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Anger, Marital Satisfaction, and Coronary Heart Disease†

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The present study examined the association of several aspects of anger experience and expression with marital satisfaction in one hundred and eighty seven coronary heart disease (CHD) patients and their spouses. Anger and marital satisfaction were measured by the Korean adaptation of the State-Trait Anger Expression Inventory (STAXI-K, Chon, Hahn, & Lee, 1998), and a short version of the Marital Satisfaction Scale (Lee, 1998), respectively. Regression analyses revealed that higher levels of CHD patients' anger-out predicted lower levels of spouses' marital satisfaction, and CHD patients' state anger predicted lower levels of their own marital satisfaction. In contrast, higher levels of CHD patients' anger-control predicted higher levels of spouses' marital satisfaction. In addition, higher levels of spouses' state anger predicted lower levels of CHD patients' and spouses' own marital satisfaction, and spouses' anger-in predicted lower levels of their own marital satisfaction. These associations were stronger for female patients than for males. The results suggest that models of psychosocial risk factors for CHD should consider the combined effects of personality and relationship variables. Finally, the findings were discussed from a cross-cultural perspective, and some implications for future studies are suggested.

Keywords: anger, coronary heart disease, marital satisfaction

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A growing body of evidence suggests that psychosocial factors play an important role in the development and progression of coronary heart disease (CHD, Smith & Ruiz, 2002). These psychosocial factors are typically conceptualized as either *intra*personal factors (e.g., anger/hostility, depression, anxiety) or *inter*personal factors (e.g., social isolation, marital relationships). The association of anger and hostility with CHD has been well documented. A quantitative review of prospective studies (Miller, Smith, Turner, Guiarro, & Hallet, 1996) found that behavioral ratings and self-reports of anger and hostility were associated with increased risk of CHD and premature death, and subsequent prospective studies replicated support this effect (Chang, Ford, Meoni, Wang, & Klag, 2002; Kawachi, Sparrow, Spiro, Vokonas, & Weiss, 1996; Williams, Paton, Siegler, Eigenbrodt, Nieto, & Tyroler, 2000). Further, the relation has been consistently found in both Western cultures (Gallacher, Yarnell, Sweetnam, Elwood, & Stansfeld, 1999) and Eastern cultures (Chon, Hahn, Chang, Kim, & Oh, 1998). In sum, although there are exceptions (e.g., Leon, Finn, Murray, & Bailey, 1988), anger and hostility have been consistently associated with CHD across time, method, and culture.

Recent studies have explored more specific associations between anger and CHD. For example, with respect to the anger experience and CHD[1)], trait anger has been consistently associated with CHD (e.g., Siegman, Townsend, Blumenthal, Sorkin, & Civelek, 1998; Williams et at., 2000). In contrast, the association of anger expression and CHD has been inconstant: anger-in has been associated with CHD (Gallacher et al., 1999), whereas anger-out has also been associated with CHD (Kawachi, et al., 1996), creating at least some confusion and controversy (see Chon, 2002, for review). In addition, recent studies found that individual differences in the tendency to control the expression of anger (i.e., anger-control) may be negatively associated with CHD (Siegman, Malkin, Boyle, Vaitkus, Barko, & Franco, 2002; Siegman, et al., 1998). Hence, the association of trait anger and CHD has been consistent, whereas anger-in and anger-out in their relation to CHD have been less consistent, with some suggestions that anger-control may be negatively associated with CHD.

