

Lifestyle determinants of behavioural outcomes triggered by direct-to-consumer advertising of prescription medicines: a cross-sectional study

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Advertising attempts to sell products by encouraging people to buy them. Medicine advertising similarly aims to persuade individuals to search or ask for a medicine.¹ Direct-to-consumer advertising of prescription medicines (DTCA), a controversial type of advertising, has grown swiftly over the past few decades.²⁻⁴ DTCA has only been legally developed in New Zealand and the United States.^{5,6} These two countries have different economies and health systems. New Zealand has mostly public healthcare and self-regulated DTCA.⁷ In New Zealand, advertisements are not independently evaluated for the quality and validity of scientific statements unless someone complains,⁸ and this system has not prevented misleading advertisements.⁹ Even in the United States, which has mostly privately-funded healthcare⁷ and DTCA is regulated and overseen by the Food and Drug Administration, violations by pharmaceutical companies are prevalent, predominantly for providing misleading information.¹⁰⁻¹³

DTCA both benefits and harms public health.¹⁴⁻¹⁶ Given that some medications are underused and some are overused, DTCA that increases prescribing may have positive or negative effects.¹⁶ DTCA can have positive outcomes when the disease to be treated is severe and the medicine is safe, effective and underused; whereas, when the condition is not serious and the medicine is potentially unsafe, less effective or overused, the effects

Abstract

Objective: Direct-to-consumer advertising of prescription medicines encourages individuals to search for or request advertised medicines, can stimulate taking medications rather than making lifestyle behaviour changes, and may target individuals with poorer demographic and socioeconomic status and riskier health-related behaviours. This study thus explored whether responses to medicine advertising vary as a function of lifestyle behaviours, and demographic and socioeconomic factors.

Methods: Data were collected through an online survey of a nationally representative sample of 2,057 adults in New Zealand. Multivariate binary logistic regressions were used to explore whether lifestyle behaviours, including nutritional habits, alcohol consumption, illegal drug consumption, physical activity, attitudes towards doing exercise, as well as demographic and socioeconomic status were associated with self-reported behavioural responses to medicine advertising.

Results: Individuals who had unhealthier lifestyle behaviours were more likely to respond to medicine advertising.

Conclusions: The findings raise concerns regarding the misuse or overuse of medications for diseases that may otherwise be improved by a healthier lifestyle.

Implications for public health: To improve public health and wellbeing of society, we call for regulatory changes regarding advertising of medicines. Where applicable, lifestyle changes should be advertised as potential substitutes for the advertised medicines. Interprofessional collaboration is also recommended to educate individuals and convey the value of health behaviour changes.

Key words: direct-to-consumer advertising, prescription medicines, self-reported behavioural outcomes, lifestyle behaviours, New Zealand

of DTCA will be negative.¹⁶ Supporters argue that DTCA can inform and empower the public and increase their autonomy by educating them about medical conditions and possible treatments.¹⁷⁻¹⁹ However, even though DTCA may inform individuals, it may also mislead them.¹⁴ Critics argue that DTCA is persuasive rather than informative because

it presents partial and biased information that exaggerates the potential benefits of medicines.^{17,20-23} DTCA has also been criticised for using 'scare-mongering' tactics to encourage patients to start a treatment.^{24,25} Past research shows DTCA leads to the advertised medicines being sought and requested by individuals.^{12,17,26,27} Of note,

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studies reveal that when a message shows a medicine as very effective, individuals do not try to process the rest of the information presented in the message.²⁸ Doctors may face extra work and frustration if a patient discusses the medicine with them as a result of 'evidence' from an advertisement.^{14,28} Research also shows that when patients request a specific medicine; doctors usually prescribe it.^{21,29,30} Further, advertising a medication as the solution to a health condition may cause audiences to think that healthy lifestyles, such as proper nutrition and exercise, are ineffective or needless.³¹ Hence, the influence of medicine advertising on consumers with unhealthier lifestyle practices is of particular concern.

