Affective stimuli in behavioural interventions soliciting for health check-up services and the service users’ socioeconomic statuses: a study at Japanese pachinko parlours

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Editor’s note

The study reported in this article examines a health intervention that uses gendered stereotypes of the nursing profession and suggestive uniforms that play on women’s sexuality to encourage people to engage in health checkups. The intervention was not under the control of the authors and the study was approved by an institutional research ethics board. The Journal of Epidemiology & Community Health condemns the use of sexism, gender and professional stereotypes and other forms of discriminatory or exploitative behaviour for any purpose, including health promotion programs. In light of concerns raised about this paper (see eLetters with this paper), we are conducting an audit of our review process and will put in place measures to ensure that the material we publish condemns sexism, racism and other forms of discrimination and embodies principles of inclusion and non-discrimination.

ABSTRACT

Background Socioeconomically vulnerable people are likely to have more health risks because of inadequate behaviour choices related to chronic social stresses. Brain science suggests that stress causes cognitively biased automatic decision making, preferring instant stress relief and pleasure (eg, smoking, alcohol use and drug abuse) as opposed to reflectively seeking health-maintenance services (eg, health check-ups). As such, hedonic stimuli that nudge people towards preventive actions could reduce health behaviour disparities. The purpose of this intervention study was to test this hypothesis.

Methods An instant health check-up service company had 320 health check-up sessions at pachinko (Japanese gambling) parlours; 1721 persons in intervention sessions and 6507 persons in control sessions received the service. The stimuli the company used in the intervention sessions were young women wearing mildly erotic nurse costumes, who solicited the pachinko players for health check-up services. We compared the prevalence of socioeconomically vulnerable individuals between the intervention and control sessions, adjusting for individual-level and parlour-level potential confounders.

Results Even adjusting for health risks and within-parlour clustering, the intervention sessions gathered more socioeconomically vulnerable customers than the regular sessions. Compared with control sessions, in intervention sessions the adjusted prevalence ratios were 1.15 (95% CI 0.99 to 1.35) for not having a job (vs having a job) and 1.36 (95% CI 1.00 to 1.86) for holders of National Health Insurance (which includes more socially vulnerable people than other insurance programmes).

Conclusion The results supported our hypothesis. Offering health check-up opportunities equipped with ‘tricks’ that nudge people to act might be effective for anyone but is potentially more valuable for socially vulnerable people. Ethical discussions are needed to further consider the use of erotic stimuli and other essential drivers of human behaviour.

INTRODUCTION

Every year, millions die by non-communicable diseases globally. Diabetes, cardiovascular disease, lung disease and cancer—the four most prevalent non-communicable diseases—are key targets of recent global health activities. Many non-communicable diseases are associated with human behaviours. Therefore, public health promoters should target daily personal choices concerning diet, physical activity, consumption of tobacco and alcohol and the utilisation of healthcare services. Public health campaigns have aimed to increase individuals’ awareness of the risks of inadequate behaviours, expecting them to make healthier choices in reflective ways. However, recent systematic reviews suggest that these campaigns are not effective or only have small effects.

There are two pillars in the goals of public health: improving overall population health and reducing health disparity across social classes. Evidence suggests that most diseases, both communicable and non-communicable, are more prevalent among socioeconomically vulnerable populations in terms of income/wealth, education and work. This is because inadequate health behaviours are also more prevalent among them. There are two alternative mechanisms that potentially cause inadequate health behaviour among the socially vulnerable: materialistic and psychosocial. First, impoverished people are materially deprived, having limited access to necessary goods and services to maintain their health. Second, chronic daily stressors due to...
socioeconomic hardship (eg, financial insecurity, job insecurity or inadequate social comparisons against wealthier peers) may cause worry, frustration and anger, and alter health behaviours. Studies in social psychology and behavioural economics suggest that psychosocial stressors and the relevant negative emotions may strengthen cognitive biases for one’s preferences towards temporality and risks, resulting in short-sighted decisions. The effects of strong cognitive biases mirror the higher prevalence of hedonic and addictive behaviours, including tobacco, alcohol and drug use, among socially disadvantaged populations.12–5

