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Prehospital delay and independent/interdependent construal of self among Japanese patients with acute myocardial infarction

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Abstract

Reducing the time from symptom onset to reperfusion therapy is an important approach to minimizing myocardial damage and to preventing death from acute myocardial infarction (AMI). Previous studies suggest that certain ethnic or national groups, such as the Japanese, are more likely to delay in accessing care than other groups. The aims of this paper were the following; (1) to examine whether culture (defined as independent and interdependent construal of self) is associated with delay in accessing medical care in Japanese patients experiencing symptoms of AMI; (2) to determine if the relationship between independent and interdependent construal of self and prehospital delay time is mediated by cognitive responses and/or emotional responses; and (3) to determine if independent and interdependent construal of self independently predicts choice of treatment site (clinic vs. hospital). A cross-sectional study was conducted at hospitals in urban areas in Japan. One hundred and forty-five consecutive patients who were admitted with AMI within 72 h of the onset of symptoms were interviewed using the modified response to symptoms questionnaire and the independent and interdependent construal of self scale. The interdependent construal of self scores were significantly associated with prehospital delay time, controlling for demographics, medical history, and symptoms ($p < .001$). However, the relationship between independent and interdependent self and prehospital delay times was not mediated by cognitive or emotional responses. In multiple logistic regression analysis, patients with high independent construal of self were more likely to seek care at a hospital rather than a clinic compared to those with lower independent construal of self. In conclusion, cultural variation within this Japanese group was observed and was associated with prehospital delay time.

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Keywords: Independent/interdependent construal of self; Acute myocardial infarction; Culture; Japan; Prehospital delay; Care-seeking

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Introduction

Reducing the time lag from symptom onset to reperfusion therapy is an important approach to minimize myocardial damage and to prevent death from acute myocardial infarction (AMI) (FTT, 1994; GUSTO, 1993). Prehospital delay time and factors associated with prehospital delay time have been extensively explored in the United States (US), Europe, and Australia. However, there have been far fewer studies reported in Asia in general and in Japan in particular.

Reported median prehospital delay time from symptom onset to hospital arrival ranges from 1.8 to 8.0 h in Western countries (Ridker, Manson, Goldhaber, Hennekens, & Buring, 1992; Tjoe & Luria, 1972). Sociodemographics, clinical characteristics, and social context factors have been extensively studied in relation to prehospital delay time over the last two decades. Female gender, older age, a history of diabetes mellitus, symptom onset at night and consultation with a physician have been associated with prolonged prehospital delay time (Dracup & Moser, 1991; Dracup et al., 1995; GISSI–Avoidable Delay Study Group, 1995; Goldberg, Yarzebski, Lessard, & Gore, 2000; Yarzebski, Goldberg, Gore, & Alpert, 1994). Severity of overall AMI symptoms (e.g. chest pain, nausea, and shortness of breath) more consistently predicts prehospital delay time over severity of chest pain alone. In contrast, the findings across studies suggested that education and a history of myocardial infarction (MI) do not markedly decrease or increase prehospital delay time (Dracup et al., 1995).

Another consistent finding from previous studies is that patients in certain ethnic groups or nationalities are more likely to delay in accessing care when experiencing signs and symptoms of AMI compared to Caucasians (Dracup et al., 2003; Goff et al., 1999; Goldberg et al., 2002). For example, a multi-site study reported that AMI patients from Europe and South America were significantly more likely to delay in seeking medical help compared to patients from North America or Australia/New Zealand (Goldberg et al., 2002). McKinley and her colleagues (2004) compared the prehospital delay time between Western countries (the US and the United Kingdom (UK)) and Asian countries (Korea and Japan). Median prehospital delay times in the US and the UK were 3.5 and 2.5 h, respectively, while the median prehospital delay times in Korean and Japan were 4.4 and 4.5 h, respectively. Besides the observation that ethnicity or nationality was related to delay in care-seeking behavior, other possible explanations for the differences in delay time between these nationalities and ethnic groups have not been explored.

Culture shapes individual's beliefs, values, attitudes, and behaviors. Nationality or ethnicity is not equivalent to culture (Matsumoto, 1996). However, individuals with a certain ethnicity or nationality frequently share beliefs, values, attitudes, and behaviors and these, in turn, influence health practices, e.g. specific patterns of illness behaviors, therapeutic practices, and decisions about treatments (Kleinman, 1978). Cultural differences may lead to different care seeking patterns in patients experiencing symptoms such as those of AMI.

Individualism—Collectivism is the most well known culture-level dimension. Individualism, represented by most northern and western regions of Europe, emphasizes an individual's goal autonomy, and freedom over group goals (Singelis, 1994). In contrast, collectivism, represented by Asia, Africa, and South America, emphasizes group goals over individual goals and harmony within a group (Singelis, 1994). The concept of independent/interdependent construal of self was derived from this individualism—collectivism theory to explain individual differences across cultures.

