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Cynicism, anger and cardiovascular reactivity during anger recall and human–computer interaction

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Abstract

Cynicism moderated by interpersonal anger has been found to be related to cardiovascular reactivity. This paper reports two studies; Study 1 used an Anger Recall task, which aroused interpersonal anger, while participants in Study 2 engaged in a multitasking computer task, which aroused non-interpersonal anger via systematic manipulation of the functioning of the computer mouse. The Cynicism by State Anger interaction was significant for blood pressure arousal in Study 2 but not for Study 1: in Study 2, when State Anger was high, cynicism was positively related to blood pressure arousal but when State Anger was low, cynicism was negatively related to blood pressure arousal. For both studies, when State Anger was low, cynicism was positively related to cardiac output arousal and negatively related to vascular arousal. The results suggest that Cynicism–State Anger interaction can be generalised to non-social anger-arousing situations for hemodynamic processes but blood pressure reactivity is task-dependent. The implication for the role of job control and cardiovascular health during human–computer interactions is discussed.

Keywords: Hostility; Cynicism; Cardiovascular Reactivity; Anger; Computer task

1. Introduction

Cynical hostility, a general distrust of others, has been found to predict cardiovascular disease risk and mortality (e.g., Pollitt et al., 2005). Research suggests that cynically hostile individuals' cardiovascular health risk may be mediated by their greater cardiovascular reactivity during stress. Greater cardiovascular stress reactivity has been found to predict cardiovascular disease (Carroll et al., 2003; Everson et al., 1996) and cynical hostility has been found to be associated with greater blood pressure reactivity (Christensen and Smith, 1993; Everson et al., 1995).

On the other hand, some studies have reported null findings (Felsten, 1995; Fichera and Andreassi, 2000) and contrary evidence of high cynical individuals having *less* blood pressure reactivity during stress have also been reported (Bongard et al., 1998; Carroll et al., 1997). This paper explores two possible explanations for the inconsistent pattern of findings: (i) the use of blood pressure reactivity without investigating the underlying hemodynamic regulatory processes, and (ii) the possible moderating role of State Anger in the cynical hostility–reactivity relationship.

Mean arterial blood pressure is a function of two hemodynamic processes — cardiac output and peripheral resistance. Similar blood pressure reactivity can reflect different profiles of hemodynamic regulatory processes (Julius, 1989). Research suggests that there is adequate test–retest reliability for hemodynamic profiles (Kasprowicz et al., 1990). Between different studies, congruent patterns of cardiac output and vascular resistance reactivity could be present though discrepant results are obtained for blood pressure reactivity. While case studies have supported this discrepancy (Sherwood and Turner, 1992), the investigation of this phenomenon in relation to Cynicism has been rare. This paper compares cross-sample stability in the

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Cynicism–Reactivity relationship for cardiac output and vascular resistance reactivity with blood pressure reactivity.

Discrepant results could also be due to the moderating effect of State Anger. Cynical hostility has been found to be related to cardiovascular reactivity when State Anger was elevated (Suarez and Williams, 1989). Since the Cook–Medley Hostility Scale measures hostility and a cynical mistrust of others (Smith and Pope, 1990), its effects on cardiovascular stress reactivity could be moderated by hostility-related emotions such as anger or the presence of interpersonal conflicts (Suarez and Williams, 1992). Studies have used social harassment (e.g., Everson et al., 1995) to demonstrate this relationship, while studies that have used non-social stressors (e.g., mental arithmetic) tend to find null results (e.g., Carroll et al., 1997). When State Anger was low, cynical hostility has not been found to be associated with any distinctive hemodynamic profile (Lawler, 1996). Since State Anger has typically been aroused through social stressors, some researchers have proposed that the predictive power of Cynicism and State Anger manifests within the context of interpersonal conflicts (Smith et al., 2004). However, such a conclusion is generally based on studies that have used anger arousing tasks based on social conflict (e.g., debate, social harassment), which confounds both social conflict and anger arousal. As far as we know, there have been no studies that disentangled the moderating effects of interpersonal State Anger from non-interpersonal State Anger on the Cynicism–Reactivity relationship.

Previous research indicates that anger is not an exclusive response to social conflict; it can be aroused in a non-interpersonal context as well. In the context of the Frustration–Aggression Hypothesis (Dollard et al., 1980), a number of studies have shown that goal obstruction in a non-interpersonal context can arouse anger (see Berkowitz, 1989 for review). A novel approach was taken in this paper whereby the controllability of a computer task was manipulated to arouse non-interpersonal anger. This paradigm also investigates the psychophysiological processes during human–computer interactions — an emerging area of research (Olson and Olson, 2003). Information Technology has been found to be a source of work stress (Lim and Teo, 1999). Most studies have used computers to present stressors, but few studies have investigated the malfunction of computers (and other Information Technology) as a source of stress.

In Study 1, we aroused interpersonal anger in our participants by having them recall an anger-arousing social conflict situation that they have experienced (i.e., Anger Recall). Study 2 of this paper investigated whether non-interpersonal State Anger aroused via a malfunctioning computer mouse would also moderate the Cynicism–Reactivity relationship.

2. Study 1

2.1. Aim

To investigate if State Anger moderates the relationship between Cynicism and blood pressure reactivity or its hemodynamic basis — cardiac output and total peripheral resistance in an anger recall task.

3. Method

3.1. Participants

Sixty-one undergraduate men in a Scottish University volunteered for this experiment. A homogenous sample, in terms of gender, was used for this paper to maximise power since gender differences have been found for cardiovascular reactivity (Lawler et al., 1995). Participants reported having no medical conditions and were not taking any medications. Two participants withdrew. Another participant had a missing value for one variable (i.e., State Anger Baseline). These 3 participants were removed from the sample and this reduced the sample analysed to 58. Table 1 lists the characteristics of this sample.

3.2. Procedures

Data collection was separated into two sessions. The first session consisted of personality assessment. The second session was held no more than 1 week after the first session, lasted for about 2 h and consisted of the experiment. During the second session, participants did two tasks — Anger Recall and a series of computer tasks. The order for these two tasks was counterbalanced with 3-minute rest periods in between. The computer tasks were given to investigate a separate set of hypotheses and its results will not be reported here. Data collected during the 5 min resting baseline before executing the various experimental tasks were taken as the baseline values.

Before and after the Anger Recall task, participants answered questions relating to their mood. At the end of the experiment, all participants were debriefed and given compensation at the rate of £4 per hour dependent on the total time they had taken to participate in the two sessions combined.

Table 1
Mean (SD) of sample characteristic and physiological reactivity (n=58) for Study 1

Sample characteristic	Mean (SD)
Age	21.26 (3.04)
Height, cm	179.07 (5.84)
Weight, kg	72.47 (9.04)
BMI, kg/m^2	22.57 (2.55)
Barefoot's13-item Cook–Medley Cynicism Scale	6.98 (2.88)
State Anger Reactivity	1.04 (.80)

Physiological reactivity	Baseline	Anger recall
Systolic blood pressure, mm Hg	105.79(14.88)	120.28 * (18.46)
Diastolic blood pressure, mm Hg	71.41 (10.18)	83.88 * (14.40)
Heart rate, bpm	70.88 (10.35)	77.46 * (9.56)
Cardiac output, l/min	4.29 (.90)	4.30(1.10)
Total peripheral resistance, dyne–sec* cm^{-5}	1617.04 (475.84)	1924.59 * (758.75)
State Anger	1.28 (.40)	2.31 * (.79)

* Significantly different from baseline at $p<.005$ using paired sample t-tests.