

Friendships Make The Heart Grow Stronger: Does Social Support Help the Heart Cope Better In the Trier Social Stress Test Paradigm.

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Abstract

The current study explored cardiovascular mood and behavioural responses to stress in the context of social support operationalised both in terms of manipulating support (friend/peer/alone) and measured perceived adequacy. Access to more social support has been linked to a range of health outcomes, including the reduction of morbidity/mortality, and more adaptive stress responses. Some but not all laboratory stress studies manipulating access to a friend/stranger have shown reduced blood pressure responses (e.g.^{1,2}), an inconsistency that may reflect ambiguity in support operationalization. An alternate approach measures participants' perceptions of support adequacy (questionnaires), and found greater perceived adequacy is associated with more adaptive blood pressure responses³. Participants were randomly assigned to three conditions (alone n = 25; peer n = 24; and friend n = 10), completing the Social Support Network Inventory (SSNI: ⁴); and following each trial the Activation Deactivation Adjective Checklist⁵. The Trier Social Stress Test (TSST: ⁶), was used to manipulate stress exposure (trials: baseline, speech preparation, speech task, maths task, and recovery). Cardiovascular (Niccomio Impedance Cardiograph) and behavioural responses (displacement activities, affective comments and interactions, Observer V8.0) were recorded continuously, and mood response ratings given following each trial. Significant ANOVA within subject trial main effect responses (all p<.001) were mediated by the TSST, with large increases in cardiovascular activity (e.g. systolic blood pressure (SBP)) and mood activation (e.g. tension). In contrast group by trial interaction effects were mostly non-significant, suggesting that manipulated support was not affecting stress responses. Perceived support adequacy was significantly correlated with a number of measures of cardiovascular reactivity and recovery (e.g. Heart Rate, SBP) Self-reports of perceived availability of social support (r=.27) and of emotional support (r=.30) were positively correlated with BP responses. Reports of greater satisfaction of access to practical help (r=.37) and reciprocity (r=.31) significantly correlated to greater SBP recovery. Less tension was reported with reports of more frequent face to face contact (r =-.26) (all correlations p<.05). There was a lack of association between; observational responses and cardiovascular responses, and between self-reported mood responses and cardiovascular responses. In a small subset (n=13) behavioural responses were correlated with cardiovascular and mood (p criterion set to 0.1), and showed Mean stress SBP response was correlated with total number of affective comments, and baseline HR with more interactions. The results support the suggestion that perceptions of greater support adequacy are associated with more adaptive stress responding whereas, support manipulation was not associated with differences in stress responding. Behavioural observations provided preliminary results suggesting limited associations between responses, potentially highlighting differentiated presentation across individuals unrelated to CV activity or mood ratings.

Keywords: Stress, Social Support, Trier

1. Introduction

Stress has been identified as a risk factor for coronary heart disease (CHD) amongst other related cardiovascular disorders⁷. The risk of developing CHD as a result of high levels of stress has been shown to be as strong as other well established risk factors such as high blood pressure and cigarette smoking⁸. The reactivity hypothesis⁹ suggests intuitively that people with high levels of cardiovascular reactivity to everyday stressors are at greater

risk of developing cardiovascular disorders. Therefore, emphasis has been placed on the exploration of stress reactivity and of developing interventions to reduce the negative impact of such reactivity on health outcomes. Many studies have supported this hypothesis with a recent longitudinal study of BP responses to mental stress by ¹⁰ showing exaggerated reactivity to be positively correlated with CHD mortality. Developing understanding of factors that contribute to high reactivity is at the forefront of current research aiming to improve clinical interventions to ultimately reduce levels of mortality due to CHD.

The stress buffering hypothesis suggests that social support acts to protect a person during the appraisal or presence of a stressful situation¹¹. Social support as a stress buffering mechanism may occur by preventing a situation being perceived as stressful or by producing more adaptive (necessary responses and recovery for a given situation) responses to the stress. Access to more social support has been linked to a range of positive health outcomes, including the reduction of morbidity/mortality, and more adaptive stress responses. House, Landis and Umberson's ¹² review concluded that mortality rates were higher when people were socially isolated. Findings suggesting lack of social support as a risk factor for heart disease and other detrimental health outcomes indicate the importance of understanding the physiological mechanism involved with social support. A thorough understanding of which aspects of social support provide health benefits is also required.