The concept of independent construal of self emphasizes an individual's uniqueness and expression of self (Markus & Kitayama, 1991). The self is stable despite a changing social context. Individuals with higher independent construal of self are likely to describe themselves in relation to their personal attributes, desires, preferences, and abilities (Markus & Kitayama, 1991). In contrast, the interdependent construal of self emphasizes a social role, status, and relationship to others. When individuals with higher interdependent construal of self experience cardiac symptoms, they may make an effort to stay in their social role unless their symptoms interfere with performance of the role. Therefore, the concept of self-construal could be used to explain different care-seeking behaviors within a culture, because a considerable variation in the independent and interdependent construal of self can occur within a single culture, as well as across cultures (Yamada & Singelis, 1999; Matsumoto, 1996).

Furthermore, Markus and Kitayama (1991) hypothesized that self-construal may lead to different emotional responses and/or cognitive experiences. Since then, the concept of self-construal has received considerable attention as a possible explanation for cross-cultural differences in cognition and emotion. From previous delay studies, we know that emotional experiences (e.g., fear) and cognitive responses (e.g., symptom interpretation as heart or non-heart in origin) play an important role in patients promptly seeking medical treatment. Thus, emotional and/or cognitive responses to the onset of AMI symptoms may mediate the association between self-construal and prehospital delay time.

The overall aim of our paper is to examine whether independent and interdependent construal of self explains delay in accessing medical care in Japan. The purposes of this study were to examine: (1) the contribution of independent and interdependent construal of self to prehospital delay time, after controlling for demographics, medical history, and AMI symptoms; (2) whether independent and/or interdependent construal of self and prehospital delay time is mediated by emotional responses and/or cognitive responses during care-seeking; and (3) whether independent and/or interdependent construal of self independently predicts a visit to a clinic/small hospital which does not provide continuous cardiac care prior to admission to a hospital with continuous cardiac care.

Methods

Clinical sites and medical care system in Japan

A cross-sectional study was conducted in Japan. Data were collected in 2002 at three hospitals located in Aichi prefectures and two hospitals in Tokyo. All clinical sites in the present study were able to provide cardiac catheterization and 24-h, continuous cardiac care. The capacity of inpatients-beds ranged from 150 beds to 1260 beds in these medical institutions, which qualified them as either a secondary or tertiary emergency medical center.

To understand the trajectory of care-seeking by patients in the current study, it is important to describe several characteristics of the Japanese medical care system. All Japanese are covered by universal health insurance and are free to choose any medical institution for their care (Okimoto & Yoshikawa, 1993). To visit ambulatory clinics or small hospitals, an appointment is usually not required. Some patients with evolving cardiac symptoms visit these medical institutions, instead of calling an ambulance (Fukuoka et al., submitted for publication). These patients are usually transferred to a hospital with a cardiac catheterization laboratory, since most ambulatory clinics and small hospitals do not provide continuous cardiac monitoring or reperfusion therapy. Occasionally, patients may receive one bolus infusion of a thrombolytic drug prior to transfer (Fukuoka et al., submitted for publication). Unlike the US, primary angioplasty is the major reperfusion therapy for AMI in Japan (Watanabe et al., 2001).

Patient characteristics

Inclusion criteria for the present study were the following: (1) mental alertness, (2) Japanese speaker, (3) hemodynamic stability, (4) independent living (e.g. not being hospitalized or not being in a nursing home), (5) no history of advanced malignancy or other debilitating illness, (6) hospitalization within 72 h after the onset of symptoms, (7) diagnosis of AMI. The AMI diagnosis was based on the consensus of the Joint European Society of Cardiology/American College of Cardiology Committee (2000).

Two hundred fifty-eight patients with AMI were consecutively admitted to a hospital during the data collection period. Of those, 100 patients did not meet at least one inclusion criteria. Specifically, 34 patients were hemodynamically unstable; 34 patients were not mentally alert; 10 patients arrived at the hospital with symptom onset greater than 72 h; 6 patients died before they could be approached; 5 patients were not living independently; 4 patients had a severe hearing or/and speaking problem; and the remaining 7 were excluded for other reasons. In addition, 13 patients refused to participate in the study primarily due to their physical condition. The remaining 145 patients comprise the sample for the present study.

Procedures

The investigators received approval from the Institutional Review Boards at all clinical sites and the University of California San Francisco (UCSF) prior to data collection. A nurse or a physician in each clinical site informed the researchers when new AMI patients were admitted. Permission to approach a patient was obtained from the patient's physician and/or nurse. After written informed consent was obtained from the patient, the patient interview was conducted by two masters-prepared nurses who were experienced in cardiac patient care. The patient interview was conducted as soon as possible after the patient became hemodynamically stable in order to obtain accurate information. The average time until interview was 3.6 days (SD $\pm$ 1.7 days) from the time of hospital admission. After patients were discharged from the hospital, a medical chart review was conducted to collect discharge data.