There have also been growing number of studies which showed that interpersonal factors

1) Although there have been a variety of anger measures, the State-Trait Anger Expression Inventory (STAXI, Spielberger, 1988) has been the most widely used scale thus far. STAXI consists of state anger and trait anger for the experience of anger, and anger-in, anger-out, and anger-control for the expression of anger. As will be seen later, some researchers reported more detailed aspects of trait anger, namely, trait anger-temperament and trait anger-reaction. Following the tradition, however, we adopted the above five subscales in what follows (see method section for more in details).

such as marital status and quality of marital relationships may be important to the development and progression of CHD (for reviews, see Kiecolt-Glaser & Newton, 2001; Smith & Ruiz, 2002). For example, Medalie and Goldbourt (1976) reported that marital quality was associated with the development of angina pectoris at the 5-year follow-up. Recent prospective studies found that marital stress may be associated with more objective CHD outcomes (Coyne, Rohrbaugh, Shoham, Sonnega, Nicklas, & Cranford, 2001; Matthews & Gump, 2002; Orth-Gomer, Wamala, Horsten, Schenck-Gustafsson, Schneiderman, & Mittleman, 2000). More specifically, Orth-Gomer and her colleagues (2000) found that women with CHD who reported high levels of marital conflict were nearly three times as likely to experience a recurrent coronary event as married but nondistressed women. Coyne and his colleagues (2001) reported a similar association between marital conflict and death in a sample of patients with congestive heart failure, most of whom had experienced a prior myocardial infarction (MI). In a large sample of initially healthy but high-risk men, Matthews and Gump (2002) found that increasing levels of marital stress were associated with increased risk of death from CHD.

Although anger/hostility and marital processes are typically considered separately in studies of CHD risk, these variables are clearly related. Anger and hostility are associated with self-reports (Smith, Pope, Sanders, Allred, & O'Keefe, 1988) and behavioral displays (Smith, Sanders, & Alexander, 1990) of martial conflict. Further, anger and hostility are associated with worsening marital adjustment over time (Newton & Kiecolt-Glaser, 1995; Miller, Marksides, Chiriboga, & Ray, 1995). Currently, however, there have been few studies of the relation between anger and marital adjustment among persons with established CHD. If psychosocial risk factors such as anger experience or expression and marital adjustment are associated, then models of the nature of and mechanisms underlying such risk factors must consider the likely reciprocal effects of personality traits and social relationships (Gallo & Smith, 1999). Studying personality or relationship factors separately may otherwise provide an incomplete account of their association with subsequent health. That is, personality characteristics such as trait anger or styles of anger expression may influence health, at least in part, through their effects on close relationships. In turn, relationships may influence health, at least in part, through their association with health-relevant personality traits. Further, the mechanisms underlying the effects of these risk factors on health may involve the active, reciprocal processes through which maladaptive personality traits alter relationships and parallel processes through

which problematic relationships maintain and accentuate maladaptive personality characteristics (Gallo & Smith, 1999; Smith, 1995). However, a first step in this line of inquiry is to determine the association between *intra*personal and *inter*personal risk factors. Thus, the primary purpose of the present study is to explore the relation between anger and marital satisfaction in patients with CHD and their spouses.

One corollary issue involves gender differences in anger, marital satisfaction, and their association. Prior studies suggest that there are no significant gender differences in the experience and expression of anger (Averill, 1982; Deffenbacher, Oetting, Thwaites, Lynch, Baker, Stark, Thacker, & Eiswerth-Cox, 1996; Kopper & Epperson, 1996; Stoner & Spencer, 1987). In contrast, there have been some reports showing gender differences in the subscales of the STAXI (Fischer, Smith, Leonard, Fuqua, Campbell, & Masters, 1993; McCann & Biaggio, 1989; see Kring, 2000, for review) such that men had higher scores than women in Anger-out and Trait-Anger Temperament. Previous studies on this issue, however, utilized healthy samples, thus little is known about the gender differences in the experience and expression of anger among persons with CHD. Moreover, previous studies suggest gender differences in the effects of marital process on health, such that marital *status* is more closely related to CHD risk for men than for women, whereas martial strain exacts a greater toll from women than from men (Kiecolt-Glaer & Newton, 2001). Further, the association of anger experience and expression with the patient's and their spouse's level of marital satisfaction may differ for men and women, given potential gender and relationship role differences (in expectations) regarding the experience and expression of anger. Thus, a second purpose of the paper is to examine possible gender differences in the associations between anger experience/expression and marital satisfaction among CHD patients and their spouses.