Given this theoretical and empirical evidence, health-promoting interventions aiming to reduce health disparities may perform better by targeting the automatic decision-making processes that, in theory, contribute more to socially vulnerable people. However, evidences on the effectiveness of those interventions regarding reducing health disparities are lacking. Recent studies have suggested potential triggers of automatic choices, including financial incentives, positive affect, peer pressures and hedonic or sexual attraction.6–10 In this study, we specifically focused on positive affect (ie, a positive feeling state induced by modest positive events).9 More specifically, we evaluated the effects of a sexually attractive young woman soliciting actions as a potential strong stimulus triggering behaviour change. Erotic stimuli can be a strong cue to action, given its inherent stemming from human evolution.11

In this clustered, non-randomised controlled study, we tested this idea using real-world data: the data of the customers who obtained instant health check-up services at Japanese pinball (‘pachinko’) parlours, where there were many adults who were engrossed in an arcade game. In the intervention sessions, female staff members wore mildly erotic nurse costumes (ie, short skirts and typical nurse caps, figure 1). We hypothesised that, compared with regular health check-up sessions, socially vulnerable customers may be more likely to obtain health check-ups in the intervention sessions. Since the solicitation was performed by a young female in this intervention, we believed the effect would be stronger for male pachinko players than for female players.

METHODS

Data

We used individual data from 8485 customers who used instant health check-up services at Japanese pinball parlours. The private company provided instant health check-up services. They provide these services at their own retail shops as well as mobile service sessions at alternative locations, such as shopping malls, local marketplaces and metro rail stations, which are frequented by many socially vulnerable people. The pachinko parlour is one such place. Pachinko is a type of commercial amusement arcade game originating in Japan. A player snaps small metal balls, and the balls cascade down a vertically set board with densely nailed pins. The balls may be captured by a jackpot or bingo, resulting in the release of more balls. Players try to collect as many balls as possible since each ball has value and players can exchange them for prizes. Many pachinko parlours also have slot machines. The pachinko market is large, with reported earnings of 34.862 billion yen in 2005.12 Like any form of gambling, pachinko has long been discussed concerning its strong link with addiction.13

The intervention

Between 2011 and 2013, the company operated 320 health check-up sessions at 110 pachinko parlours. To overcome the problem that pachinko players were not interested in the health services, in 63 sessions, the company hired young female staff members from temporary staff service companies (intervention sessions). To solicit customers, in intervention sessions these female staff members wore sexually attractive nurse costumes. In other sessions (control sessions), the staffs wore ordinary suits or regular medical white coats. The average number of staffs in a session was not systematically different between the intervention and control sessions, with one company staff who dealt with reception and health check-up services, and a few other staffs who solicited customers. The solicitation staffs wore nurse costumes in the intervention sessions. We thought that solicitation by the costumed young women might trigger individuals to take the examination due to automatic cognitive processes that shortcut reflective cost considerations.

These sessions comprised normal business activities, and no special arrangements were made for the sake of this study. The researchers did not provide financial subsidies to the company or the customers. Hence, the funding for the present study was used for data analysis and manuscript preparation.

Measurements

Socioeconomic status (SES). In the check-up sessions, customers responded to a brief, self-reported questionnaire that asked for information related to SES: occupational status and type of public health insurance. We generated two binary outcome variables representing having no job (vs have a job) and using National Health Insurance Services (NHIS) (vs other insurance types) as representing low SES. Japan has universal

Figure 1 Differences in staff costumes between the intervention and control sessions. (A) Intervention: with young female staffs wearing short-skirted nurse costumes (B) Control: with nurses and staffs dressed normally.
public healthcare insurance coverage based on multiple insurance schemes. Among them, NHIS mainly targets the self-employed or those without jobs, who are likely to be less socially privileged. Occupation was categorised as no job, home maker, part-time job, employee, self-employed, business manager, student or other. We dichotomised this variable as ‘no job’ or ‘other’.

