The Effect of Public Service Advertising on Cardiovascular Disease in Korea

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(Received 08 Aug 2015; accepted 22 Dec 2015)

Abstract

Background: Public Service Advertising (PSA) is a public interest message disseminated in the form of an advertisement communication and its main purpose is to promote public behavioral changes regarding a social issue. Korea Centers for Disease Control and Prevention (KCDC) has been delivering PSA by various media. However, the effect of PSAs has never been evaluated. The purpose of this study was to estimate the effects of broadcasted PSA produced by KCDC on cardiovascular disease (CVD).

Methods: One thousand adult participants throughout 15 provinces in Korea were chosen through the quota sampling method in 2012. A face-to-face research survey with 13 questions was conducted using a Computer Assisted Personal Interview (CAPI) system. Previous exposure to the PSA message, understanding, and behavioral intention to change was assessed.

Results: After watching the PSA, about 75% of participants answered that they could understand the contents well and 70% had willingness to change their behaviors associated with CVD. However, only 24% of participants answered they watched the PSA during the past year.

Conclusion: The PSA had positive effects on increasing the level of understanding and intention to change behaviors regarding CVD. However, the level of exposure was low. KCDC should make an effort to increase the public exposure level, which could be an important success factor regarding the PSA. In addition, KCDC should consider customized PSA for vulnerable people such as multi-cultural families, the disabled, and the elderly.

Keywords: Public service advertising, Cardiovascular disease, Exposure level, Understanding, Intention

Introduction

Public communication campaigns (PCCs) refer to an organized set of communication activities directed at large audiences in order to generate specific outcomes within a specified time period. The purpose of PCCs is to influence and change the behaviors of individuals (1-3). The most frequently used type of public communication campaign is the Public Service Advertising (or advertisement) (PSA) via mass media. PSAs are public interest messages disseminated in the form of an advertisement communication and are easily comprehensible and persuasive to promote behavioral changes of the public towards a social issue (4, 5). PSA can act as a window to increase knowledge about a particular issue related to the public because it can play an important role as an in-
formant or a carrier for the viewers to change their attitude (6). In addition, unlike commercial advertisements that mainly focus on creating "product images" and inducing "purchasing the product", PSA concentrates on actual behavioral change through information. Eventually, if it is possible to enhance the effect of PSA that stimulates behavioral change, then PSA can be used as an important tool to achieve social objectives.

"Cardiovascular disease (CVD) refers to a wide variety of heart and blood vessel diseases, including coronary heart disease, stroke, and peripheral artery disease. CVD is of paramount public health importance because it is widespread across the world and can potentially be prevented" (7). In response, the Korea Centers for Disease Control and Prevention (KCDC) has been delivering PSA by various media sources in order to improve awareness about cardiovascular disease, to correct behaviors, and to educate and promote prevention management regarding pre-existing diseases.

Community campaign or education including PSA was an effective way to reduce the risks of CVD (8-14). In particular, there have been landmark projects such as the Stanford Heart Disease Prevention Project in the United States (8, 9) and The North Karelia Project in Finland (11-14) showing substantial improvement in CVD risk factors as a result of PSA. Unfortunately, in Korea, PSA is in a premature stage, therefore, the effect of PSAs has never been evaluated.

The purpose of this study was to assess the effectiveness of the PSA on cardiovascular disease through surveying, with the goal of understanding the following three factors; 1) How many people have watched the advertisement (exposure level), 2) How well people understood the message (level of understanding), and 3) Whether people became willing to change their behavior after watching the PSA.

Methods

Sample and collection methods
This research involved surveying 1,000 male and female adults who were age 19 yr or over throughout 15 provinces in Korea (excluding Jeju Province), using the quota sampling method based on gender, age and population proportions in each province (±3.1% margin of error at a 95% confidence level). The survey was performed from the 15th of Mar until the 10th of Apr 2012, about four wk.