Research discusses that DTCA can change people's views on normal and medical conditions by encouraging the use of medicine to cure 'every ill'.^{32,33} Aspects of bodily experiences, which are normally reflections of individuals' lifestyles, have been medicalised by the pharmaceutical industry's efforts to find treatments for these 'new' illnesses.^{34,35} Lifestyle behaviours can affect both consumer behaviour³⁶ and consumer health.³⁷⁻⁴² Lifestyle has been studied as a leading contributor to health outcomes by researchers.⁴³ Previous research has established that the study of lifestyle behaviours can provide more information about, and a better picture of, individuals than their demographics.³⁶ Lifestyle comprises people's daily behaviours, such as activities, fun and nutrition.⁴³ Health lifestyles are defined as health-related behaviours according to individuals' preferences from available options.⁴⁴ Unhealthy nutrition, physical inactivity, drug abuse, smoking, alcohol consumption and medicine abuse are common indicators of an unhealthy lifestyle.^{41-43,45} According to existing studies, engaging in one or more unhealthy lifestyle behaviours advances the risk of death.⁴⁶⁻⁴⁹ A meta-analysis revealed that having a healthy lifestyle is linked to a lower risk of death so that a mix of healthy lifestyle behaviours, such as not smoking, moderate alcohol drinking, healthy nutrition, regular physical activity, and having an optimal weight, was linked to a 66% decrease in mortality.⁴⁸

Furthermore, "demographic and socioeconomic factors are major determinants of health."^{50(p131)} The social determinants of health, "the conditions in which people are born, grow, live, work and age,"^(p36) can result in health inequalities.⁵¹

Research demonstrates that people with lower socioeconomic status have poorer health conditions.⁵¹ "Health behaviour is greatly influenced by peoples' environmental, socioeconomic and cultural settings."^{52(p213)} Earlier studies show that being socially or economically disadvantaged (e.g. having low income) is associated with unhealthy lifestyle factors, such as physical inactivity, smoking and being obese.⁵¹⁻⁵⁴ Moreover, disparities in health information seeking have been associated with gender, education, age and ethnicity.^{27,55-58} For instance, women and individuals who had lower income and were less educated, older, and ethnic minorities were more likely to respond to DTCA.²⁷

In summary, individuals with less healthy lifestyle behaviours and poorer socioeconomic characteristics are more likely to have health issues,^{46,47,59} and thus may be at higher risk of being medicalised. Given their poorer health and the fact that DTCA can be misleading and emotive,⁶⁰ and focus on taking medications rather than changing lifestyle behaviours,⁶¹ such individuals might be more at risk of responding to DTCA. The present study thus extends previous research, which found that demographic and socioeconomic factors associated with responding to DTCA,²⁷ to examine whether lifestyle factors also help to explain individuals' responses to DTCA. Specifically, this study examines whether individuals who have unhealthier lifestyles are more likely to report being influenced by medicine advertising.

Methods

Study sample

This exploratory study analysed data collected by an Australasian market research company through an online survey of 2,057 adults in New Zealand in 2013. A quota sampling method was used, capturing a nationally-representative sample of the New Zealand population, to allow for generalisability of the results. The survey had ethical approval from the University of Otago, and all participants gave their informed consent.

Variables and measures

The data used in this study came from a larger research project on consumer behaviour and lifestyle. In this study, measures and variables relevant to demographics, socioeconomics,

lifestyle factors and behavioural responses to DTCA were explored.

Dependent variables

Self-reported behaviours in response to seeing an advertisement for a medicine²⁷ were measured by four yes/no questions adapted from prior studies: 'As a result of seeing an advertisement for a drug, have you asked your doctor for a prescription?';⁶² 'As a result of seeing an advertisement for a drug, have you asked your doctor for more information about an illness?';⁶² 'As a result of seeing an advertisement for a drug, have you searched the Internet for more information regarding an illness?';^{1,63} and 'As a result of seeing an advertisement for a drug, have you asked your pharmacist for more information about a drug?'.⁶²

Independent variables

Common indicators of a healthy/unhealthy lifestyle, i.e. nutritional habits, substance abuse (including consumption of illicit drugs and alcohol), physical activity,^{41,42,45} as well as attitude towards doing exercise were independent variables.