Covariates
From the information provided by the firm, we used age, time since last health check-up (years) and biomarkers from blood samples, including serum triglyceride, serum total cholesterol and fast blood glucose. For time since last check-up, we asked, “When did you get your last health check-up?” Response options were within 1 year, 1–3 years, 4–9 years and 10 years or more. We dichotomised this variable as ‘0–3 years’ or ‘4 years or more’. Using dry blood spot sampling, blood tests were conducted by the customers themselves under staff guidance. The results were immediately reported and recorded in the database. The company staff members calibrated the blood test devices at the beginning of the daily sessions.

Statistical analysis
First, we evaluated differences in the basic characteristics of customers who used the services between the intervention and control groups using a $X^2$ test, a t-test or a Wilcoxon test, where appropriate. Since we only had access to the data of those who used the health check-up service, we could not calculate the odds of using the health check-up service among pachinko customers. Then, following a recent statistical recommendation, we used Poisson regression and calculated the prevalence ratios (PRs) of customers with poor SES in the check-up sessions using nurse costumes (intervention) against regular sessions (control). When modelling covariates, the three biomarkers from the blood samples were log-transformed and standardised to normalise right-skewed distributions. Since data availability for the health check-up items depended on the customer’s choice, some data were missing. To address potential biases due to missing data, we employed multiple imputation, creating 100 fully imputed datasets and statistically combining them to obtain the estimates of interest. Following recent statistical guidelines, we used expectation-maximisation with a bootstrapping algorithm. We adjusted for within-parlour clustering, employing parlour random effects in the generalised estimating equation. For a robustness check, we conducted a sensitivity analysis based on the application of multiple imputation procedures (only data with complete cases or imputed) and clustering adjustments. We conducted both sex-combined and sex-stratified analyses. All P values were two-tailed. All analyses were conducted with the statistical package R V.3.3.2 for Windows.

Patient involvement
No patients were involved in setting the research question or the outcome measures, nor were patients involved in planning the design or implementation of the study. No patients were asked for advice on the interpretation or presentation of the results.

RESULTS
In total, 1721 persons (986 men and 735 women) participated in the intervention sessions and 6507 persons (3436 men and 3071 women) participated in the control sessions. Additional characteristics of interest are shown in table 1.

The results of Poisson regression showed that, even after adjusting for multiple covariates, customers with a low SES, defined as having no job and using NHIS, were more prevalent in the intervention sessions. The fully adjusted PRs were 1.36 (95% CI 1.00 to 1.86) for NHIS holders and 1.15 (95% CI 0.99 to 1.35) for not having a job. When stratifying by gender, women showed somewhat larger PRs than men; the adjusted PR of NHIS holders was 1.45 among women and 1.32 among men, while the PRs for not having a job were 1.27 among women and 1.13 among men (table 2).

Sensitivity analyses using non-imputed (complete case) data provided stronger associations, specifically on the PRs for not having a job among women and weaker associations for women with NHIS (table 2). The full results of our sensitivity analysis are provided in online supplementary table S1.

DISCUSSION
The results supported our hypothesis: solicitation by young women wearing sexy nurse costumes to promote taking instant health check-up services gathered more socially disadvantaged pachinko players (ie, jobless or having NHIS). Interestingly, however, the finding was contradictory to our hypothesis on sex differences. That is, despite our expectations, the proportion of socially disadvantaged people in intervention sessions were larger among women rather than men, suggesting stronger disparity-reducing effects for women than men.

Many studies on behaviour economics and marketing have investigated the effects of various incentives on altering personal choices. Thaler and Sunstein’s seminal work suggests that ‘choice architecture’, which is nudging people towards specific personal choices, could be a powerful strategy for social innovations. In the field of public health, most studies relevant to that subject have dealt with financial incentives. A randomised controlled trial by Blakely et al tested the impacts of price discounts on healthy foods at supermarkets on the levels of healthy food purchasing per consumers’ socioeconomic disadvantages. They found ethnicity differences in the intervention effects, but none across income or education levels. To our knowledge, few studies have investigated the effects of other behavioural change triggers including non-financial incentives and positive affect on socioeconomic disparities in health behaviour. Therefore, this study is the first to investigate the impacts of sexual stimuli as a trigger of positive affect inducing healthy behaviour and their variations by SES.