It is suggested that inconsistencies within stress literature may be a result of ambiguity in the operationalization of social support. This viewpoint is supported by Uchino, Carlise, Birmingham and Vaughn¹³ who highlight the difference between perceived (participants belief of social support network) and received (actual social support during stressor) social support constructs. Schwerdtfeger and Schlagert¹⁴ used both perceived and actual received manipulations of social support, examining physiological responses to stress, concluding that different aspects of social support effect specific aspects of cardiovascular responding. Several studies¹ have operationalised social support as presence of a support figure during a stressful situation. Manipulations have included friend, no friend, confederate and alone conditions with findings suggesting that social support lowers physiological responses to stress. In contrast, other studies ² have measured social support network finding mixed associations between social support and positive stress responses. Perceived adequacy of access to support using self-report measures has also been studied. Roy, Steptoe and Kirschbaum³ found positive associations between adequacy of social support and more adaptive stress responses.

The current study aims to address the possible ambiguity of operationalization by manipulating actual presence of social support figure and measuring perceived adequacy of support network. Results are presented supporting previous findings that support adequacy is associated with more adaptive stress responding. Preliminary findings for observed behavioural responses are also discussed, highlighting the importance of individual differences in reactivity to stress.

2. Methodology

2.1 Design

The current study used a repeated measures design with one Between Subjects factor (Support with 3 levels) and one Within Subjects factor (TSST trial, with 5 levels). Each participant was randomly assigned to one of three support conditions (alone, unknown support or with a friend), and completed all five stages of the Trier Social Stress Test. In each condition the participant support figure was instructed to provide positive encouragement but to refrain from offering help or providing answers. Unknown support figures were randomly selected from the participants peer group whereas friend support figures were a 'best friend or family member' of the participant. The dependent measures were cardiovascular responses (Cardiac Index, Heart Rate, and Blood Pressure), mood responses (energetic and tense activation), and observed behavioural responses (displacement activities, affective comments and interactions).

2.2 Participants

An opportunity sample of 59 (alone n = 25; peer n = 24; and friend n = 10) participants was recruited via email and poster advertisement from the North West of England. Age ranged from 18-55 with gender split of 23 males and 36 females.

2.3 Measures

2.3.1 laboratory layout

The laboratory had a standardised setup tailored to induce greater stress responses. The laboratory was separated from the control room by a one way mirror. The laboratory setup consisted of a large blue chair which was facing the one way mirror and a television and camera providing real time visual feedback of the participant. A large red microphone was also connected to a large amplifier and positioned directly in front of the participant. During the peer or friend conditions a stand chair was positioned to the left of the large blue participant chair.

2.3.2. cardiovascular measurements

Niccomo impedance cardiograph was used as a non-invasive monitor of haemodynamic parameters including heart rate (HR), systolic blood pressure (SBP) and diastolic blood pressure (DBP).

2.3.3 behavioural coding

Behavioural observations of the with friend support condition were made using Observer (V.08) software. Coding was made by two researchers to ensure rater reliability. Observational coding consisted of: displacement activities, affective comments and interactions (in the peer and friend conditions). The breakdown of behavioural displacement activities that were coded were derived from Troisi's [15] list of activities. Behaviours were omitted if they were not witnessed throughout the trial run or were not deemed applicable to the current tasks.

2.3.4 questionnaires

The Social Support Network Inventory (SSNI: [4]) was completed by all participants to gain participant scores of perceived support adequacy. Participants also completed 6 copies of the Activation Deactivation Adjective Checklist (ADACL: [5]) one at the beginning of each stage of the trier social stress test and one at the end of the recovery period. The ADACL provided self-reported tension scores at each stage of the protocol.

2.3.5 trier social stress test

The Trier social stress test [6] has been reliably used as a stress induction protocol in past research. The protocol consists of the following five minute periods; baseline, speech preparation, speech task, maths task, recovery. The inclusion of a speech task and an arithmetic task allows for individual strengths across topic areas.

2.3.6 analysis software

Statistics software version SPSS 21 was used for quantitative analysis of data collected from the questionnaires and the Niccomo impedance cardiograph.

2.4 Procedure

Participants initially entered an interview room where they were briefed and verbal consent was taken. A demographics questionnaire and the SSNI were then completed prior to placement of the electrodes (two on the neck, two on the torso/chest). Participants were seated and fitted with the blood pressure cuff on their non-dominant arm. Following a signal check participants completed the first ADACL mood rating scale. The Trier social stress protocol was then initiated. The protocol consists of a 5 minute baseline period followed by a 5 minute speech preparation period, where participants are instructed to prepare for a 5 minute interview for their dream job. Following the preparation period participants are instructed to talk fluently for 5 minutes to tell the researchers why they are suitable for their dream job. Prompts were delivered if participants hesitated or repeated material previously covered. Next participants undertook the maths task for a further 5 minutes where they are asked to continuously subtract 13's from 2011, having to start over from the beginning if they made a mistake. Further, there were set points at which the experimenter would inform the participant that they had made a mistake and had to start again, regardless of participant capability. Upon completion of the tasks

participants entered the recovery period were they were simply required to sit and relax, talking amongst themselves if they were accompanied by a support figure. Between each 5 minute section of the Trier social stress test participants completed another ADACL mood rating scale.