Nutritional habits were evaluated using a summed index of twelve yes (1)/no (2) statements pertaining to the consumption of different food categories in the past 24 hours; higher values indicate more healthy nutritional habits. Healthy food habits included eating: vegetables, fruit, breakfast, a meal at home that was made from scratch (i.e. no pre-prepared packets were used). Healthy food habits were subsequently reverse scored. Unhealthy food habits included eating: confectionery (e.g. lollies, sweets), potato chips and/or chocolate; fast food (e.g. McDonalds, fish and chips); takeaways (e.g. Thai, Indian); at a restaurant or café; a meal at home made from pre-prepared food/sauces (e.g. frozen chips, pre-prepared rice risotto from a packet, pasta sauce); biscuits, cakes, or pastries; dessert or ice cream; and drinking fizzy drink containing sugar (e.g. Coke, Sprite; adapted from Food Standards Agency⁶⁴).

Illegal drug consumption was assessed by a summed index of two statements, made on a five-point scale: 0 (never), 1 (rarely), 2 (occasionally), 3 (often) to 4 (daily), regarding consumption of marijuana and consumption of speed, ecstasy or magic mushrooms (modified from past research)⁶⁵ in the past 12 months. Higher values indicate more consumption. For measuring alcohol

consumption, participants were asked to indicate the type and volume of standard drinks consumed on their heaviest drinking occasion in the past seven days.⁶⁶⁻⁶⁸ This measure has been noted to represent 'at risk' drinking⁶⁸ and the period of seven days provides a thorough picture of alcohol consumption⁶⁹ and moderates the chances of under-reporting, even though it does not consider the occasional drinking of participants.⁷⁰ Before the estimation of alcohol consumption, the alcohol percentage by volume (ABV) was reviewed and revised for each record.⁶⁶ Standard drink consumption was measured by applying the equation indicated by the Food Standards Authority Australia and New Zealand (FSANZ) and used in an earlier study: "volume of the container in liters × % alcohol by volume (ml/100 ml) × 0.789"^{66,71}

Physical activity was determined through a summed index of four statements (0: not selected / 1: going to/participating in) measuring engagement in physical activities in an average month, including going to the gym/run/walk, participating in individual sport (e.g. swimming, golf), participating in a team sport, and going tramping or camping. Higher values indicate more physical activities. Consumers' attitude towards doing exercise was measured by a single item measuring attitude towards the importance of doing exercise, made on a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). All questions came from the New Zealand lifestyle survey, which is a part of an ongoing project performed by the University of Otago since 1979.

Demographic and socioeconomic variables were also considered in the models: gender, age (as a continuous variable), ethnicity (as multiple dummy variables, with New Zealand European as the reference level), income, and level of education (as ordered categorical variables).²⁷

Statistical analysis

Data were analysed using IBM SPSS Statistics, Version 22.0. Descriptive statistics were employed to calculate frequencies, in addition to the mean, and standard deviation of items. Multivariate binary logistic regression models were used to reveal the factors determining self-reported behavioural outcomes. For each model, odds ratios (ORs) with 95% confidence intervals (CIs) were examined. Accuracy of prediction and overall appropriateness of the models were

examined by significant ($p < 0.01$) Omnibus test of model coefficients, and nonsignificant ($p > 0.05$) Hosmer–Lemeshow tests.⁷²

Results

Descriptive statistics

The demographics and socioeconomics of the sample are shown in Table 1.²⁷ Table 2 shows the means and standard deviations for non-demographic independent variables.

Predictors of behavioural outcomes

Results of the multivariate binary logistic regression models predicting self-reported behavioural responses to DTCA are presented in Table 3.