METHOD

Participants and procedure

Participants were one hundred and ninety CHD in-patients at Yeungnam University Hospital and their spouses in Daegu. This hospital serves as one of the major hospitals in Daegu, a city of approximately 2.5 million inhabitants. Participants were included as consecutive hospitalized CHD patients, and were invited for participation if they were under 65 in age. The diagnosis of MI was based on (1) the clinical history taken by a cardiologist; and (2) standard ECG readings. The spouses of CHD patients were included only if they had no history of MI. Three CHD patients failed to

report several items on anger measures, thus were eliminated from the total sample, leaving a total of 187 CHD patients and 187 spouses for further analyses. Both groups completed a set of questionnaires, which are described below.

Instruments

Anger was assessed by the Korean adaptation of the State-Trait Anger Expression Inventory (STAXI-K, Chon, Hahn, & Lee, 1998), measuring both experience of anger (state anger and trait anger) and expression of anger (anger-in, anger-out, and anger-control). STAXI-K revealed the same factor structure as the original STAXI, although four items needed to be replaced by newly constructed items (see Chon, Hahn, & Lee, 1998 for details). The STAXI-K has a good internal consistency, with Cronbach alphas over .70, except anger-in for female participants (.69). Test-retest reliability coefficients over a 3 week period were .65 to .82, except state anger (.14). The finding indicates that the STAXI-K scores are reasonably stable over time, except state anger, consistent with the conceptual framework (Spielberger, 1988). In the present study, internal consistencies of each scale were satisfactory: state anger (α = .88), trait anger (α = .93), anger-in (α = .92), anger-out (α = .83), anger-control (α = .86) among CHD patients. Internal consistencies of each scale among spouses also revealed the similar levels of reliability with the alpha range of .82 (anger-out) to .93 (trait anger).

Each item was rated on a four-point scale; state anger was assessed by 1 = 'not at all,' 2 = 'somewhat,' 3 = 'moderately so,' and 4 = 'very much so,' while other subscales (trait anger, anger-in, anger-out, and anger-control) were rated by 1 = 'almost never,' 2 = 'sometimes,' 3 = 'often,' and 4 = 'almost always.'

Marital satisfaction was assessed by the same scale utilized in previous studies (Chon & Hahn, 2000; Chon, Hahn, Chang, Kim, & Oh, 1998). The scale was constructed, based on their highest item-total correlations, to select the best five items (e.g., "I am satisfied with the present marital life", "My marital life is boring.") out of 10 original ones (Lee, 1998). Lee (1998) reported that the Cronbach's alpha for the Marital Satisfaction Scale was .95 with ten items. The Cronbach's alpha was .74 in the present study, in part due to the smaller number of items for the present study. Each item was rated on a five-point scale: 1 = 'not at all,' 3 = 'moderately,' and 5 = 'very much so.'

Participants provided additional demographic information, such as sex and age.

RESULTS

Characteristics of participants

CHD patients consisted of one hundred and thirty three (71.7%) men and fifty four (28.9%) women, with a mean age of 53.34 (SD = 8.44); consequently, spouses consisted of 54 men and 133 women, with a mean age of 52.35 (SD = 8.86). There were significant group differences between CHD patients and their spouses in age, t = 3.20, p <.002, and in gender, X^2 = 187.00, p <.001.

Gender differences in anger and marital satisfaction

Each of the five anger scores and marital satisfaction was compared in men and women, with age as the covariate in both CHD patients and their spouses. There were significant gender effects for all anger scores among CHD patients. Specifically, women compared to men reported less state anger (Female = 10.35 vs. Male = 11.17), F (1, 183) = 4.65, p <.032, trait anger (Female = 15.94 vs. Male = 21.04), F (1, 184) = 25.47, p <.001, and anger-out (Female = 12.39 vs. Male = 17.04), F (1, 184) = 37.77, p <.001, whereas women reported significantly more anger-in (Female = 17.31 vs. Male = 11.08), F (1, 184) = 133.06, p <.001 and anger-control (Female = 23.50 vs. Male = 19.73), F (1, 184) = 18.92, p <.001, than men.