This study was exempted from the approval by the institutional review board of Seoul National University Boramae Medical Center (IRB No. 07-2015-3).

A CAPI (computer-assisted personal interview) survey system was used in which enumerators conduct face-to-face interviews using notebook computers in order to show video format advertisement.

Advertisement contents
The PSA used in this research to assess the effectiveness of PSA, "the Silent Killer" (15). The main message was ‘preventing and managing cardiovascular disease by quitting or not smoking.’ This advertisement was delivered from the 1st of Nov until the 31st of Dec in 2011 (for two mo). This advertisement, which was 44 sec in length, improved attention span thorough video contents containing descriptive and emotional expressions similar to movie trailers. It stimulated willingness to prevent and manage cardiovascular disease by using gunshot noises and depicting to shoot the heads and hearts of actors with an intention to use the notion of danger in smoking (threat appeal). The descriptive content was narrated by a specialist from a related medical society, “The chance of cardiovascular disease can be reduced by half if you quit smoking for even one year only”. At the end of the advertisement, the actors were still being targeted but they easily dodged the bullets, ending the advertisement positively and showing the ‘Red Circle Campaign’ scene, symbolizing a healthy blood vessel.

Research tools
The primary method of approach for assessing effectiveness of PSA uses SMCRE (Source-Message-Channel-Receiver-Effect) derived by Lasswell, 1948 (16). This method can assess the effectiveness of PSA based on exposure to the
message, understanding of the message and the actual actions of the viewer from the point of receiving the message to the point of actual behavioral change.

**Analytical Methods**

The general characteristics of subjects were analyzed using frequency and percentage. The level of exposure, understanding, and intention to change was analyzed by the chi-square test using the PASW Statistics 18.0 program. The statistical significance level of this research was set at 0.05.

**Results**

**General characteristics**

Table 1 shows the summary demographic information about the 1,000 survey participants including sex, age, region, education level, monthly income, marital status, and occupation.

| Characteristics                          | Classification          | Frequency (Number of persons) | Proportion (%) |
|-----------------------------------------|-------------------------|-------------------------------|----------------|
| Total                                    |                         | 1000                          | 100            |
| Sex                                      | Male                    | 493                           | 49.3           |
|                                          | Female                  | 507                           | 50.7           |
| Age                                      | 19~44                   | 508                           | 50.8           |
|                                          | 45~64                   | 390                           | 39.0           |
|                                          | 65 and Older            | 102                           | 10.2           |
| Region                                   | Seoul & Vicinity        | 499                           | 49.9           |
|                                          | Chungcheong             | 103                           | 10.3           |
|                                          | Gyeongsang              | 265                           | 26.5           |
|                                          | Honam                   | 103                           | 10.3           |
|                                          | Gangwon                 | 30                            | 3.0            |
| Education                                | High School or less     | 584                           | 58.4           |
|                                          | College or higher       | 416                           | 41.6           |
| Average Monthly Household Income         | Less than 4 million KRW| 635                           | 63.5           |
|                                          | 4 million KRW or Above  | 365                           | 36.5           |
| Marital Status                           | Married                 | 756                           | 75.6           |
|                                          | Not Married             | 244                           | 24.4           |
| Occupation                               | White Collar            | 183                           | 18.3           |
|                                          | Blue Collar             | 451                           | 45.1           |
|                                          | Housewife               | 223                           | 22.3           |
|                                          | Other                   | 143                           | 14.3           |
| Smoking per day                          | Less than ten cigarettes| 71                            | 7.1            |
|                                          | 11-19 cigarettes        | 36                            | 3.6            |
|                                          | More than one pack      | 131                           | 13.1           |
|                                          | Non-smoker              | 762                           | 76.2           |
| Knowledge level about the disease        | Low                     | 111                           | 11.1           |
|                                          | High                    | 889                           | 88.9           |
| Experience with the disease              | First-hand              | 125                           | 12.5           |
|                                          | Close people            | 316                           | 31.6           |
|                                          | No experience           | 559                           | 55.9           |