Measures

Prehospital delay time and clinic visit

Since the majority of clinics or small hospitals did not provide any reperfusion therapy to the patients evolving an AMI (Fukuoka et al., submitted for publication), prehospital delay time was defined as the time duration from symptom onset to arrival at one of the five hospitals that provided reperfusion therapy and continuous cardiac care around the clock. The date symptoms started was categorized into either weekends/holidays or weekdays. The time of onset of symptoms was divided into four categories (midnight to 5:59 am, 6 am to 11:59 am, noon–5:59 pm, and 6 am to 11:59 pm). Information regarding a clinic/small hospital visit was obtained from the patient's referral letter from the clinic/small hospital, the medical chart review, and confirmed with the patient.

Sociodemographic and medical history

Age, gender, highest education level, annual household income, marital status, employment status, and medical histories (including previous cardiac events, diabetes mellitus, smoking, hypertension, overweight/obesity, hyperlipidemia, and sedentary life style) were assessed by medical chart review and patient interview. Symptom severity was measured on a scale of 0–10, with 0 being no symptoms and 10 being the most severe symptoms. Types of symptoms (such as chest discomfort/pain, diaphoresis, shortness of breath, and weakness/fatigue) were also assessed by patient interview using a yes/no question.

Response to symptoms questionnaire

The response to symptoms questionnaire contained questions regarding social context in which symptoms first started, antecedents of symptoms, and behavioral, cognitive and emotional responses during an evolving AMI (Burnett, Blumenthal, Mark, Leimberger, & Califf, 1995). This questionnaire was modified by Dracup and Moser (1997) and later translated from English to Japanese, back translated, and used in a Japanese AMI sample (Dracup et al., 2003). Twelve of the 18 items were rated from 1 (not at all) to 5 (very much). The remaining items were in the form of multiple choice questions. Since we were particularly interested in cognitive and emotional responses, a principal components factor analysis was used to determine which of 9 cognitive and emotional items clustered together (see Table 1). A three-factor solution emerged using a varimax rotation. Responses to "Did not recognize symptom as heart related", "Did not know the symptoms of a heart attack", and "Did not realize symptoms were important" loaded onto the first factor and accounted for approximately 37% of variance. The first factor represented *interpretation of symptoms.* The responses of "thought serious," "felt anxious," and "felt control" loaded onto the second factor and accounted for approximately 19% of the variance. The second factor represented *perceived severity*. The responses of "embarrassed to get help," "felt afraid," and "did not want to trouble others," loaded onto the third factor and accounted for 13% of variance. The third factor represented *delay due to social concern*. Three scores were derived for each participant based on the sum of responses to highly loaded items. Because "felt control" negatively loaded onto the second factor, its score was reversed. Cronbach's alpha values for the first, second and third factors were .90, .74, and .58, respectively.

Independent and interdependent construal of self

The independent and interdependent construal of self (short version) involves two dimensions, independence and interdependence (Gudykunst, Matsumoto, Ting-Toomey, & Nishida, 1996). Sample items reflecting independence are "I take responsibility for my own actions," "I prefer to be self-reliant rather than depend on others." Sample items reflecting interdependence are "I sacrifice my self-interest for the benefit of my group," and "I respect the decisions made by the group." Each subscale consists of 6 items. The response to each item uses a 7-point Likert-type scale, from 1 (strongly disagree) to 7 (strongly agree). The possible range is 6–42 for each subscale. A higher score in one of the subscales indicates a tendency towards either independent or interdependent construal of self. Both subscales were previously tested in 753 college students in four different countries (Korea, Japan, Australia, and the US) (Gudykunst et al., 1996). The subscales were consistently reliable across four different ethnic groups. In the present study, the Cronbach's alphas for the Independent and Interdependent subscales were 0.68 and 0.62.

Statistical analysis

All statistical analyses were performed on log transformed prehospital delay times, since the

Table 1
Factor loadings of cognitive and emotional responses

Cognitive and emotional response items	Factor 1	Factor 2	Factor 3
1. When you first experienced your symptoms how serious did you think they were?	−.290	.843	.090
2. How anxious (distressed or upset) were you by your symptoms when you first noticed them?	−.191	.853	.151
3. How much ability to control your symptoms did you think you have?	−.075	−.651	.310
4. Delayed because your were embarrassed to get help	−.072	−.091	.728
5. Delayed because your feared what might happen	.130	.143	.631
6. Delayed because you did not recognize your symptoms as heart symptoms	.875	−.258	.117
7. Delayed because you did not want to trouble anyone	.102	−.070	.790
8. Delayed because you did not know the symptoms of a heart attack	.894	−.184	.115
9. Delayed because you did not realize the importance of your symptoms	.874	−.121	.159

Factor 1 was termed symptom interpretation; Factor 2 was termed perceived severity; and Factor 3 was termed delay due to social concern.

distribution of prehospital delay times was positively skewed. Probability values less than 0.05 were identified as statistically significant. The Pearson r correlation coefficient was used to examine the association between prehospital delay times and variables expressed as interval data such as age, symptom severity, independent and interdependent construal of self scores, and cognitive and emotional response scores. Spearman's rho was used to analyze the association between the prehospital delay time and rank order variables.