Similar pattern emerged, except for state anger, among spouses. Women reported lower scores than men in trait anger (Female = 15.48 vs. Male = 18.44), F (1, 184) = 14.26, p <.001, and anger-out (Female = 13.22 vs. Male = 16.26), F (1, 184) = 28.14, p <.001, whereas women expressed more anger-in (Female = 15.82 vs. Male = 10.57), F (1, 184) = 85.94, p <.001, and anger-control (Female = 22.65 vs. Male = 20.61), F (1, 184) = 14.14, p <.001, than men. No significant gender effect, however, was found for state anger (Female = 10.95 vs. Male = 10.19), F (1, 184) = .56, ns, among spouses.

With respect to the marital satisfaction, men reported higher satisfaction than women in both CHD patients (Female = 14.59 vs. Male = 15.46), F (1, 184) = 4.25, p <.041, and spouses (Female = 14.86 vs. Male = 16.26), F (1, 183) = 13.16, p <.001.

Gender differences in the association of anger and marital satisfaction

Bivariate correlations between five anger scores and marital satisfaction are presented separately for men and women in Table 1 and Table 2. Taken together, CHD patients' report of marital satisfaction was negatively associated with their own report of state anger among men, whereas among women it was negatively associated with state anger, trait anger, and

positively associated with anger-in and anger-control.

Similarly, spouses' report of marital satisfaction was positively associated with anger-control among male patients, whereas it was negatively associated with state anger, but positively associated with anger-in and anger-control among female patients.

Table 1. Bivariate Correlation between Anger Variables and Marital Satisfaction among Female Patients (N = 54)

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Table 2. Bivariate Correlation between Anger Variables and Marital Satisfaction among Male Patients (N = 133)

To test gender differences in the magnitude of associations between anger variables and marital satisfaction, hierarchical multiple regression analyses were employed. Gender was dummy-coded (female = 0, male = 1), anger variables were centered (i.e., score - mean), and interaction terms were computed by multiplying the relevant variables (Aiken & West, 1991). Variables were entered in three blocks: age, main effects (i.e., gender, anger scores), and the

Table 3. Summary of Hierarchical Regression Analysis for Patients' Anger Variables Predicting Marital Satisfaction

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two-way interaction term (e.g., state anger x gender). The criterion variable was either CHD patients' or spouses' marital satisfaction. In the first series of regression analyses, analyses were conducted to determine whether CHD patients' anger predicted their own marital satisfaction or spouses' marital satisfaction. The results of analyses of patients' anger variables are presented in Table 3.

CHD patients' state anger was negatively related to their own marital satisfaction, and patients' anger-out was negatively related to spouses' marital satisfaction. In contrast, patients' anger-control was positively related to spouses' marital satisfaction. There were also significant interaction effects for patients' trait anger x gender and patients' anger-in x gender on their own marital satisfaction. Thus, consistent with the correlations in Tables 1 and 2, patients' trait anger scores were more closely related to their reports of marital satisfaction among women than men (rs = -.31 vs. -.01, respectively), as were their anger-in scores (rs = .29 vs. -.05, respectively).

Similar interactions emerged in the prediction of spouses' marital satisfaction. Patients' state anger x gender and patients' anger-in x gender were significant for spouses' marital satisfaction. The association of patients' state anger with their spouses' reports of marital adjustment was stronger for female patients than for male patients (rs = -.34 vs. -.06, respectively). Similarly, the association of patients' anger in scores with spouses' marital satisfaction was stronger for female patients than for male patients (rs = .38 vs. -.16). Thus, although the associations between anger variables and marital adjustment were generally

Table 4. Summary of Hierarchical Regression Analysis for Spouses' Anger Variables Predicting Marital Satisfaction

similar in direction for male and female patients (see Table 1 and 2), they were significantly larger among females in some cases.

