative events, cues and even thoughts. Under social stress, people are under a moderate negative emotion, and this would make them tend to take prosocial behaviour [5]. The study by Hovnanyan and colleagues investigated the relationship between different types of acute stress and willingness to help and donate behaviours, taking into account the role of emotional intelligence. Moreover, despite that the data collected during the 2020 COVID-19 year, if the willingness to help would change as donation goals changed would also be counted in. The acute stress types that have been considered in the experiment are social stress, emotional stress and cognitive stress. The method has been designed as 4 stress/control conditions and 2 charity scenarios. Participants engaged in online video interviews with two experimenters to explore stress effects on help and donation willingness. Initial questionnaires were followed by phone interviews a week later. Pressure group expose to reading phrases that appear on the monitor, mental arithmetic tasks and internationally affected pictures through different stress tests such as the online version of the singing stress test. No pressure control group completed low cognitive demand tasks. They reported negative effects before and after stress/control tasks. After stress exposure, they imagined donating to COVID-19 or influenza patients and reported willingness and amount. They were reminded of tasks and asked about willingness in different scenarios. The result shows that participants were more willing to help after social stress than after cognitive stress and emotional stress and moreover, influenza is comparable to COVID-19 in terms of prevalence and mortality, but participants showed more willingness to help COVID-19 patients.

Social stress shows a significant tendency of prosocial behaviour and this may let people consider the difference between social stress and other stress. This may exist because of individual's mind difference. People under more psychological stress may tend to care for themselves more compared to social stress. People under social stress may just need more support and require connected

relationships to make them integrate into society and have the connection. Stress can have an effect on human behaviour, especially the topic of this paper, on prosocial behaviour. Through different studies, different types of stress can all have an effect on prosocial behaviour.

3. Relevant Factors to the Effect of Stress

3.1. The Role of Closeness and Empathy

Prosocial behaviour is the prioritization of others, but more than that, there is more prosocial behavior when an interpersonal relationship is involved. When it comes to a person's kin relationship or just people they know, it may have more stress induce under such relationship, and break the equilibrium. When people are exposed to both a stranger and one's friend or family member at one time under stressed condition, people would subconsciously be choosing someone closer. The study by Passarelli and Buchanan investigated the universality of the pro-social position in human society and tried to observe the parallel relationship between stress, kin relationship and prosocial behaviours [6]. Paticipants were divided into groups with time pressure and the others without. Participants were asked to imagine donating money (up to $100) to someone who needed medical care for diabetes. The people they could donate included their mothers, friends, and strangers. If participants took longer than 7 seconds to respond in the time pressure condition, the survey moved on to the next question automatically. Participants showed a tendency to donate more to people they're closer to. They also investigated the effect of "stress" instead of "time pressure". Also changing "friend" to "cousin", Participants took TSST-G (same rule as TSST but allow more participants to participate) or a placebo version of TSST that does not contain any pressure components such as social evaluation and controllability. After the experiment, participants were given a measure of stress and their cortisol was measured. Results show that the pressure manipulation effectively influences cortisol response and both testing groups showed similar prosocial behaviour to three different targets (mother, cousin and stranger). Therefore, the result for both experiments demonstrate the effect between time pressure/stress on prosocial behaviours. More than that, the study suggested the tendency of people choose their closer relatives rather than strangers under stress. The study not only indicates the relationship between prosocial behaviour and stress, it also deeply studied prosocial behaviour and kin relationship. Consequently, discovered that the importance of kin relationship, not only in other aspect but especially in such "altruism" behaviour. The study suggests that under prosocial behaviour, kin relationships are still deeply engrained in subconscious human behavior.

Empathy is the thought to regulate prosocial behavour, the sharing and understanding of another person's] affective states. Moreover, empathy can connect with prosocial behaviour [4]. The study by Azulay and colleagues is investigating the relationship between empathy and acute stress, may end up in either pro-social or selfish responses [4]. Participants were randomly assigned to TSST or control treatment (same setting with TSST but no pressure induction). Interpersonal reactivity index (measure of dispositional empathy, IRI) was used to measure empathy level. Then each of them will get a small box, containing 10 coins of 1 New Israeli Shekel, an envelope, and written instructions. Let participants decide if they want to give money to other participants or keep them. Salivary cortisol levels as well as subjective stress and anxiety measures were used to verify whether stressful manoeuvres result in increased physiological and psychological stress responses. The result of the game shows, under gender comparison, female participants are willing to give more money to other participants than male participants. Pressure control did not make a great difference. Overall, women with higher empathy, the higher the cortisol reactivity, the more generous the behaviour towards unfamiliar objects. Conversely, for women with low empathy, the higher the cortisol reactivity, the less generous the behaviour. A similar, albeit less significant, trend was observed for men. The result shows that the effects of acute stress on social behaviour are moderated by gender and empathy level. The study performed has suggested the relationship between stress, empathy and how they associate with prosocial behavour. As the argument discussed, prosocial behaviour does affect individuals

stress level and empathy level. The higher empathy level individual possesses, the more possibility of prosocial behaviour ones may show.