Based on an appraisal tendency framework and theoretical models on affect and behaviour choice, the potential underlying mechanisms of our findings may be twofold. First, as mentioned in the introduction, psychosocial stressors due to socioeconomic hardships may strengthen cognitive biases and the automatic processes of affective decision making. Observational and interventional studies of impoverished Indian farmers suggest that poverty directly impedes cognitive ability, which prevents those of lower SES from making rational decisions (in this case, buying fertilisers). In our study, socially stressed persons may irrationally choose to pay for health check-up services regardless of their actual interests in health-maintaining behaviours, as they are simply attracted to the sexy costumed women. Alternatively, positive emotions such as happiness, pride, relief, hope, and surprise may enhance cognitive capacity and promote reflective decision making. In this study, positive environmental moods created by the costumed women may support pachinko players to understand the importance of health-improving behaviours, leading to the rational choice of obtaining a check-up.
In either case, the cue triggering the pachinko players’ action towards using the health check-up service was the solicitation by young women wearing sexually attractive nurse costumes. People are more likely to pay attention to targets of their sexual interest. According to recent neuroscientific studies, compared with women, men are more likely to have their cognitive ability influenced by women. Another study found that a picture of attractive women on an advertising letter promoting bank loans increased men’s attention by 25% compared with a letter with a picture of a reliable male agent. Therefore, we initially thought that the intervention sessions would be more powerful with male participants than their female counterparts. However, the results of this study did not support this, showing potentially stronger effects for socially vulnerable people.

### Table 1 Basic characteristics of those who took health check-ups by operation types

<table>
<thead>
<tr>
<th></th>
<th>Men Intervention</th>
<th>N (%)</th>
<th>Control</th>
<th>N (%)</th>
<th>P value</th>
<th>Men Intervention</th>
<th>N (%)</th>
<th>Control</th>
<th>N (%)</th>
<th>P value</th>
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<tbody>
<tr>
<td>Age (years)</td>
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<td>≤39</td>
<td>215 (21.8)</td>
<td>839 (24.4)</td>
<td>0.18</td>
<td>90 (11.3)</td>
<td>460 (15.0)</td>
<td>0.01</td>
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<td>40–59</td>
<td>323 (32.8)</td>
<td>1050 (30.6)</td>
<td></td>
<td>247 (31.1)</td>
<td>1004 (32.7)</td>
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<td>≥60</td>
<td>448 (45.4)</td>
<td>1547 (45.0)</td>
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<td>458 (57.6)</td>
<td>1607 (52.3)</td>
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<td>Socioeconomic status</td>
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<td>Type of health insurance programme</td>
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<tr>
<td>National Health Insurance</td>
<td>432 (69.1)</td>
<td>1164 (67.5)</td>
<td>0.46</td>
<td>385 (70.6)</td>
<td>1017 (64.1)</td>
<td>0.006</td>
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<tr>
<td>Other</td>
<td>193 (30.9)</td>
<td>560 (32.5)</td>
<td></td>
<td>160 (29.4)</td>
<td>569 (35.9)</td>
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<td>Job status</td>
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<tr>
<td>No job</td>
<td>225 (22.7)</td>
<td>659 (19.3)</td>
<td>0.01</td>
<td>104 (13.1)</td>
<td>249 (8.1)</td>
<td>&lt;0.001</td>
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<tr>
<td>Home maker</td>
<td>4 (0.4)</td>
<td>7 (0.2)</td>
<td></td>
<td>333 (41.9)</td>
<td>1220 (40.0)</td>
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<td>Part-time job</td>
<td>53 (5.3)</td>
<td>182 (5.3)</td>
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<td>94 (11.8)</td>
<td>349 (11.5)</td>
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<td>Employed, self-employed, manager</td>
<td>407 (41.0)</td>
<td>1602 (46.9)</td>
<td>0.04</td>
<td>97 (12.2)</td>
<td>434 (14.2)</td>
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<td>Student, other</td>
<td>304 (30.6)</td>
<td>967 (28.3)</td>
<td></td>
<td>166 (20.9)</td>
<td>795 (26.1)</td>
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<td>Last health check-up</td>
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<td>0–3 years ago</td>
<td>573 (81.9)</td>
<td>1958 (80.1)</td>
<td>0.30</td>
<td>78.53 (1693)</td>
<td>78.49(1)</td>
<td>0.98</td>
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<td>≥4 years ago</td>
<td>127 (18.1)</td>
<td>486 (19.9)</td>
<td></td>
<td>21.47 (464)</td>
<td>21.51 (0)</td>
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<td>Mean (SD)</td>
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<tr>
<td>Age</td>
<td>54 (16.2)</td>
<td>54 (17.3)</td>
<td>0.84</td>
<td>59.2 (13.9)</td>
<td>57.7 (15.7)</td>
<td>0.01</td>
<td></td>
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<tr>
<td>Last health check-up (years ago)</td>
<td>3.2 (4.3)</td>
<td>3.3 (4.5)</td>
<td>0.26</td>
<td>3.4 (4.4)</td>
<td>3.5 (4.6)</td>
<td>0.98</td>
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<tr>
<td>Serum cholesterol (mg/dL)</td>
<td>198.6 (41.4)</td>
<td>196.1 (36.1)</td>
<td>0.47</td>
<td>213.1 (39.7)</td>
<td>211.3 (39.4)</td>
<td>0.28</td>
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<tr>
<td>Serum triglycerides (mg/dL)</td>
<td>188.9 (124.2)</td>
<td>183.2 (126)</td>
<td>0.04</td>
<td>191.9 (162.6)</td>
<td>184.4 (126)</td>
<td>0.02</td>
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<tr>
<td>Serum glucose (mg/dL)</td>
<td>109.7 (100.9)</td>
<td>106 (38.7)</td>
<td>0.57</td>
<td>101.4 (31.4)</td>
<td>100.9 (26.4)</td>
<td>0.86</td>
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</tbody>
</table>