Two additional series of regression analyses were performed to determine whether spouses' anger scale scores predicted their own marital satisfaction or CHD patients' marital satisfaction. Results of these analyses are presented in Table 4.

In these regression analyses, as in the above analyses, spouses' age, anger scores, gender, and anger x gender were entered as predictors, and spouses' own marital satisfaction or CHD patients' marital satisfaction as criterion variable. Results revealed that spouses' state anger and anger-in scores were negatively related to their own marital satisfaction. Spouses' state anger was also negatively related to patients' reports of marital satisfaction. No other anger scores and no interactions with gender were associated with the level of either CHD patients' or spouses' marital satisfaction.

DISCUSSION

The present study examined the relation between anger and marital satisfaction in 187 CHD patients and their spouses. The findings indicated that, as a whole, state anger, trait anger, and anger-out are associated with lower marital satisfaction, whereas anger-in and anger-control are associated with higher marital satisfaction. The associations between these aspects of anger and marital satisfaction were stronger for women than men. In addition, men experienced anger more frequently, and expressed anger more outwardly compared to women. Finally, men reported more marital satisfaction than women.

The present study has some limitations. First, the cross-sectional design precludes conclusion about any causal association between anger and marital satisfaction. Either direction is possible, and reciprocal causal influences are likely (Smith, 1995). Further, it is possible that both factors are influenced by a third variable (e.g., severity of illness). Second, the study was based on self-reports of anger and marital satisfaction. Thus, the effects may be inflated by common method variance. Hence, replication with a multimethod approach (e.g., Smith et al, 1990) would be useful. Finally, although it is clear that anger and marital adjustment are related, without data on the course of CHD, we cannot determine if this overlap of risk factors conveys different or more important information about prognosis than their separate consideration.

However, the findings have potentially important implications. In the growing literature on psychosocial risk factors for CHD, the majority of studies have dealt with either individual characteristics such as anger/hostility, anxiety, or depression (Rutledge, Linden, &

Davies, 2000) or social factors (King, Reis, Porter, & Norsen, 1993). The present findings suggest, however, that personality and social relationship risk factors co-occur. Thus, future studies may require contextual models of the *inter*-relation of individual and interpersonal risks to understand their effects on CHD. Stated differently, it may be more productive to examine possible psychological and social factors in the onset and course of CHD in the same study. For example, depression and marital dysfunction both confer increased risk of CHD onset and poor prognosis (Smith & Ruiz, 2002). Importantly, depression both predicts and is predicted by poor marital adjustment (Whisman, 2001). Hence, comprehensive understanding of the effects of these risk factors may require consideration of the ways in which they may be elements of a single, reciprocally related unhealthy psychosocial process.

The association between anger variables and marital adjustment was stronger for women than for men. Specifically, high levels of the experience and expression of anger among female CHD patients were more closely related to their own and their husbands' marital satisfaction than were levels of these characteristics among male patients, even though some anger variables and marital adjustment were significantly correlated among male patients. Therefore, models of the combined role of personality and social risk factors should take into account possible gender differences in these patterns of risk.

The findings contradict studies which showed no gender differences in the experience and expression of anger (Kopper & Eppreson, 1996; Deffenbacher, Oetting, Thwaites, Lynch, Baker, Stark, Thacker, & Eisweth-Cox, 1996). On the other hand, the findings are consistent with results reported by Fischer, Smith, Leonard, Fuqua, Campbell, and Masters (1993), which revealed significant gender differences in the anger-out and trait anger-temperament subscales of STAXI. These inconsistent findings may be partially due to the fact that, as they grow older, couples may more strongly adopt socio-cultural stereotypes (Plant, Hyde, Keltner, & Devine, 2000) or standards (Chon, 2002) in which it is more acceptable for men to experience and express anger than women. In fact, the findings suggest that men experience more state-and-trait anger, and express anger more outwardly than women.

