Stress Types and Moral Judgement: Literature Review of Extant Studies

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Abstract. Moral dilemma, the specific type of moral judgement scenarios, has been fundamentally shaped by two moral principles: deontology states that the moral decision should base on moral norms; utilitarianism ask people to consider the consequences. Early study indicated that acute stress affected moral judgement between the biases of deontology and utilitarianism. Since then, Gawronski et al. adopted process dissociation procedure (PD) and proposed the CNI model (three sequential parameters representing distinct determining factors of moral inclinations: C indicated consequences susceptibility, N signified norms susceptibility, I showed general biases towards inaction). Liu et al. further advanced the CAN algorithm (three parameters regenerated basing on identical moral dilemma frame: C and N indicated consequences and norms sensitivities, A represented general biases towards action/inaction). Researchers followed the train of thought to identify and clarify the biases and oversights of the former operations, and to figure out the accurate moral inclination influenced by acute stress. Furthermore, the later researches extended applicability scope to different stress types. Chronic stress, as repeated or prolonged acute stress attracted growing concern. The article delineates the research lineage in recent years, and discuss the potential approaches to reveal the mechanism of stress type in moral judgement.

Keywords: Moral dilemma, Moral Judgemen, Stress Types, deontology, utilitarianism.

1. Introduction

Moral judgements commonly happen in individual's daily routine. Greene et al. proposed a dual process theory holding that reasoning and emotional processes acted on moral judgement independently, which have been supported by neuropsychological and behavioural regions [1]. Furthermore, Green et al. sought to make a match between a specific opposition of moral dilemma (deontology and utilitarianism) and a tension resulted from comprehensive cognitive and emotional process. Their analogical speculation had aroused increasing attentions in moral judgement field. Meanwhile, in terms of the stress functioning in many of the same brain regions with emotion process, following research conducted by Youssef et al. verified that acute stress as an influential role functioned in moral decision-making [2]. The study considered one specific form of moral dilemmas, in which responses can be oriented towards two outcomes: an action out of principle (deontological decision), and an action based outweighs overall well-being (utilitarian decision). They found that acute stress led to less utilitarian judgements in personal moral dilemmas by measuring salivary cortisol. Starcke et al. tested a different type of stressors (anticipatory stress) by monitoring a different stress indicator (heart rate) to replicate Youssef et al.'s finding [3]. Thus, the role of stress in moral judgement had also been investigated by a growing number of researches. Acute stress was regarded as the adaptive physiological reaction when body encounter challenging stimuli, while chronic stress was considered as the repeated or prolonged physiological reactions to stressful circumstances [4]. The degree of stress was observed commonly by the elevation of cortisol or heart rate in moral judgement researches.

Early studies above were criticized for having theoretical ambiguities as it was grounded in an unquantified assumption that regarding the two outcomes as antithetical edge of a single continuum [5]. Gawronski et al. adopted process dissociation procedure (PD) proposed by Jacoby's to quantify deontological inclination (moral decision based on the intrinsic nature rather than its consequences, captured by D parameter) and utilitarian inclination (moral decision determined by its consequences, captured by U parameter), meanwhile, not to regard the two as binary oppositions [6].

To further clarify the determinants contributing to moral principles inclinations, Gawronski et al. conceptualized two principles inclinations into three overt properties which could be observed and measured. Furthermore, the properties were quantified into three distinct parameters, C indicated the degree of consideration of consequences, N signified the degree of susceptibility to norms, I showed inclination towards inaction irrespective of considerations of consequences and norms. The CNI parameters in sequential arrangement indicated the moral judgement process [7]. However, the CNI model was also accused of several methodological limitations [8]. To support a more unbiased operationalization method, Liu et al. regenerated the parameters based on the previous model and then advanced the CAN algorithm, C indicated consequence sensitivity, A represented general bias towards action/inaction, N represented norm sensitivity [9]. In addition to the above line of studies on acute stress, some researchers extended the investigation to chronic stress by leveraging the existing analytical methods, to see whether stress would exert different impact on moral inclination on a larger time scale [4, 10].

This paper endeavours to map out the recent researches of the influence of stress on moral judgement, to figure out the underlying theoretical fulcrum for the overt functions of acute stress, to sketch the possible pattern of chronic stress impact, and to figure out unexplored approaches to moral judgement regarding the relation transformation between characteristics and stress.