Association between prehospital delay and construal of self scores

A hierarchical multiple regression was performed to examine whether patient's independent and interdependent levels independently predicted prehospital delay time, after controlling for demographics (age and gender), medical history (diabetes mellitus), symptoms (symptom severity and diaphoresis), and social context (date and time symptom started) (See test 1 in Fig. 1).

Mediator effect

To examine whether the relationship between the independent and/or interdependent construal of self and prehospital delay time was mediated by cognitive and emotional responses, the following three criteria needed to be met (Baron & Kenny, 1986).

(a) Independent variables (independent/interdependent construal of self scores) should significantly predict mediators (symptom interpretation, perceived severity, or delay due to social concern) (test 2 in Fig. 1),
(b) The mediators (*symptom interpretation, perceived severity, or delay due to social concern*) should significantly predict the dependent variable (prehospital delay time) (test 3 in Fig. 1) and
(c) When both the mediators and independent variables were in a linear regression model, a previous significant relationship between independent (Independent/interdependent construal of self) and dependent (prehospital delay time) variables should no longer be significant or effect size should be reduced.

Predictors of a clinic/small hospital visit

A multiple logistic regression was performed to determine whether a patient's independent and interdependent levels independently predicted a clinic/small hospital visit, after controlling for demographics (age and gender), medical history (diabetes mellitus), symptoms (symptom severity and diaphoresis), and social context (date and time symptom started).

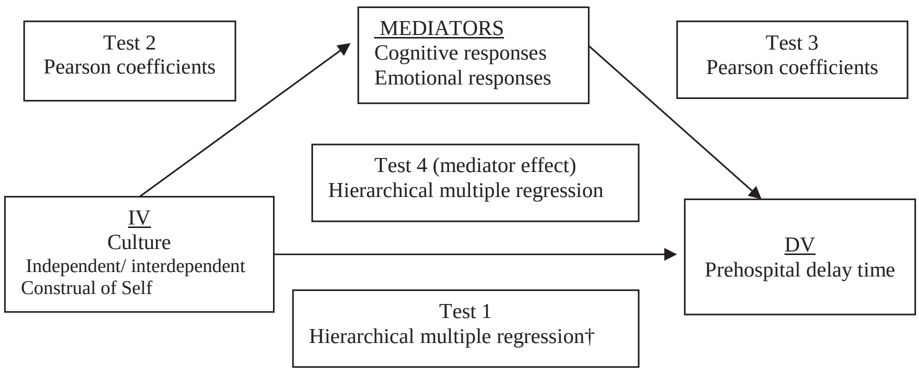
Results

Prehospital delay time

The median prehospital delay time was 3 h and 34 min for the 145 patients hospitalized with AMI. The distribution of prehospital delay times is shown in Table 2. Only 12% of patients arrived at a hospital within 1 h after onset of symptoms. Approximately 46% of patients ($n = 66$) called 119 (emergency medical system phone number in Japan), and 52.4% ($n = 76$)

Table 2
Distribution of prehospital delay time ($N = 145$)

Delay time (h)	Percent	n
0–⩽1	12.4	18
1–⩽2	17.2	25
2–⩽6	35.2	51
6–⩽12	13.2	19
12–⩽72	22.0	32



† In step 1 age, gender, and diabetes mellitus were entered, in step 2 symptom severity, diaphoresis, date and time of symptom onset, and in step 3 Independent and Interdependent Construal of Self were entered.

Fig. 1. Analysis plan for research question 1.

of patients went to a clinic/small hospital that did not have a cardiac catheterization laboratory and then were transferred or referred to a hospital.

Independent variables

Patient characteristics

The average age was 62 (SD ± 11) years, with a range from 32 to 88 years. Approximately 87% ($n = 126$) were male; 79.3% ($n = 115$) were married; 44.8% ($n = 65$) lived with more than 3 family members; 30.6% ($n = 44$) had a college or higher level educational degree; and 56.5% ($n = 82$) earned greater than or equal to ¥4,000,000 ($33,000) annually. Fifty four percent of patients smoked and 56% had a history of hyperlipidemia. Twenty-nine percent had diabetes mellitus and 43.4% had hypertension. Approximately one-fourth of patients were not physically active. None of these sociodemographic variables or cardiac risk factors was associated with prehospital delay time ($p > .05$).

Clinical symptoms

The average severity of symptoms was 8.1 (SD ± 2.1) on a 0-10 scale. The most frequently reported symptoms were chest discomfort/pain (95.2%), diaphoresis (64.1%), shortness of breath (28.3%), and weakness/fatigue (18.6%). However, only severity of symptoms and diaphoresis were associated with prehospital delay time (Pearson correlation $r = -.27$, $p = .001$; Spearman's rho $= -.28$, $p = .001$).