The present findings were based on a Korean sample. Previous studies suggest that anger-out is a predominant standard in Western culture, whereas anger-in is a predominant standard in Eastern culture (Chon, Kim, & Ryoo, 2000; Stephan, Stephan, & De Vargas, 1996; Triandis, 1994). Consequently, anger-in was more associated with cardiovascular diseases in Western cultures, whereas anger-out

was more associated with cardiovascular diseases in Eastern culture, perhaps due to their incongruence with their respective predominant standard (Chon, 2002). If this interpretation is correct, anger-in, instead of anger-out, may be more detrimental to marital satisfaction in Western cultures. In another cultural issue, there is a patriarchal tradition in Korea. In this context, anger-out is seen as more appropriate for men than women, whereas anger-in is seen as more appropriate for women. Thus, it is an open question whether or not the same pattern of associations with marital satisfaction will occur in other cultures. Further studies across several cultures would be useful in understanding the relation between anger and marital satisfaction.

Whether examining gender differences or cultural differences, one important aspect largely ignored in the literature thus far is the role of standards or expectations for anger expression. Stated differently, although the majority of studies have been focused on either anger-in or anger-out in its association to CHD, some recent findings (Chon et al., 1998; Chon & Hahn, 2000; Engbretson, Matthews, & Scheier, 1989), and reviews (e.g., Chon, 2002) suggest that it may not be the mode of anger expression itself (i.e., anger-in vs. anger-out), but the mismatch between preferences or standards for anger expression (e.g., anger-in) and the mode of anger expression (e.g., anger-out), which influences health in general and CHD in particular. For example, anger expression was a significant predictor of CHD (Chon, et al., 1998) and blood pressure (Engbretson, Matthews, & Scheier, 1989), but only when it was incongruent with the individual's, standard or preference of anger expression. Thus, it may be fruitful to examine both the individual's and the cultural standard of anger expression as well as the mode of anger expression in future studies.

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분노, 결혼만족 및 관상동맥 질환

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본 연구에서는 관상동맥 질환에 대한 분노와 결혼만족 간에 연관성을 살펴보았다. 이 목적을 위하여 187명의 관상동맥 질환 환자와 환자의 배우자를 대상으로 한국판 상태-특성 분노 표현 척도(STAXI-K, Chon, Hahn, & Lee, 1998)과 결혼만족도 척도(이경성, 1998)의 단축형을 사용하였다. 회귀 분석 결과 관상동맥 질환자 가운데 높은 수준의 분노 표출이 배우자의 낮은 수준의 결혼만족도를 예언하고 있었으며, 관상동맥 질환자의 상태 분노는 자신의 낮은 수준의 결혼만족도를 예언하는 것으로 나타났다. 반면에, 관상동맥 질환자의 높은 수준의 분노 통제는 배우자의 높은 수준의 결혼만족도를 예언하고 있었다. 덧붙여, 배우자의 높은 수준의 상태 분노는 관상동맥 질환자와 자신의 낮은 수준의 결혼만족도를 예언하고 있었으며, 배우자의 높은 수준의 분노 억제는 자신의 낮은 수준의 결혼만족도를 예언하고 있었다. 이러한 연관성은 전반적으로 남자에 비하여 여자에게서 두드러지게 나타났다. 본 연구 결과는 관상동맥 질환의 위험 요인에 관한 모형에서 개인내적인 성격과 개인외적인 사회적 맥락을 함께 고려할 필요가 있음을 암시하고 있다. 끝으로, 본 결과를 비교문화적 조망에서 논의하고, 추후 연구를 위한 시사점이 제안되었다.

주요어: 분노, 관상동맥 질환, 결혼만족