### Table 2 Prevalence ratio (95% CIs) of being of low socioeconomic status for those using health check-up services in intervention sessions (with nurse costumes) compared with control sessions (without nurse costumes)

<table>
<thead>
<tr>
<th></th>
<th>Complete case</th>
<th>Imputed*</th>
<th>Complete case</th>
<th>Imputed*</th>
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</thead>
<tbody>
<tr>
<td>All</td>
<td></td>
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<tr>
<td>Crude</td>
<td>1.37 (0.99, 1.88)</td>
<td>1.38 (1.00, 1.89)</td>
<td>1.26 (1.01, 1.57)</td>
<td>1.20 (0.98, 1.46)</td>
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<tr>
<td>Age-adjusted</td>
<td>1.34 (0.98, 1.83)</td>
<td>1.36 (1.00, 1.87)</td>
<td>1.22 (1.04, 1.43)</td>
<td>1.16 (0.99, 1.35)</td>
</tr>
<tr>
<td>Age, check-up history and biomarkers adjusted</td>
<td>1.32 (1.07, 1.63)</td>
<td>1.36 (1.00, 1.86)</td>
<td>1.31 (1.10, 1.55)</td>
<td>1.15 (0.99, 1.35)</td>
</tr>
<tr>
<td>Men</td>
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<tr>
<td>Crude</td>
<td>1.29 (0.89, 1.88)</td>
<td>1.30 (0.90, 1.88)</td>
<td>1.18 (0.88, 1.56)</td>
<td>1.16 (0.90, 1.50)</td>
</tr>
<tr>
<td>Model 1: age-adjusted</td>
<td>1.27 (0.87, 1.86)</td>
<td>1.30 (0.89, 1.89)</td>
<td>1.17 (0.94, 1.47)</td>
<td>1.14 (0.92, 1.40)</td>
</tr>
<tr>
<td>Age, check-up history and biomarkers adjusted</td>
<td>1.45 (1.09, 1.93)</td>
<td>1.29 (0.89, 1.88)</td>
<td>1.13 (0.88, 1.44)</td>
<td>1.13 (0.92, 1.39)</td>
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<tr>
<td>Women</td>
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<tr>
<td>Crude</td>
<td>1.46 (1.12, 1.91)</td>
<td>1.47 (1.13, 1.92)</td>
<td>1.50 (1.16, 1.93)</td>
<td>1.35 (1.07, 1.69)</td>
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<tr>
<td>Age-adjusted</td>
<td>1.43 (1.11, 1.84)</td>
<td>1.45 (1.12, 1.87)</td>
<td>1.37 (1.06, 1.76)</td>
<td>1.27 (1.01, 1.60)</td>
</tr>
<tr>
<td>Age, check-up history and biomarkers adjusted</td>
<td>1.19 (0.98, 1.46)</td>
<td>1.45 (1.12, 1.86)</td>
<td>1.87 (1.27, 2.75)</td>
<td>1.27 (1.01, 1.59)</td>
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</table>