2. Stress explorations with the CNI model

Recent research tried to further explore the acute stress functioning mechanism on moral judgement by analysing through PD procedure and CNI model [11]. Participants of Li et al.'s research were campus students majored in social sciences recruited via advertisement, 78 in total (33 males, 45 females; aged between 18 and 29 years old). The research excluded individuals who were under extraordinary chronic stress, and randomly assigned eligible participants to stress group and control group. Before stress induction task, both groups were instructed to complete a set of questionnaires, including the demographic questionnaire, one scale to assess the level of anxiety and another one to measure affect changes. After three minutes break, the two groups were asked to accomplish different tasks to attain two different levels of stress intensity. Stress group was required to give a 5-minute speech facing interviews and camera, and to accomplish a 5-minute calculation task. The task procedure was proved to effectively cause subjective and physiological stress. Control group was asked to finish the same tasks without monitors. Subsequently, both groups were required to perform the scales of anxiety measurement and affect measurement again, and then to finish moral judgment test with a 24-moral-dilemma set. Scenarios from the 24-moral-dilemma set was collected and adapted by Gawronski et al., consisting of four parallel basic moral judgement forms by depicting two factors: 1. norms (criteria that ban action or mandate action); 2. consequences (benefits of action that have more than its costs or have less than its costs) [7]. The physiological indicator of acute stress was heart rate, recorded from the beginning of the second time they filled the scales to the end. Data analyses were operated by comparing the stress responses and the performances on moral dilemmas between groups. Traditional analysis (that is, to simply identify utilitarian response with agreement to one specific form that the action banned by criteria and whose benefits are greater than its costs, while disagreement is equal to deontological response), PD analysis, and the CNI model analysis were conducted.

However, Li et al.'s analyses using the PD procedure and the CNI model were somewhat inconsistent with Gawronski et al.'s. For controlling the cognitive load degree, Gawronski et al. assigned digit strings with varying degrees of complexity to two condition groups relatively. The result through the PD procedure showed that cognitive load had no significant effects on U and D parameters. The CNI model suggested that cognitive load only affected moral judgments by boosting general inaction biases. It was attributed that the inconsistency to the different types of stressors induced by different tasks (the memory task of digital strings versus the complex task of public speech and calculation). That is, stress type could also influence moral decision–making. Recent study on

zebrafish also showed adaptive mechanisms from zebrafish to maintain integrity of neurons and prevent overload under chronic stress [12]. Thus, as a paired term to acute stress, chronic stress warrants further exploration in the association with moral decision – making.

Zhang et al. sought to extended the CNI model approach into chronic stress domain [4]. Participants of Zhang et al.'s study were campus students who enrolled in an elective psychology course, 197 in total (68 males, 129 females; aged 18 to 22 years old). They were instructed to complete a scale that consisted of 10 items for the measurement of the level of subjectively experienced chronic stress for the past one month, and to make moral judgments on Gawronski et al.'s moral dilemma set [7]. The model and the data fitted well. Both groups had no remarkable differences on the C and N parameters, which meant chronic stress was irrelevant to the consequences consideration and moral norms susceptibility. Meanwhile, the parameter I showed significantly higher points with the high-stress group. That is, participants who experienced subjectively stress more frequently, showed stronger general inaction biases, while in the traditional analysis, the preference might be replaced with deontological inclination.

However, the CNI model was also confronted with the following challenges about its experimentation and derivation: (1) inadvertent consequence manipulation; (2) vagueness regarding the consistency of the experimenters' intention and the relevant norms; (3) obscure as to whether the subjects perceive the meaning of each course of action; (4) the inaction preference should be a deontological principle, not a separate confounding factor; (5) the unrealistic assumptions that sensitivities to consequences and norms were activated sequentially [8-9]. Therefore, basing on the four parallel basic moral judgement forms manipulation, Liu et al. (2021) implemented the CAN algorithm: (1) parameter C was regenerated as the mean value of considering consequences by adopting a algebraically subtracting strategy; (2) parameter N was regenerated as the mean value of considering norms by adopting the same strategy; (3) parameter A was calculated by the mean probability of action under the four parallel forms by using an aggregate mean strategy [9]. The sequence of the parameters in the CNI model indicated a sequential judgement progress. However, CAN algorithm supported parallel processes with cognition and institution to consequences and norms.

3. Stress studies using the CAN algorithm

To prove internal effectiveness and mathematical predictions of the CAN algorithm, Liu et al. adopted the original data from Gawronski et al.'s study. The re-analysed data supported predictions. It was demonstrated that, the algorithm had the following advantages over the CNI model: (1) can be applied in correlation analysis and multiple comparisons, (2) can be used for analysing continuous-scale data, (3) can be generated more appropriately by considering the dual process theory [9].