Asking a doctor for a prescription

Asking a doctor for a prescription was associated with older age (OR=1.01, 95%CI 1.001-1.02), higher alcohol consumption (OR=1.03, 95%CI 1.01-1.05), more illegal drug

consumption (OR=1.29, 95%CI 1.17-1.42); lower education (OR=0.90, 95%CI 0.83-0.97), less positive attitudes toward doing exercise (OR=0.79, 95%CI 0.66-0.94), doing less exercise (OR=0.78, 95%CI 0.69-0.89), and less healthy eating habits (OR=0.84, 95%CI 0.78-0.91). Chinese (OR=2.24, 95%CI 1.11-4.51), and Indian (OR=6.05, 95%CI 3.37-10.86) respondents were more likely to ask a doctor for a prescription than New Zealand Europeans. Gender and income did not have any influence on asking a doctor for a prescription. This model correctly classified the outcome for 88.6% of the cases and demonstrated a good fit to the data (Table 3).

Asking a doctor for more information about an illness

Asking a doctor about an illness was associated with more illegal drug consumption (OR=1.11, 95%CI 1.01-1.23), older age (OR=1.02, 95%CI 1.01-1.03), lower income (OR=0.89, 95%CI 0.83-0.96), doing less exercise (OR=0.78, 95%CI 0.70-0.88), and less healthy eating habits (OR=0.88, 95%CI 0.82-0.94). Maori (OR=2.06, 95%CI 1.42-2.99), Chinese (OR=2.05, 95%CI 1.07-3.91), Indian (OR=4.14, 95%CI 2.40-7.12), and 'Other' ethnicities (OR=1.52, 95%CI 1.06-2.16) were more likely than New Zealand Europeans to ask a doctor for more information about an illness. Alcohol consumption, attitudes toward doing exercise, education and gender did not have any influence on asking a doctor about an illness. This model correctly classified the outcome for 84.1% of the cases and showed a good model fit (Table 3).

Searching the Internet for more information regarding an illness

Seeking more information from the Internet regarding an illness was associated with more positive attitudes toward doing exercise (OR=1.15, 95%CI 1.02-1.30), doing less exercise (OR=0.84, 95%CI 0.77-0.92), and less healthy eating habits (OR=0.93, 95%CI 0.89-0.98). Indian (OR=1.71, 95%CI 1.06-2.77), and 'Other' ethnicities (OR=1.31, 95%CI 1.01-1.70) were more likely than New

Table 1: Demographics and socioeconomics of the Sample (n=2,057)

Variable	Frequency (%)	Mean	S.D.
Age (years) (Continuous variable)		44.21	17.60
Education n(%)			
No secondary schooling	61 (3.0)		
School examinations only	165 (8.0)		
School certificate examination only	355 (17.3)		
University entrance/Matriculation only	277 (13.5)		
Technical or trade certificates	329 (16.0)		
Professional training	215 (10.5)		
University qualifications	655 (31.8)		
Ethnicity n(%)			
New Zealand European	1,290 (62.7)		
Maori	218 (10.6)		
Chinese	74 (3.6)		
Indian	79 (3.8)		
Pacific Islands	68 (3.3)		
'Other' Ethnicities	328 (15.9)		
Gender n(%)			
Male	1,001 (48.7)		
Female	1,056 (51.3)		
Income (annual) n(%)			
Less than \$NZ20,000	199 (9.7)		
\$NZ20,000–\$NZ39,999	460 (22.4)		
\$NZ40,000–\$NZ59,999	413 (20.1)		
\$NZ60,000–\$NZ79,999	338 (16.4)		
\$NZ80,000–\$NZ99,999	212 (10.3)		
\$NZ100,000–\$NZ119,999	202 (9.8)		
Over \$NZ120,000	232 (11.3)		

Table 2: Non-demographic independent variables.