3. Results

A repeated measures ANOVA with Greenhouse-Geisser corrected degrees of freedom showed significant main effect of TSST trial across all participants (all $p < .001$) with large increases in cardiovascular activity (e.g. SBP: $F(3.23, 177.78) = 22.6$, $p < .001$, $\eta^2 = .291$) and mood activation (e.g. tension: $F(3.3, 181.45) = 21.85$, $p < .001$, $\eta^2 = .28$). In contrast group by trial interaction effects were mostly non-significant, suggesting that manipulated support was not affecting stress responses (observed power was significant $< .8$ for all interaction effects suggesting that interaction effects might be vulnerable to Type II error).

Self-reports of feeling tense by group were significant $F(6.6, 181.45) = 2.38$, $p < .05$, $\eta^2 = .081$) with participants from the friend group reporting less tension during the maths and recovery stages of the Trier. Perceived support adequacy was significantly correlated with HR ($r = .29$, $p < .05$) and SBP ($r = .30$, $p < .05$). Self-reports of perceived availability of social support ($r = .27$, $p < .05$) and of emotional support ($r = .30$, $p < .05$) were positively correlated with SBP responses. In spite of higher reactions during trials responses returned to baseline much quicker in these participants. Reports of greater satisfaction of access to practical help ($r = .37$, $p < .05$) and reciprocity ($r = .31$, $p < .05$) significantly correlated to greater blood pressure recovery. Less tension was reported with reports of more frequent face to face contact ($r = -.26$) (all correlations $p < .05$).

There was a lack of association between; observational responses and cardiovascular responses, and between self-reported mood responses and cardiovascular responses. In a small subset ($n = 13$) measured behavioural responses were correlated with cardiovascular and mood (p criterion set to 0.1), and showed Mean stress SBP response was correlated with total number of affective comments ($r = .55$, $p < 0.1$), and baseline HR with more interactions ($r = .55$, $p < 0.1$). More affective comments were also significantly correlated with more displacement activities ($r = .50$, $p < 0.1$).

4. Discussion

The fact that participants showed an increase in CV and self-reported tension demonstrates a matter of great importance to the study; specifically that the TSST is a successful method of inducing stress in people within the lab environment. Conversely, unlike previous findings [1], the presence of support, or lack thereof, did not influence subjects' physiological responses to the stages of the TSST. On the other hand the presence of a support figure did influence participants' self-report tension, with those accompanied by a friend reporting less tension during the recovery period than those accompanied by a stranger or with no social support. This is in line with previous findings by Roy, Steptoe and Kirschbaum [3]. Combined these findings suggest that while presence of a support figure may be of no benefit to physiological stress responses, the presence of a friend has the potential to make a person feel better mentally after the stress has passed.

Interestingly while actual social support was found to have no effect on physiological responses, subjective measures of the quality of a persons' social support network did. The perceived adequacy of a persons' support network, alongside perceived emotional and social support availability, was found to be related to a persons' CV responses, including their HR and BP. This implies that people with more access to better support networks have more adaptive responses to stress. From this it could be suggested that these people tend not to worry about stressful experiences as much as they have an efficient support network they can rely upon, thus mitigating their physiological response. This suggestion is further supported by the finding that subjective measures of reciprocity and access to practical help were associated with greater BP recovery. This lends further support to the notion that less aversive psychological responses to stress can act as a mechanism through which better physiological responses can be achieved, with psychological response mediated through the presence of an efficient support network. As an extension of this, people who reported spending more time with others in person (face to face) reported feeling less tense throughout the trials of the TSST. This again suggests that those who are used to being accompanied by others have more adaptive responses to stressful stimuli.

Behavioural observations provided preliminary results which suggested limited associations between CV responses and mood self-reports. The limited findings may reflect differentiated behavioural presentation across individuals unrelated to CV activity or mood ratings. Future studies should look to increase sample size with a view to investigating these preliminary findings further. As a result it may be possible to categorise responders by behavioural responses to explore the possibility that, specific groups of behavioural responders may show more or less adaptive stress responses portrayed by their outward signs of coping.

The findings presented in the current study allow future studies to focus on perceived adequacy of social support as the manipulation of support. Emphasis should be placed upon the construction of effective interventions. The findings suggest such interventions require encouragement of people to engage in social events and improve their social support networks. This supports the suggestion that the existence of a strong social support network may be beneficial to people's health [3]. In particular these findings suggest future research should explore the possibility that people with high reactivity [9] to stress may benefit from increased social support network, or the perception thereof. This accentuates the importance of impressing upon these high reactors, the need for positive social relationships, and the implementation of interventions to support this beneficial entity.

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6. References

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