**The exposure level of the PSA by general characteristics**

After watching the PSA, study participants were asked whether they had previously seen the CVD advertisement and 239 (23.9%) people said ‘yes’, and 761 (76.1%) people said ‘no’ to the question. The exposure level in the Gangwon (40.0%) and Gyeongsang (31.1%) area was relatively high and the Honam area was low (16.5%) \(P=0.028\). The groups with low exposure levels \(P<0.05\) also...
included individuals with an average household income less than 4 million KRW (21.4%), non-married (18.4%), and low level of knowledge (15.3%) (Table 2).

Table 2: The exposure level of the PSA by general characteristics

| Characteristics                          | Classification |
|------------------------------------------|----------------|
|                                          | Yes            | No             | Total         | P-value |
| Have you watched the advertisement? Yes/No|                |                |               |         |
| Male                                     | 108 (21.9)     | 385 (78.1)     | 493 (49.3)    | .145    |
| Female                                   | 131 (25.8)     | 376 (74.2)     | 507 (50.7)    |         |
| Age 19~44                                | 109 (21.5)     | 399 (78.5)     | 508 (50.8)    | .080    |
| Age 45~64                                | 108 (27.7)     | 282 (72.3)     | 390 (39.0)    |         |
| 65 and Older                             | 22 (21.6)      | 80 (78.4)      | 102 (10.2)    |         |
| Region Seoul & Vicinity                  | 120 (24.0)     | 379 (76.0)     | 499 (49.9)    | .028*   |
| Chungcheong                              | 58 (21.9)      | 207 (78.1)     | 265 (26.5)    |         |
| Gyeongsang                               | 32 (31.1)      | 71 (68.9)      | 103 (10.3)    |         |
| Honam                                    | 17 (16.5)      | 86 (83.5)      | 103 (10.3)    |         |
| Gangwon                                  | 12 (40.0)      | 18 (60.0)      | 30 (3.0)      |         |
| Education High School or less            | 142 (24.3)     | 442 (75.7)     | 584 (58.4)    | .715    |
| College or higher                        | 97 (23.3)      | 319 (76.7)     | 416 (41.6)    |         |
| Average Monthly Household Income Less    | 136 (21.4)     | 499 (88.6)     | 635 (63.5)    | .015*   |
| than 4 million KRW                       |                |                |               |         |
| 4 million KRW or Above                   | 103 (28.2)     | 262 (81.8)     | 365 (36.5)    |         |
| Marital Status                           |                |                |               |         |
| Married                                  | 194 (25.7)     | 562 (74.3)     | 756 (75.6)    | .022*   |
| Not Married                              | 45 (18.4)      | 199 (81.6)     | 244 (24.4)    |         |
| Occupation                               |                |                |               |         |
| White Collar                             | 49 (26.8)      | 134 (73.2)     | 183 (18.3)    | .075    |
| Blue Collar                              | 94 (20.8)      | 357 (79.2)     | 451 (45.1)    |         |
| Housewife                                | 65 (29.1)      | 158 (70.9)     | 223 (22.3)    |         |
| Other                                    | 31 (21.7)      | 112 (78.3)     | 143 (14.3)    |         |
| Smoking per day                          |                |                |               |         |
| Non-smoker                               | 192 (25.2)     | 570 (74.8)     | 762 (76.2)    | .292    |
| Less than ten cigarettes                 | 16 (22.5)      | 55 (77.5)      | 71 (7.1)      |         |
| 11-19 cigarettes                         | 8 (22.2)       | 28 (77.8)      | 36 (3.6)      |         |
| More than one pack                       | 23 (17.6)      | 108 (82.4)     | 131 (13.1)    |         |
| Knowledge level about the disease        |                |                |               |         |
| Low                                      | 17 (15.3)      | 94 (84.7)      | 111 (11.1)    | .024*   |
| High                                     | 222 (25.0)     | 667 (75.0)     | 889 (88.9)    |         |
| Experience with the disease              |                |                |               |         |
| First-hand                               | 35 (28.0)      | 90 (72.0)      | 125 (12.5)    | .514    |
| Close people                             | 73 (23.1)      | 243 (76.9)     | 559 (55.9)    |         |
| No experience                            | 131 (23.4)     | 428 (76.6)     | 559 (55.9)    |         |