Time and date symptoms started

Approximately 35% of AMIs occurred on weekends or holidays. The percentage of patients who experienced onset of symptoms at various time intervals of the day were as follows: midnight to 5:59 am, 18.7%; 6 am to 11:59 am, 32.9%; noon to 5:59 pm, 22.6%; and 6 pm to 11:59 pm, 25.8%. Neither day of the week (weekend/holidays vs. weekdays) nor time symptoms started was related to prehospital delay time.

Independent and interdependent construal of self

The average independent and interdependent construal of self scores were 33.2 (SD ± 4.0) and 29.4 (SD ± 4.4), respectively. No reciprocal association was seen between the two ($r = .056$, $p = .511$). The interdependent construal of self score was positively associated with the prehospital delay time ($r = .18$, $p = .035$), while the independent score was not ($r = -.16$, $p = .068$).

Association between prehospital delay and construal of self scores

Table 3 shows the hierarchical multivariate regression on the prehospital delay time (test 2 in Fig. 1). The model explained approximately 24% of the variance in prehospital delay time ($F = 4.65$, $p < .001$). In step 3, independent and interdependent construal of self scores significantly predicted prehospital delay time, after controlling for age, gender, diabetes mellitus, time and date symptoms started, severity of symptoms, and diaphoresis. (R square change = .055, F change = 4.65, $p = .011$). The independent score was negatively associated with prehospital delay time ($p = .038$), while the interdependent score was positively associated with prehospital delay time ($p = .017$). Independent and interdependent scores accounted for 2.6% and 3.4%, respectively, of the unique variance in prehospital delay time.

Table 3
Hierarchical multiple regression for prehospital delay time ($N = 139$)

Steps & IVs	R^2	F change	Step 1 ß/SE	Step 2 ß/SE	Step 3 ß/SE	p for step 3
Step 1	.052	2.45				
Age,			.008/.005	.006/.004	.006/.004	.132
Gender			.152/.146	.135/.137	.015/.141	.918
Diabetes mellitus			.171/.102	.197/.096*	.176/.094	.064
Step 2	.188**	5.51				—
Time[a]				.032/.038	.058/.038	.133
Day[b]				.164/.098	.152/.090	.095
Symptom severity				−.058/.022*	.065/.022**	.004
Diaphoresis				−.233/.098*	−.214/.097*	.029
Step 3	.243*	4.65				—
Independent					−.024/.012*	.038
Interdependent					.024/.010*	.017

*$p < .05$, **$p < .001$.

[a]Midnight to 5:59 am, 6 am to 11:59 am, noon to 5:59 pm and 6pm to 11:59 pm symptoms started.

[b]Weekdays and weekends/holidays symptoms started.

Mediator effect

Independent variables: mediators

The average mean scores in symptom interpretation, perceived severity and delay due to social concern were 9.19 (SD$\pm$3.91), 9.13 (SD$\pm$3.11), and 5.75 (SD$\pm$2.36), respectively. Table 4 shows the results of tests of association between the independent/interdependent construal of self and symptom interpretation, perceived severity, and delay due to social concern using the Pearson coefficient. There were no associations between the independent variables and mediators ($p>.05$). Thus, symptom interpretation, perceived serious, and delay due to social concern cannot be considered a mediator.

Mediators: dependent variable

Table 4 shows the results of the Pearson coefficient tests between dependent variable and mediators. Both symptom interpretation and perceived severity were significantly associated with prehospital delay time ($p<.05$), but not delay due to social concern. In sum, given these reported results, no mediators were associated with both independent and dependent variables. Thus, the relationship between the independent or interdependent construal of self and prehospital delay time was not mediated by cognitive and emotional responses.

Overall multivariate regression model

Since symptom interpretation and perceived serious were significantly associated with prehospital delay time, these two factors were added to the main analysis as independent variables. Table 5 shows the results of the analysis. The overall model explained approximately 33% of the variance in prehospital delay time ($F = 5.55$, $p<.001$). The independent score was no longer associated with the prehospital delay time ($p = .12$), while the interdependent score was still significantly associated with prehospital delay time ($p = .01$). Symptom interpretation on the part of the patients accounted for approximately 5% of the unique variance in prehospital delay time, which was the largest unique contribution among significant independent variables.

Multivariate logistic regression on a clinic hospital visit

Table 6 summarizes the results of a multivariate logistic regression analysis using the patients' choice of a clinic /small hospital as the dependent variable. After controlling for age, gender, date and time symptoms started, severity of symptoms, and presence/absence of diaphoresis, patients with higher independent scores were less likely to visit a clinic/small hospital than those with lower independent scores ($p = .004$). However, interdependent scores did not predict a clinic/small hospital visit ($p>.05$).