Items	Scale Range	Mean (SD)
Alcohol consumption	0-61.3	3.16 (5.90)
Attitudes towards doing exercise	1-5	4.26 (0.80)
Healthy eating habits	12-24	22.06 (2.07)
Illegal drug consumption	0-8	0.46 (1.19)
Physical activity	0-4	2.56 (1.10)

Zealand Europeans to search the Internet for more information. Moreover, women were more likely to search the Internet for more information than men (OR=1.48, 95%CI 1.21-1.82). Illegal drug consumption, alcohol consumption, education, age and income did not have any influence on searching the Internet for more information. This model correctly classified the outcome for 65.7% of the cases and demonstrated a good fit to the data (Table 3).

Asking a pharmacist for more information about a drug

Asking a pharmacist for more information about an advertised drug was associated with older age (OR=1.02, 95%CI 1.01-1.03), more illegal drug consumption (OR=1.22, 95%CI 1.11-1.34), doing less exercise (OR=0.87, 95%CI 0.77- 0.97), and less healthy eating habits (OR=0.91, 95%CI 0.86-0.97). All ethnic minorities, including Maori (OR=2.32, 95%CI 1.61-3.34), Chinese (OR=2.55, 95%CI 1.40-4.61), Indian (OR=1.93, 95%CI 1.06-3.53), Pacific Islands (OR=2.11, 95%CI 1.12-3.98) and Other ethnicities (OR=1.98, 95%CI 1.42-2.76), were more likely to ask a pharmacist for more information about a drug than New Zealand Europeans. Alcohol consumption, attitudes toward doing exercise, education, gender and income did not have any influence on asking

a pharmacist for more information. This model precisely classified the outcome for 83.9% of the cases and showed a good model fit (Table 3).

Discussion

DTCA has been criticised for altering individuals' perceptions of health and illness, including encouraging the medicalisation of normal conditions and pharmaceuticalisation over healthy lifestyle choices;^{16,73} while unhealthier lifestyle behaviours have been linked to a higher possibility of poorer health.^{74,75} Previous research revealed that women and individuals who had lower income and were less educated, older, and ethnic minorities were more likely to report behavioural responses to DTCA.²⁷ The current study extended earlier research by examining the links between individuals' healthy/unhealthy lifestyle practices, in addition to already established demographic and socioeconomic factors, and their self-reported behavioural responses to DTCA. The findings of the current exploratory study revealed that individuals with unhealthier lifestyles were more likely to be influenced by DTCA.

Physical inactivity and unhealthy eating behaviours predicted all self-reported behavioural responses to DTCA. Illegal drug

consumption predicted all self-reported behavioural responses except for searching the Internet for more information regarding an illness. Higher alcohol consumption and less positive attitudes toward doing exercise predicted asking a doctor for a prescription. However, more positive attitudes toward doing exercise predicted searching the Internet for more information, which could be owing to a mediating factor that can be explored in future research.

Studies on health inequalities have attempted to reveal the behavioural factors that are associated with health outcomes, particularly lifestyle behaviours (e.g. physical inactivity, drug or alcohol consumption, unhealthy nutrition).⁷⁶ Earlier research has indicated that personal lifestyle causes health disparities;^{43,77,78} individuals' risk of poor health advances when they undertake unhealthy lifestyle behaviours.^{46,47,59} An alternative explanation is that these unhealthy lifestyle behaviours and health inequalities may be caused by socioeconomic and cultural disparities.^{52,79-81}

This is, however, the first study to reveal the association between lifestyle factors and behavioural responses to DTCA. The present findings extend existing research by showing that individuals who have a tendency towards poorer lifestyle choices, are more receptive to medicine advertising than those with healthier lifestyles. This association could be due to individuals with poorer lifestyle behaviours being more likely to have poorer health,^{74,75} and/or their desire to take a medicine rather than changing lifestyle behaviours.

