Approach and avoidance coping: Diurnal cortisol rhythm in prostate cancer survivors

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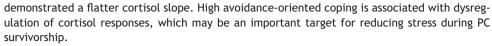
Abstract Psychological coping responses likely modulate the negative physiological consequences of cancer-related demands. This longitudinal, observational study examined how approach- and avoidance-oriented strategies for coping with cancer are associated with diurnal cortisol rhythm in prostate cancer (PC) survivors. Sixty-six men (M age = 65.76; SD = 9.04) who had undergone radical prostatectomy or radiation therapy for localized PC within the prior two years reported their use of approach and avoidance coping via questionnaire at study entry (T1). Participants provided saliva samples (3 times per day over 3 days) for diurnal cortisol assessment at T1 and again 4 months later (T2). When controlling for relevant biobehavioral covariates, cancer-related avoidance-oriented coping was associated with flatter cortisol slopes at T1 (B = .34, p = .03) and at T2 (B = .30, p = .02). Approach-oriented coping was not associated with cortisol slopes. Post-hoc analyses revealed a significant interaction between avoidant coping and time since completion of cancer treatment on T2 cortisol slope (B = −.05, p = .04). Men who used relatively more avoidance-oriented coping who were further in time from treatment

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demonstrated a flatter cortisol slope. High avoidance-oriented coping is associated with dysregulation of cortisol responses, which may be an important target for reducing stress during PC survivorship.

Coping constitutes cognitive and behavioral efforts to manage demands of circumstances an individual appraises as stressful (Lazarus and Folkman, 1984). The stressors experienced with cancer diagnosis and treatment are associated with a variety of physical and psychological outcomes in cancer survivors across the disease trajectory (Stanton, 2006). Coping responses, often construed as either approach-oriented (e.g., active planning, emotional expression) or avoidance-oriented (e.g., disengagement), modulate the negative consequences of cancer-related and general life stressors and alter quality of life (Low et al., 2006). Few studies have sought to identify the possibility that specific strategies for coping with cancer-related stress can shape neuroendocrine mechanisms (e.g., diurnal cortisol) (e.g., Diaz et al., 2014), which can contribute to adverse cancer outcomes (Armaiz-Pena et al., 2013).

Aberrant diurnal cortisol patterns have been linked to a number of health outcomes in cancer patients, including disease progression and early mortality (e.g., Cohen et al., 2012; Sephton et al., 2013; see also Armaiz-Pena et al., 2013). Findings in breast cancer patients suggest that diurnal cortisol rhythm may be shaped by individual coping strategies (Diaz et al., 2014). However, no study has examined these associations in men with prostate cancer (PC). Thus, it is unclear if men who are better able to cope with cancer sequelae exhibit healthier cortisol patterns. The present study examined how approach- and avoidant-oriented coping strategies are related to diurnal cortisol rhythm in PC survivors. It was hypothesized that greater use of avoidance- and less use of approach-oriented coping would be associated with flatter diurnal cortisol slopes. Such findings would emphasize the negative impact of PC diagnosis and treatment, and given findings that flatter cortisol slope predict worse outcomes, also highlight modifiable cognitive-behavioral intervention targets.

1. Method

1.1. Participants and procedures

Men who completed radical prostatectomy or radiation therapy for localized PC within the prior two years took part in a larger study on ''health-related quality of life after PC.'' Sixty-six English-speaking, non-smoking men were recruited via physician/clinic referrals ($n = 4$), community outreach ($n = 12$), advertisement ($n = 3$), and an institutional tumor registry database ($n = 47$) (see Table 1). Participants were excluded for presence of medical conditions or medications, including steroids, that could confound cortisol evaluation.

This study utilized a longitudinal observational design. After providing written informed consent, participants completed questionnaires in person at study entry (T1) and again 4 months later (T2). At T1 and T2 participants provided saliva samples (3 times per day over 3 days beginning on Tuesday) for measurement of cortisol output as described below. Men received $50 compensation. All procedures were approved by the authors' Institutional Review Board.

1.2. Measures

Cancer-specific coping was assessed by the Brief COPE (Carver, 1997), a 28-item self-report inventory, and the Emotional Approach Coping Scales (Stanton et al., 2000). Patients rated their coping behaviors in response to their experience of cancer on a 4-point response scale. A composite measure of approach-oriented coping was constructed with the active coping, planning, acceptance, support seeking, emotional expression, and emotional processing subscales; the avoidance-oriented coping composite was constructed from the behavioral disengagement, denial, and mental disengagement subscales. The composite scale scores represent the mean of included items (approach $\alpha = .82$; avoidance $\alpha = .79$).

Diurnal cortisol was assessed with saliva samples collected at home using Salivette collection tubes (Sarstedt, Inc.). Participants collected saliva upon awakening (morning), 8 h post-awakening (afternoon), and at bedtime for three consecutive days. They were instructed not to eat, drink, or brush teeth for at least 20 min before sampling. Each day, participants self-reported relevant health behaviors (e.g., caffeine intake, tobacco use) and compliance with collection instructions. Participants were instructed to call or text a voicemail line after each sample collection to ensure compliance. Average sample collection times were: waking: 6:17 am ($SD = 1:01$); 8 h post-waking: 2:42 pm ($SD = 1:40$); bedtime: 11:34 pm ($SD = 1:45$). Participants refrigerated samples until returning them via express mail. Salivettes were stored in a $-20\,^{\circ}C$ freezer until analysis. Concentrations of salivary free cortisol were measured in duplicate using a commercially available chemiluminescence-immunoassay at the TUD Biopsychology Laboratory in Dresden, Germany. Assay sensitivity was measured to be .015 µg/dL. The lower detection limit is .41 nmol/L, and inter-assay and intra-assay coefficients of variance are <10%.

Participants self-reported demographic and disease-related variables. They also completed a modified version of the Impact of Events Scale-Intrusion subscale (Horowitz, 1987) as a measure of cancer-specific distress ($\alpha = .89$).

1.3. Data analyses

Hierarchical linear modeling (HLM) allows for the analysis of nested data (i.e., the average cortisol output at three time points nested within participant). HLM provides analysis of change over time on an individual basis (i.e., cortisol levels across the day) (Bryk and Raudenbush, 1992). Observations of cortisol at T1 and T2 were predicted in separate models