Table 5
Multiple regression for prehospital delay time (*N=139*)

IVs	R^2	F change	ß	SE	sr^2	p
	.326	5.549				<.001
Age			.008	.004	.023	.040
Gender			.015	.136	—	.915
Diabetes mellitus			.156	.090	—	.086
Time[a]			−.087	.040	.025	.034
Day[b]			.100	.087	—	.252
Symptom severity			−.045	.022	.026	.045
Diaphoresis			−.278	.098	.043	.005
Independent scores			−.017	.011	—	.123
Interdependent scores			.025	.009	.037	.010
Symptom interpretation			.037	.012	.052	.002
Perceived serious			−.010	.016	—	.549

[a]Midnight to 5:59 am, 6 am to 11:59 am, noon to 5:59 pm and 6pm to 11:59 pm symptoms started.
[b]Weekdays and weekends/holidays symptoms started.

Table 4
Pearson coefficient *r* between independent and dependent variables and mediators (*p* value)

	Mediators		
	Symptom interpretation	Perceived severity	Delay due to social concern
Independent construal of self scores[a]	−.09(.32)	.09 (.29)	.02 (.82)
Interdependent construal of self scores[a]	.01 (.88)	.06 (.46)	.05 (.54)
Prehospital delay time[b]	.29(<.001)	−.29(<.001)	.14 (.10)

[a]Independent variable.
[b]Dependent variable.

Table 6
Multiple logistic regression on a clinic/small hospital visit ($n = 139$)

Predictors	Odds ratio	95% CI
Age	1.04	1.00, 1.08
Female sex	0.48	0.14, 1.63
Diabetes mellitus	1.42	0.64, 3.19
Weekend/holidays	1.08	0.49, 2.39
Symptom onset time		
6:00 am–11:59 am	1.57	0.53, 4.67
noon–5:59 pm	0.78	0.24, 2.48
6:00 pm–11:59 pm	0.56	0.18, 1.77
Absence of diaphoresis	1.22	0.52, 2.85
Symptom Severity ($\leqslant 7$)	3.39	1.43, 8.00
Independent score	0.85	0.77, 0.95
Interdependent score	1.06	0.98, 1.16

Reference categories: age in one year increment, male sex, absence of diabetes mellitus, weekdays & Time between midnight–5:59 am symptoms started, presence of diaphoresis, symptom severity>7, and independent and interdependent construal of self in one score increment.

Discussion

Prehospital delay time

In the present study, the median prehospital delay time, 3 h 34 min, was longer than most large-scale US studies. More than 40% of patients arrived at a hospital beyond the therapeutic window of 6 h after symptom onset. Only 45% of patients called 119, while approximately 50% initially sought care at a clinic or small hospital without continuous cardiac monitoring. Therefore, the importance of using an ambulance and not first visiting a clinic needs to be incorporated into health education in Japan, particularly for patients at high risk for AMI.

Similar to other study findings (Dracup & Moser, 1997; Goldberg et al., 2002; Kenyon, Ketterer, Gheorghiade, & Goldstein, 1991) increased symptom severity and presence of diaphoreses were significantly related to reduction of prehospital delay time. However, although some previous studies reported that female gender, low income, and/or a history of diabetes mellitus or hypertension were associated with an increased prehospital delay time (Dracup & Moser, 1997; Gurwitz et al., 1997; Schmidt & Borsch, 1990), no association was observed in this study. The lack of association may be related to the system of health care in Japan, which is one of universal access, thereby decreasing the salience of such factors qas income.

Prehospital delay in relation to the independent/interdependent construal of self

This was the first study to examine care-seeking behaviors of AMI patients in relation to the concept of independent/interdependent construal of self. We found that patients with higher independent construal of self scores were more likely to bypass consulting with a clinic/small hospital, but rather went directly to a large hospital with specialized cardiac service. Those with a more interdependent construal of self had longer prehospital delay times. The overall model explained 34% of the variance in prehospital delay time. Although the effect of interdependent construal of self appears to be small in the model, it is important to note the complexity of the phenomenon of delay in seeking care. Previous researchers have not identified self-construal as a contributing factor of prehospital delay even at a minimal level. In the future, similar studies need to be conducted to confirm this relationship.

We all live in the midst of a complex web of human relationships within a social structure. An individual has a social role within a family, work, and community. Individuals with higher interdependent construal of self tend to prioritize group goals over individual goals and maintain harmony within a group (Markus & Kitayama, 1991). These individuals might not tell others about his/her cardiac symptoms in order to fulfill role obligations. For example, a high school principal noticed his chest discomfort immediately after lunch. He decided to wait to go to a hospital until he had given a speech in a graduation ceremony early in the afternoon. Meanwhile, he tried to relax and took some over-the-counter medications. The principal did not tell other teachers about his symptoms until the completion of graduation ceremony. In this example, the length of prehospital delay was related to the degree of engagement with a social role and/or self-sacrifice to achieve a group goal: reflections of an interdependent construal of self.