3.2. Gender Differences, Stress, and Prosocial Behaviour

With the investigation into prosocial behaviour, gender as a great difference has also been considered as part of the factors. With the empathy level being studied, the great empathy level ones have, especially women, the more prosocial behaviour one present [7]. Therefore, the study by Zhang explores more detail between prosocial behviour and gender. The study by Zhang and colleagues explored the impact of gender based on the relationship between individual acute stress to prosocial behaviour [8]. University students were recruited and assigned to control condition, and stress condition. Participants took TSST-G and then assigned to the game. (They were told that they play with real people but actually they play with computers). They'll be playing the dictator game, Ultimatum game and the third-party compensation game. Cortisol levels were also measured. The dictator game is the "dictator" has a number of tokens and to decide if they would like to give any (or all) of the token to other "receivers" if they can only accept the tokens passively. This game is to assess the dictator's generosity in the dictator game. The next third-party punishment task is to have a participant (C) who will be randomly assignment a quantity of tokens and will be observing A and B playing the dictator game. When C observes A as a dictator didn't play a fair game, C can choose to use tokens in their hand to punish A with a 3:1 ratio of token. In the Ultimatum game, the proposer A receives 100 tokens at one time, and they can decide the number of tokens A and B get and B can only take it. The purpose is to measure the generosity of A in the game. The result of the game shows proposer A usually gives 0% to 60% of their total amount and B usually accepts tokens ranging from 40% to 50%. As cortisol reactivity increases, male shows more generosity instead of female. The result shows an interaction effect of gender and cortisol reactivity on participants' generosity behaviour. As cortisol reactivity increases, men are more generous, however, with the cortisal reactivity on women was not significant. This shows a difference in gender between men and women.

Pure prosocial behaviour refers to the behaviour that brings benefit to others and confers net costs to the indivisuals. Social value orientation refers to a personality trait that reflects stable individual differences. Exist when people weigh their own outcomes in social dilemmas and compare them to those of others [9]. The study by Ying, and colleagues studies the moderating role of gender and social value orientation on the relationship between acute stress and individuals' purely pro-social behaviour (i.e., purely pro-sociality and pro-social third-party punishment) Participants being randomly assigned to stress condition and control condition. Stress condition participants do a job finding interview and their performance were recorded and commented, the control group is the audience. Then they start the social decision-making part, the dictator game and the third-party punishment task. The dictator game and the third-party punishment task are the same rule in the study by Zhang. Results showed a significant main effect of condition on the amount of punishment in the third-party punishment task and the amount of input in the dictator game, but a nonsignificant effect of condition on the frequency of third-party punishment. After exposure to acute stress, third-party participants tended to allocate more tokens to recipients as victims and donate more tokens to recipients in the dictator game compared to controls. The result shows that acute psychological stress affects the frequency and amount of punishment in purely pro-social punishment and pro-social third-party punishment, i.e., donation and third-party punishment tasks in the dictator game. In addition, these effects varied according to participants' gender and social value orientations [9].

Adaptive behavioural response can be induced by psychological stress response. There are different coping strategies in stressful situations. "Fight-and-flight" refers to the reaction that escape or oppose the stressor whereas tend-and-befriend" refers to the state of making friends and forming affiliating relationship in order to gain necessary resources to get over the difficulties and stress [10]. Males seem to show less prosocial behaviour from past studies compare to women. Their tendency of prosocial behaviour is usually aroused by stress. Therefore, under stress, male may show more "tend-and-befriend" pattern in order to get over their stress. The study by Steinbeis and colleagues

investigates psychological pressure and its consequences [10]. The method recruited 145 males and arranged them to 2 stress groups and 2 control group, stress (stress vs. No stress) and affiliation (in-group vs. out-group). They'll be in a group with 12–18 people and play trust game, dictator game, ultimatum game, money burning game and risk game. Player A choosex a number greater or equal to 0 and smaller and equal to 20 to player B, Player B chooses a good deal of money to give back to Player A. Money burning game is the choice of destroying other's money, the multiplier will be 5x. Risk game asked player to choose high risk choice or low risk choice to measure their risk-taking propensity. Stress group will do the TSST and no stress group will just read a paragraph talking about weather. To control affiliation, people will be asking about their preference between two paintings. Salivary cortisol was collected at the point of time. The result of the game shows stress groups trusted less than no stress group. In addition, the cost of punishment was relatively low in the stress group. Participants showed more reciprocity with the in-group and more spiteful punishment with the out-group. From the result, both "fight-or-flight" and "tend-and-befriend" pattern are elicited by stress. From the study, male shows more tend-and-befriend pattern after stress instead of "fight-or-flight". "Tend-and-befriend" pattern shows up more in men after they have been subjected to stress, suggesting that motivated subordination and access to the resources are necessary to overcome stressful conditions.

4. Conclusion

Stress shows a positive relationship with prosocial behaviour. More detaily, it is the social stress in the aspect of acute stress. Acute stress as a commonly seen stress in human psychological area, is easy to induce. Therefore, when it has a correlation with prosocial behaviour, it is worth more for deeper investigation and study. On the other side, studying this helps people gain more information on prosocial behaviour and in order to increase such positive behaviour in society to improve good morality. Prosocial behaviour is also related to various factors, such as kin relationship, empathy and gender. Kin relationship is something that human would always prioritize for with no exception for prosocial behaviour. Empathy as a frequent factor in emotional related study is also showing connection with prosocial behaviour. Empathy level and prosocial behaviour show more connection in females. This brings up the gender difference in prosocial behaviour. Various study found that female shows more prosocial behaviour than male and will engage in more spontaneous pro-social behavior than male.

The limitation of the relative studies is the issue of the sample size. From all the studies that have been investigated and discussed, there were hundreds of participants at most, dozens at least, showing a limitation of quantity. Another issue is about age. In the recent study, age has been settled to young or middle-aged, however, for the study to be more generalized, age needs to be ranged wider to the elderly. Considering the differences between ages, when people grow older, the change in their body and brain might affect their behaviour. In the future study, the direction is better to develop longitudinal research. Previous studies mainly adopted horizontal design. Another direction is about the culture. A broader research focus, especially on the effect of culture on this issue, would be necessary. This review can provide some guidance to the design of programs that aim to promote prosocial behavior in schools and communities.

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