The latest research reanalysed the original data from Zhang et al.'s acute stress study, and conducted an extension study on the influence of chronic stress by running CAN algorithm [10]. In the reanalysis study, researchers found that chronic stress was not strong relevant to the regenerated parameters. The different results were attributed to the inaccuracy of the I parameter and the probable statistical errors by dichotomizing continuous raw data in the previous CNI study. The similar statistical performance was observed in the extension study. Participants of the extension study were recruited randomly from a research platform (Credamo), 208 in total (90 males, 118 females; aged 17 to 89 years old). Those who encountered acute stress accidents in past one week were excluded. Test materials replicated those utilized in Zhang et al.'s study, with an additional abbreviated scale (13 items) for controlling social desirability [13]. The algorithm analysis did not verify that chronic stress could exert any influences on the three determinants.

4. Potential perspective between chronic and acute stress

The inference of irrelevance between chronic stress and moral judgement was contrary to previous studies, including experiments in biology. Therefore, the mechanism of chronic stress required further validations. Chronic stress was regarded as a single type of stress in the studies above. However, in terms of individuals' daily life, chronic stress generally faces multiple concurrent stress sources. That is, chronic stress consists of various stress types. One research conducted in Italy during the COVID-19 lockdown period revealed that, different careers would have different biases between deontological and utilitarian inclination [14]. For example, the front-line workers such as health care workers and public safety workers who engaged more contacts with other people, presented lower stress level. They were more probable to choose utilitarian decisions. Meanwhile, the research showed healthcare providers were more inclined to make utilitarian decisions when involving risks to their own lives, while public safety personnel were more likely to accept utilitarian decisions when their own lives were not at risk. It was demonstrated that different careers cultivated diverse priorities of moral inclinations. However, whether the stress under pandemic would intensify moral inclinations, or the pandemic stress functioned on moral judgement independently of the career stress, had not yet been clarified. Therefore, whether the specific type of chronic stress will lead to particular moral judgement warrants more profound and elaborate research.

The prevailing perspective is to exclude the possible influence between chronic and acute stressors. Nonetheless, the CNI model had integrated stable characteristics (e.g., gender, psychopathic traits.) and situational manipulations (e.g., question framing, cognitive load) into the parametric considerations [7]. The same parametric logic was utilized by the CAN algorithm [9]. That is, these stable factors can somehow be categorized as personality traits, which means they can be cultivated under the impact of chronic stress. Thus, the dynamic interactions between chronic stress and acute stress were from the outset.

5. Conclusion

The article sorted out the development of analysis methods on verifying and quantifying moral judgement determiners that might be affected by acute stress. Furthermore, extension studies on chronic stress emerged as new approaches.

In the context of CNI model method, Gawronski et al. figured out that cognitive resources tax did not exert significant effects on the degree of consideration towards consequences and norms, while Li et al. drew the conclusion that acute stress enhanced susceptibility to norms. One plausible explanation to the discrepancy is that various stress missions instigate different types of cognitive reasoning process and emotional process. However, researchers can only detect heart rate or salivary cortisol levels as the single indicator of stress. Thus, they have to regard acute stress as a single stress type. Meanwhile, Zhang et al. using the same model derived that higher chronic stress enhanced general inaction biases. However, Zou et al. utilizing identical data but different algorithm (CAN) showed no detectable relation between determinants of moral judgement and chronic stress. The opposite results in chronic stress studies pointed out a need for further clarification. Researches rarely delved into the interactions and transformations between acute and chronic stress. As a further exploration, the research gaps regarding how acute stress transform into chronic stress and how chronic stress induce acute stress remain to be filled.

Another explanation proposed is the CNI model's consequence manipulation and unrealistic assumption on numerical parameter measurement and reasoning sequence. These criticisms have been theoretically proved by the dual-process model and tested by the CAN algorithm. However, this algorithm has no statistical index for potential measurement error as well. Meanwhile, the results of chronic stress test with the algorithm opposite to previous researches conducted by Zhang et al. and Mazza et al.. Thus, the internal validity of the CAN algorithm remain need be confirmed. Nonetheless, the CAN algorithm was developed and manipulated, basing on the same theoretical fulcrum as the CNI model. That is, the statistical parameter measurements of both analysis methods have taken long-

term factors (e.g., gender, characteristics and psychopathy.) into considerations. Therefore, the interactions and transformations between personality traits and different stress types will hold profound significance for further research.

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