*P<0.05, **P<0.001, chi-square test

Channels to expose the PSA

We investigated which media is the most common contact channel for exposure to the PSA among the 239 participants who saw the PSA before. It was seen via major TV broadcasting companies (KBS, MBC, SBS) by 82% of participants, followed by cable TV (24.7%). The other media sources occupied very small portions: exterior electronic billboard on buildings (4.6%); internet (4.2%); PDPs at health centers and hospitals (2.1%); subway (1.3%); and others (0.8%) (Table 3).
The level of understanding after watching the PSA

After the participants watched the PSA, we estimated whether the content of the PSA was understandable or not. About 75% of people had a high level of understanding. Educational background (P=0.038) and knowledge level about the disease (P=0.045) affected the level of understanding (P<0.05). In addition, age group (P=0.005), household income (P=0.001), and previous exposure to the advertisement (P<0.0001) were statistically significant variables (Table 4).

Table 3: Contact channels for the PSA (n=239 persons, multiple answers allowed)

| Channels for advertisement contact             | Frequency (number of persons) | Percentage | Case percentage (%) |
|------------------------------------------------|------------------------------|------------|---------------------|
| Major TV (KBS, MBC, SBS) stations              | 196                          | 68.5       | 82.0                |
| Cable TV stations                              | 59                           | 20.6       | 24.7                |
| Exterior electronic billboards on buildings    | 11                           | 3.8        | 4.6                 |
| Subway                                         | 3                            | 1.0        | 1.3                 |
| PDPs at health center and hospitals            | 5                            | 1.7        | 2.1                 |
| Internet                                       | 10                           | 3.5        | 4.2                 |
| Others                                         | 3                            | 0.7        | 0.8                 |
| Total                                          | 286                          | 100        |                      |