*Prevalence ratios were calculated with Poisson regression adjusted for within-parlour clustering using parlour random effects.
We should acknowledge two potential criticisms of this research. First, this ‘sexy strategy’ could be harmful because it is addictive. Like other addictive unhealthy behaviours, including smoking and gambling, unnecessary repeating of health check-up services increases users’ financial burden. This could be more serious among the socially disadvantaged because many of them already have financial burdens due to other addictions (e.g., pachinko). Second, this strategy could be applied for health-harmful commercial services; for instance, selling ineffective ‘functional’ foods. Ethical discussions are critical to use erotic stimuli and other essential drivers of human behaviour. In this study, the trigger was young women wearing mildly erotic nurse costumes; however, alternative tools could be used and should be investigated in the future in various intervention settings.

This study has important implications for public health and applied behaviour sciences. A direct implication is that while offering health check-up opportunities equipped with ‘tricks’ that nudge people to act could be effective for anyone, they might be more valuable for socially vulnerable individuals. In public health theory, this is consistent with the concept of proportionate universalism for tackling health disparity, positing that ‘actions must be universal, but with a scale and intensity that is proportionate to the level of disadvantage’ (p. 15).31 We do not broadly recommend using mild sexual stimulus as an alternative measure to promote health equity. Rather, this research should be regarded a case study that investigated using the ‘nudge’ concept to address health disparity issues. We recommend that public health interventions aiming to tackle health disparities should give more consideration to the proper use of recent concepts and evidence from applied behaviour sciences.

### What is already known on this subject

- Mental stress due to social vulnerability induces affective and hedonic behaviour choices that often link to health risks.
- We hypothesise that affective but safe stimuli nudging people towards preventive actions may reduce health disparities.
- Mild sexual attraction could provide such stimuli.

### What does this study add

- Health check-up sessions with women wearing mildly erotic nurse costumes gathered more socially vulnerable people than ordinary sessions.
- Using techniques related to affective responses could be an alternative measure for promoting health equity.

### Acknowledgements

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### Contributors

NK conceived the ideas, gathered and analysed data, reviewed articles and drafted the manuscript. YI helped conceptualise the study, reviewed articles and drafted the manuscript.

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### Competing interests

None declared.

### Patient consent

Detail has been removed from this case description/these case descriptions to ensure anonymity. The editors and reviewers have seen the detailed information available and are satisfied that the information backs up the case the authors are making.
Research report

Ethics approval In all service sessions, the health check-up service company informed customers about the potential utilisation of the data obtained from their services for academic research. The company has regularly requested customers to submit this data-use agreement before providing services. We obtained data from individuals who provided written informed consent. Individual identification, including names and addresses, was removed before the data were sent to us. This study was approved by the Ethical Review Board of the Medical School at the University of Tokyo (No. 10481).

Provenance and peer review Not commissioned; externally peer reviewed.

Data sharing statement No additional data are available.

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REFERENCES