Another possible explanation for these observations may relate to the distance of relationships between self and others. Individuals with high interdependent construal of self could develop a high degree of familiarity, intimacy, and trust within a group, called an "in-group" (Matsumoto, 1996). These individuals are extremely hospitable, cooperative, and helpful toward their own in-group members and can be rude, exploitative and even hostile toward individuals perceived as belonging to an out-group. In this area of interpersonal relationships, individuals with an interdependent construal of self may be more comfortable seeking help or advice from a neighborhood clinic (perceived as in-group) when experiencing cardiac symptoms. Seeking help first from the in-group instead of going to an emergency room could lead to a longer delay from symptom onset to arrival at a hospital.

Individuals with an interdependent construal of self tend to make a decision based on group consensus, while individuals with an independent construal of self tend to make a decision by themselves. One study found that individuals with interdependent construal of self preferred to have medical decisions made by a physician and by the family, while those with independent construal of self preferred to make decisions by themselves (Kim, Smith, & Yueguo, 1999).

Other explanations for the association of construal of self and delay may emerge as this dimension becomes clarified. For example, recent evidence suggests that independent and interdependent construals of self each appear to have multiple dimensions (Hardin, Leong, & Bhagwat, 2004). Specifying these dimensions might provide clearer reasons for the relation to prehospital delay.

Mediator effect

In the present study, the relationship between independent/interdependent construal of self and prehospital delay time was not mediated by cognitive and emotional responses. However, the patient's interpretations of symptoms as serious and as cardiac in nature were significantly associated with prehospital delay time. These findings may imply two things. First, a methodological issue related to the timing of patient's interview needs to be considered. Although patients were interviewed on average 3.6 days after hospital admission, they may have minimized the degree of cognitive and emotional responses they experienced while they had symptoms. Second, when patients were interviewed at the hospital, they were already free from their usual social context or role. However, if patients were asked about their cognitive and emotional responses at the moment of experiencing cardiac symptoms, they might have reported different results. Third, although we did not find a mediator effect in this study, there is still a possibility that cognitive and emotional responses might mediate prehospital delay time in relation to other factors, such as type or severity of symptoms and social context.

Limitations

Our ability to generalize the results to all AMI patients is limited for several reasons. First, in this study cultural differences in treatment seeking behaviors were tested only within a sample of Japanese AMI patients. Our results may not be applicable to different cultural groups or people with illnesses other than AMI. Second, patients in this study were relatively older and recruited in hospitals in urban areas in Japan. Younger people and/or people living in rural areas could be more or less independent than older people living in urban areas (Matsumoto, 2002). Third, approximately 40% of patients who were admitted to a hospital were excluded from the study, while others died outside of the hospital. It is estimated that approximately one third of patients with AMI die before they reach a hospital. Thus, these findings may not be representative of all patients with AMI.

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References

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *J. Pers Soc Psychol*, *51*(6), 1173–1182.

Burnett, R. E., Blumenthal, J. A., Mark, D. B., Leimberger, J. D., & Califf, R. M. (1995). Distinguishing between early and late responders to symptoms of acute myocardial infarction. *American Journal of Cardiology*, *75*(15), 1019–1022.

Dracup, K., & Moser, D. K. (1991). Treatment-seeking behavior among those with signs and symptoms of acute myocardial infarction. *Heart & Lung*, *20*(5Pt2), 570–575.

Dracup, K., & Moser, D. K. (1997). Beyond sociodemographics: factors influencing the decision to seek treatment for symptoms of acute myocardial infarction. *Heart & Lung*, *26*(4), 253–262.

Dracup, K., Moser, D. K., Eisenberg, M., Meischke, H., Alonzo, A. A., & Braslow, A. (1995). Causes of delay in seeking treatment for heart attack symptoms. *Social Science Medicine*, *40*(3), 379–392.

Dracup, K., Moser, D. K., McKinley, S., Ball, C., Yamasaki, K., Kim, C. J., et al. (2003). An international perspective on the time to treatment for acute myocardial infarction. *Journal of Nursing Scholarship*, *35*(4), 317–323.

Fibrinolytic Therapy Trialists' (FTT) Collaborative Group (1994). Indications for fibrinolytic therapy in suspected acute myocardial infarction: collaborative overview of early mortality and major morbidity results from all randomised trials of more than 1000 patients. FTT Collaborative Group. *Lancet*, *343*(8893), 311–322.

Fukuoka, Y., Dracup, K., Ohno, M., Kobayashi, F., Froelicher, E., Rankin, S., Hirayama, H. submitted for publication. Trajectory of prehospital delay in patients with acute myocardial infarction in the Japanese health care system. *Int J Cardiol*.

GISSI-Avoidable Delay Study Group (1995). Epidemiology of avoidable delay in the care of patients with acute myocardial infarction in Italy. A GISSI-generated study. *Archives of Internal Medicine*, *155*(14), 1481–1488.

Goff, D. C., Feldman, H. A., McGovern, P. G., Goldberg, R. J., Simons-Morton, D. G., Cornell, C. E., et al. (1999). Prehospital delay in patients hospitalized with heart attack symptoms in the United States: the REACT trial. Rapid early action for coronary treatment (REACT) Study Group. *American Heart Journal*, *138*(6Pt1), 1046–1057.