Table 4: The level of understanding after watching on the PSA

| Characteristics                                | Classification   | Effect of advertisement (Level of understanding) | Total | P-value |
|------------------------------------------------|------------------|--------------------------------------------------|-------|---------|
|                                                 |                  | Low (Frequency) | High (Frequency) | Total (Percentage) |
| Total                                          |                  | 255 (25.5)    | 745 (74.5)     | 1000 (100)       | .967   |
| Sex                                            | Male             | 126 (25.6)    | 367 (74.4)     | 493 (49.3)       | .976   |
|                                                | Female           | 129 (25.4)    | 378 (74.6)     | 507 (50.7)       |        |
| Age                                            | 19–44            | 138 (27.2)    | 370 (72.8)     | 508 (50.8)       | .005** |
|                                                | 45–64            | 81 (20.8)     | 309 (79.2)     | 390 (39.0)       |        |
| Region                                         | Seoul & Vicinity | 127 (25.5)    | 372 (74.5)     | 499 (49.9)       | .963   |
|                                                | Gyeongsang       | 70 (26.4)     | 195 (73.6)     | 265 (26.5)       |        |
|                                                | Honam            | 26 (25.2)     | 77 (74.8)      | 103 (10.3)       |        |
|                                                | Chungcheong      | 26 (25.2)     | 77 (74.8)      | 103 (10.3)       |        |
|                                                | Gangwon          | 6 (20.0)      | 24 (80.0)      | 30 (3.0)         |        |
| Education                                      | High School or less | 163 (27.9) | 421 (72.1) | 584 (58.4) | .038* |
|                                                | College or higher | 92 (22.1)    | 324 (77.9)     | 416 (41.6)       |        |
| Average Monthly Household Income               | Less than 4 million KRW | 185 (29.1) | 450 (70.9) | 635 (63.5) | .001** |
|                                                | 4 million KRW or Above | 70 (19.2) | 295 (80.8) | 365 (36.5) |        |
| Marital Status                                 | Married          | 187 (24.7)    | 569 (75.3)     | 756 (75.6)       | .329   |
|                                                | Not Married      | 68 (27.9)     | 176 (72.1)     | 244 (24.4)       |        |
| Occupation                                     | White Collar    | 44 (24.0)     | 139 (76.0)     | 183 (18.3)       | .331   |
|                                                | Blue Collar      | 119 (26.4)    | 332 (73.6)     | 451 (45.1)       |        |
|                                                | Housewife        | 49 (22.0)     | 174 (78.0)     | 223 (22.3)       |        |
|                                                | Other            | 43 (30.1)     | 100 (69.9)     | 143 (14.3)       |        |
| Smoking per day                                | Non-smoker       | 199 (26.1)    | 563 (73.9)     | 762 (76.2)       | .437   |
|                                                | Less than ten cigarettes | 20 (28.2) | 51 (71.8) | 71 (7.1) |        |
|                                                | 11-19 cigarettes | 10 (27.8)     | 26 (72.2)      | 36 (3.6)         |        |
|                                                | More than one pack | 26 (19.8) | 105 (80.2) | 131 (13.1) |        |
| Knowledge level about the disease              | High             | 218 (24.5)    | 671 (75.5)     | 111 (11.1)       | .045*  |
|                                                | Low              | 37 (33.3)     | 74 (66.7)      | 889 (88.9)       |        |
| Previously viewed the advertisement            | Yes              | 40 (16.7)     | 199 (83.3)     | 239 (23.9)       | .000*  |
|                                                | No               | 215 (28.3)    | 546 (71.7)     | 761 (76.1)       | .259   |
| Experience with the disease                    | First-hand       | 25 (20.0)     | 100 (80.0)     | 125 (12.5)       |        |
|                                                | Close people     | 79 (25.0)     | 237 (75.0)     | 316 (31.6)       |        |
|                                                | No experience    | 151 (27.0)    | 408 (73.0)     | 559 (55.9)       |        |

*P<0.05, **P<0.001, chi-square test
**Intention to behavioral change after watching on the PSA**

After watching the PSA, 70% of participants answered that they had willingness to change their behaviors. The following groups had a higher intention of behavioral changed than other groups (P<0.05): aged 45 to 64, married, high level of understanding the PSA, and high knowledge level about CVD (Table 5).