Goldberg, R. J., Steg, P. G., Sadiq, I., Granger, C. B., Jackson, E. A., Dudaj, A., et al. (2002). Extent of, and factors associated with, delay to hospital presentation in patients with acute coronary disease (the GRACE registry). *American Journal of Cardiology*, *89*(7), 791–796.

Goldberg, R. J., Yarzebski, J., Lessard, D., & Gore, J. M. (2000). Decade-long trends and factors associated with time to hospital presentation in patients with acute myocardial infarction: the Worcester Heart Attack study. *Archives of Internal Medicine*, *160*(21), 3217–3223.

Gudykunst, W. B., Matsumoto, Y., Ting-Toomey, S., & Nishida, T. (1996). The influence of cultural individualism-collectivism, self construals, and individual values on communication styles across cultures. *Human Communication Research*, *22*(4), 510–543.

Gurwitz, J. H., McLaughlin, T. J., Willison, D. J., Guadagnoli, E., Hauptman, P. J., Gao, X., & Soumerai, S. B. (1997). Delayed hospital presentation in patients who have had acute myocardial infarction. *Archives of Internal Medicine*, *126*(8), 593–599.

GUSTO (1993). An international randomized trial comparing four thrombolytic strategies for acute myocardial infarction. *New England Journal of Medicine*, *329*(10), 673–682.

Hardin, E. E., Leong, F. T. L., & Bhagwat, A. A. (2004). Factor structure of the self-construal scale revisited: implications for the multidimensionality of self-construal. *Journal of Cross-Cultural Psychology*, *35*(3), 327–345.

Joint European Society of cardiology/American College of cardiology Committee (2000). Myocardial infarction redefined—a consensus document of the Joint European Society of Cardiology/American College of Cardiology Committee for the redefinition of myocardial infarction. *European Heart Journal*, *21*(18), 1502–1513.

Kenyon, L. W., Ketterer, M. W., Gheorghiade, M., & Goldstein, S. (1991). Psychological factors related to prehospital delay during acute myocardial infarction. *Circulation*, *84*(5), 2193–2195.

Kim, M. S., Smith, D. H., & Yueguo, G. (1999). Medical decision making and Chinese patients' self-construals. *Health Communication*, *11*(3), 249–260.

Kleinman, A. (1978). Concepts and a model for the comparison of medical systems as cultural systems. *Social Science Medicine*, *12*(2B), 85–95.

Markus, H. R., & Kitayama, S. (1991). Culture and the self: implications for cognition, emotion, and motivation. *Psychological Review*, *98*(2), 224–253.

Matsumoto, D. (1996). *Culture and psychology*. Belmont, CA, US: Brooks/Cole Publishing Co.

Matsumoto, D. (2002). *The new Japan: debunking seven cultural stereotypes*. Yarmouth, ME: Intercultural Press.

McKinley, S., Dracup, K., Moser, D. K., Ball, C., Yamasaki, K., Kim, C. J., et al. (2004). International comparison of factors associated with delay in presentation for AMI treatment. *Eur J Cardiovasc Nurs*, *3*(3), 225–230.

Okimoto, I. D., & Yoshikawa, A. (1993). *Japan's health system: efficacy and effectiveness in universal care*. New York, NY: Faulkner & Gary, Inc.

Ridker, P. M., Manson, J. E., Goldhaber, S. Z., Hennekens, C. H., & Buring, J. E. (1992). Comparison of delay times to hospital presentation for physicians and nonphysicians with acute myocardial infarction. *American Journal of Cardiology*, *70*(1), 10–13.

Schmidt, S. B., & Borsch, M. A. (1990). The prehospital phase of acute myocardial infarction in the era of thrombolysis. *American Journal of Cardiology*, *65*(22), 1411–1415.

Singelis, T. M. (1994). The measurement of independent and interdependent self-construals. *Personality & Social Psychology Bulletin. Special Issue: the self and the collective*, *20*(5), 580–591.

Tjoe, S. L., & Luria, M. H. (1972). Delays in reaching the cardiac care unit: an analysis. *Chest*, *61*(7), 617–621.

Watanabe, I., Kanmatsuse, K., Ishikawa, K., Kodama, K., Sumiyoshi, T., & Takeshita, A. (2001). Current Japanese strategy to AMI. *Journal of Japanese Coronary Association*, *7*, 14–18 (in Japanese).

Yamada, A. M., & Singelis, T. M. (1999). Biculturalism and self-construal. *International Journal of Intercultural Relations*, *23*(5), 697–709.

Yarzebski, J., Goldberg, R. J., Gore, J. M., & Alpert, J. S. (1994). Temporal trends and factors associated with extent of delay to hospital arrival in patients with acute myocardial infarction: the Worcester heart attack study. *American Heart Journal*, *128*(2), 255–263.