| Characteristics              | Classification     | Do not have intention (%) | Have intention (%) | Total   | P-value |
|------------------------------|--------------------|----------------------------|--------------------|---------|---------|
| Total                        |                    | 300 (30.0)                 | 700 (70.0)         | 1000 (100) | .793    |
| Sex                          | Male               | 146 (29.6)                 | 347 (70.4)         | 493 (49.3) |        |
|                              | Female             | 154 (30.4)                 | 353 (69.6)         | 507 (50.7) |        |
| Age                          | 19~44              | 177 (34.8)                 | 331 (65.2)         | 508 (50.8) | .001**  |
|                              | 45~64              | 90 (23.1)                  | 300 (76.9)         | 390 (39.0) |        |
| 65 and Older                 |                    |                            |                    |         |         |
|                              | Seoul & Vicinity   | 139 (27.9)                 | 360 (72.1)         | 499 (49.9) | .461    |
|                              | Gyeonggak          | 89 (33.6)                  | 176 (66.4)         | 265 (26.5) |        |
|                              | Honam              | 32 (31.1)                  | 71 (68.9)          | 103 (10.3) |        |
|                              | Chungcheong        | 33 (32.0)                  | 70 (68.0)          | 103 (10.3) |        |
|                              | Gangwon            | 7 (23.3)                   | 23 (76.7)          | 30 (3.0)  |        |
| Region                       | High School or less| 168 (28.3)                 | 416 (71.2)         | 584 (58.4) | .313    |
|                              | College or higher  | 132 (31.7)                 | 284 (68.3)         | 416 (41.6) |        |
| Average Monthly Household Income | Less than 4 million KRW | 197 (31.0)             | 438 (69.0)         | 653 (63.5) | .351    |
|                              | 4 million KRW or Above | 103 (28.2)            | 262 (71.8)         | 365 (36.5) |        |
| Marital Status               | Married            | 207 (27.4)                 | 549 (72.6)         | 756 (75.6) | .001**  |
|                              | Not Married        | 93 (38.1)                  | 151 (61.9)         | 244 (24.4) |        |
| Occupation                   | White Collar       | 54 (29.5)                  | 129 (70.5)         | 183 (18.3) | .083    |
|                              | Blue Collar        | 136 (30.2)                 | 315 (69.8)         | 451 (45.1) |        |
|                              | Housewife          | 56 (25.1)                  | 167 (74.9)         | 223 (22.3) |        |
|                              | Other              | 54 (37.8)                  | 89 (62.2)          | 143 (14.3) |        |
| Smoking per day              | Non-smoker         | 255 (29.5)                 | 537 (70.5)         | 762 (76.2) | .492    |
|                              | Less than ten cigaretes | 27 (38.0)              | 44 (62.0)          | 71 (7.1)  |        |
|                              | 11-19 cigarettes   | 10 (27.8)                  | 26 (72.2)          | 36 (3.6)  |        |
| Knowledge level about the disease | More than one pack | 38 (29.0)                  | 93 (71.0)          | 131 (13.1) |        |
|                              | High               | 250 (28.1)                 | 639 (71.9)         | 889 (88.9) | .000**  |
|                              | Low                | 50 (45.0)                  | 61 (55.0)          | 111 (11.1) |        |
| Level of understanding       | Low                | 174 (68.2)                 | 81 (31.8)          | 255 (25.5) | .000**  |
|                              | High               | 126 (16.9)                 | 619 (83.1)         | 745 (74.5) |        |
| Experience with the disease  | First-hand         | 28 (22.4)                  | 97 (77.6)          | 125 (12.5) | .138    |
|                              | Close people       | 97 (30.7)                  | 219 (69.3)         | 316 (31.6) |        |
|                              | No experience      | 175 (31.3)                 | 384 (68.7)         | 559 (55.9) |        |

*P<0.05, **P<0.001
Discussion

Little is known about the effect of the PSA on CVD in Korea, broadcasted since 2006. In our research, we estimated the level of exposure, understanding, and intention of behavioral change among 1,000 people who were representatives of the Korean population. This study showed that the PSA had positive effects on increasing viewers' level of understanding and intention of behavioral changes regarding CVD. However, the level of exposure was low (24%).

The ultimate goal of PSAs is to achieve a change in attitude or behavior among viewers. To do so, the first step is to increase exposure to the message among the intended viewers (17). However, only 24% of respondents had previously seen the advertisement. Researchers in advertising suggest that a minimum theoretical number of impressions are required in order to impact consumer purchase of all products and brands. For cigarettes, each smoker needs to be exposed to a TV commercial 16 times in order to stimulate their purchase reaction (18). Besides, one research study revealed a campaign was effective among 45% of targeted viewers who received repetitive exposures (at least three repetitive exposures for media including TV, radio and newspaper; and at least twelve exposures for exterior billboard advertisements) (19). KCDC should consider how to increase the current exposure rate from 24% to 45%. First of all, the strategy and planning about the PSA on CVD should be reviewed. According to our study, major TV and cable TV stations were the most common contact channel from which people recognized the PSA. Other media occupied a negligible proportion. Therefore, KCDC should focus on TV channels for maximizing the effect of the PSA. Of course, we understand that KCDC is suffering from a limited budget. However, advertisement draws a wasteful result with no effect whatsoever if the minimum repetitive exposure is not achieved. That is, KCDC needs to select the media source that viewers frequently use to ensure the minimum number of exposures. Increased exposure would affect attitudes and actions through increased access to information. Therefore, effective strategy and budget consideration are necessary in order to broadcast the PSA during peak view times so that PSA campaigns are successfully broadcasted to most people in the nation (20). In addition, PSA should be continuous over a long period of time along with a series of communication actions integrated under a clear objective (21). Another thing KCDC should consider is making a customized plan to disseminate the PSA across the country. Our results show that non-married people (18.4%) and Honam region (16.5%) had relatively low exposure levels. In the case of non-married group, they are mostly part of the young generation that may prefer mobile messaging as a contact channel. That is, KCDC could consider mobile PSA as a customized method to reach young generations. Regarding geographical variation of exposure level, we did not investigate why Honam region showed a low exposure level. Therefore, further study is needed to identify what factors are affecting the exposure level.

Regarding the level of understanding, 75% of respondents answered that it was easy to understand the contents of the PSA. However, we should be cognizant of the groups that showed a low level of understanding, such as the elderly (64.7%), people with a low level of education (72.1%), people with a low level of household income (70.9%), and people with a low level of knowledge regarding CVD (66.7%). For the groups who have a low level of understanding, enforcing pilot testing could be a solution because pilot test helps PSA developers understand which part of the PSA is losing viewers' attention or is hard to understand. Therefore, pilot test is thought to be important for a successful outcome by ensuring that the target audience can comprehend the specific message presented (22, 23). In addition, KCDC could consider using the concept of "Need for Cognition" when developing another PSA in the future. "Need for cognition" can be defined as the degree of willingness for voluntary acceptance in a given situation requiring cognitive efforts. People with higher cogni-
tive needs put more effort into remembrance and cognition when receiving a persuading message and have more motive to willingly process the message, consequently affecting their attitudes regarding the message assessment being formed after the persuasion (24). Therefore, if the PSA stimulates the viewers’ need for cognition, it could improve their level of understanding the PSA. Lastly, 70% of participants showed a high intention for behavioral change after watching the PSA on CVD. Interestingly, the group with a low level of understanding had extremely low intention (31.8%) to change their behaviors. That is, level of intention might be higher when viewers can easily understand the PSA and the level of understanding could improve by increasing exposure frequency.

This research has the following limitations. First, there is a possibility for inaccurate survey answers due to individuals’ memory loss and confusion as the survey was conducted after showing the advertisement and was based on remembering the content. Second, the PSA on CVD might induce behavioral change. However, we could not estimate the real level of behavioral change but instead only estimated the level of intention to change behaviors. Therefore, further research should be performed to evaluate the real effect of the PSA on behavioral change. Third, we did not perform multivariate analysis to reveal the factors affecting exposure, understanding, and intention of behavioral change but we did conduct univariate analysis using the chi-square test. However, in the near future, further studies should be conducted to define what factors are related to the level of exposure, understanding, and intention of behavioral change. Lastly, we excluded people who are a multi-cultural family member because they could not understand Korean language very well. Therefore, the level of exposure and understanding might be slightly reduced than the results of this study. Despite of these limitations, we believe this research can provide meaningful information to policy makers.

Conclusions

The PSA had a positive effect on increasing the level of understanding and intention of behavioral changes regarding CVD. However, the level of previous exposure was low. Therefore, KCDC should make an effort to increase the exposure level, which could be an important success factor regarding the PSA. In addition, KCDC should consider customized PSA that is easily understandable by vulnerable people such as multi-cultural families, the disabled, and the elderly.

Ethical considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

Acknowledgement

Data of this study is a part of a master’s degree dissertation. The authors have no financial conflicts of interest. The authors declare that there is no conflict of interests.

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