The finding that individuals with less healthy lifestyles are more likely to be influenced by DTCA is of significant concern given that DTCA does not usually focus on public health issues such as nutrition, exercise, addictions and appropriate consumption of current medications.¹⁶ Thus, DTCA can result in public pharmaceuticalisation, which leads to the use of lifestyle medicines (e.g. weight loss pills), perceived by individuals "as a 'magic bullet' to resolve problems of daily life".^{82(p856)} Accordingly, DTCA may stimulate taking medicines rather than making lifestyle behavioural changes and may be more appealing to individuals with less healthy lifestyles, as evidenced in the current study. DTCA can even result in doctors being pressured to prescribe a medication in instances where lifestyle changes would be more appropriate. Although DTCA is

Table 3: Multivariate binary logistic regression models predicting self-reported behavioural responses to DTCA

Variable	Asking a doctor for a prescription: ^a OR (95% CI)	Asking a doctor for more information about an illness: ^b OR (95% CI)	Searching the Internet for more information regarding an illness: ^c OR (95% CI)	Asking a pharmacist for more information about a drug: ^d OR (95% CI)
Age	1.01 (1.001-1.02)*	1.02 (1.01-1.03)***	1.003 (0.997-1.01)	1.02 (1.01-1.03)***
Alcohol consumption	1.03 (1.01-1.05)**	1.005 (0.98-1.02)	1.01 (0.99-1.03)	0.99 (0.97-1.01)
Attitudes towards doing exercise	0.79 (0.66-0.94)**	0.99 (0.85-1.16)	1.15 (1.02-1.30)*	1.07 (0.91-1.26)
Ethnicity				
New Zealand European (Reference)	1.00	1.00	1.00	1.00
Maori	1.53 (0.98-2.40)	2.06 (1.42-2.99)***	1.20 (0.89-1.64)	2.32 (1.61-3.34)***
Chinese	2.24 (1.11-4.51)*	2.05 (1.07-3.91)*	1.32 (0.79-2.19)	2.55 (1.40-4.61)**
Indian	6.05 (3.37-10.86)***	4.14 (2.40-7.12)***	1.71 (1.06-2.77)*	1.93 (1.06-3.53)*
Pacific Islands	1.18 (0.52-2.69)	1.70 (0.87-3.33)	1.33 (0.79-2.22)	2.11 (1.12-3.98)*
'Other' Ethnicities	1.47 (0.95-2.25)	1.52 (1.06-2.16)*	1.31 (1.01-1.70)*	1.98 (1.42-2.76)***
Gender	0.89 (0.65-1.21)	0.93 (0.72-1.22)	1.48 (1.21-1.82)***	1.17 (0.90-1.52)
Illegal drug consumption	1.29 (1.17-1.42)***	1.11 (1.01-1.23)*	1.02 (0.94-1.10)	1.22 (1.11-1.34)***
Level of annual income	0.92 (0.85-1.005)	0.89 (0.83-0.96)*	0.98 (0.93-1.04)	0.95 (0.88-1.01)
Level of Education	0.90 (0.83-0.97)*	0.96 (0.90-1.04)	0.997 (0.94-1.05)	1.02 (0.95-1.10)
Nutritional habits	0.84 (0.78-0.91)***	0.88 (0.82-0.94)***	0.93 (0.89-0.98)**	0.91 (0.86-0.97)**
Physical activity	0.78 (0.69-0.89)***	0.78 (0.70-0.88)***	0.84(0.77-0.92)***	0.87 (0.77-0.97)*

Notes:

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

a. $R^2=0.14$ (Nagelkerke), 0.07 (Cox-Snell); Hosmer-Lemeshow test ($\chi^2 = 11.83$, d.f. = 8, $p = 0.16$); Omnibus Tests of Model Coefficients ($p < 0.001$)

b. $R^2=0.08$ (Nagelkerke), 0.05 (Cox-Snell); Hosmer-Lemeshow test ($\chi^2 = 6.71$, d.f. = 8, $p = 0.57$); Omnibus Tests of Model Coefficients ($p < 0.001$)

c. $R^2=0.04$ (Nagelkerke), 0.03 (Cox-Snell); Hosmer-Lemeshow test ($\chi^2 = 5.37$, d.f. = 8, $p = 0.72$); Omnibus Tests of Model Coefficients ($p < 0.001$)

d. $R^2=0.07$ (Nagelkerke), 0.04 (Cox-Snell); Hosmer-Lemeshow test ($\chi^2 = 10.98$, d.f. = 8, $p = 0.20$); Omnibus Tests of Model Coefficients ($p < 0.001$)

presented by pharmaceutical companies as a type of information that is 'in the best interests of individuals',¹⁷ research has shown that the main goal of medicine advertising is to persuade rather than to inform, and it has been successful at persuasion.^{21,22} Thus, the public needs to be informed that DTCA is a marketing tool, predominantly aimed at affecting prescribing behaviour, driving choice, and increasing profit.⁸³⁻⁸⁵

Limitations

The current findings were based on a cross-sectional survey; thus, causal conclusions cannot be made. Moreover, the respondents' self-reported lifestyle behaviours, as well as self-reported behavioural responses to DTCA, might not reflect individuals' actual behaviours and might increase the possibility that certain behaviours were under or over reported. However, the anonymity assured by the online survey platform, a method that has strengths over traditional methods,⁸⁶ would have assisted truthful responses.⁷¹

This study was exploratory research and included a large pool of potential predictors, which should be useful in guiding future, more confirmatory work. However, this issue can increase the chance of observing a Type I error. Moreover, since the data did not include tobacco use behaviours, future research could extend the current findings by exploring the relationship between smoking as an unhealthy lifestyle factor, and behavioural responses to medicine advertising.

Conclusions

While much attention has been paid to the effects of lifestyles on individuals' behaviour (e.g. buying behaviour),³⁶ and health inequalities,^{37-42,45} to the best of our knowledge, no study has documented DTCA-triggered behavioural responses of individuals with less healthy lifestyle habits. This study primarily revealed that individuals with unhealthier lifestyles, that is, less physical activity, higher levels of alcohol consumption, unhealthier nutritional habits and higher levels of illegal drug use, were more likely to respond to DTCA. The negative attitude towards doing exercise also influenced asking a doctor for a prescription. Overall, these associations, along with previously reported findings²⁷ linking being a woman, increasing age, lower income, lower education and belonging to an ethnic minority suggest that these 'at risk' or 'disadvantaged' groups can

be more susceptible towards DTCA and may not be able to make informed decisions. This raises concerns regarding the ethicality of DTCA in its current form, especially given that DTCA is self-regulated in New Zealand.

Implications

The findings of our large representative sample can be generalised to the national population in New Zealand and have important implications for both public health policy makers and pharmaceutical companies. Considering the findings of this study together with the outcomes of earlier studies regarding individuals' positive attitudes towards medicine advertising,²⁷ awareness on lifestyle changes should be supported through a combination of efforts to facilitate healthy behaviours.⁸⁷ Accordingly, based on our findings, we call for the pharmaceutical industry to stress healthy lifestyle behaviours as an alternative to taking medications, where applicable. Furthermore, pharmaceutical companies should not target 'at risk' individuals, position their products based on individuals' lifestyle characteristics and depict their product as a wonder drug. Instead, they need to make DTCA more ethical by explicitly and impartially stating that behavioural changes could be as effective as taking the advertised medicine. Communications on lifestyle changes in DTCA need to more specifically target those with unhealthy lifestyles. These actions can also benefit pharmaceutical companies since it is in the companies' lasting interest to advertise responsively, fairly and truthfully.⁸⁸

This study also highlights the need for interprofessional collaborations to educate individuals and convey the value of health behaviour changes to help 'disadvantaged' groups make more informed health-related decisions. Healthcare professionals thus can become "both gatekeepers and influencers over the purchase of the prescription medicine, and make the purchase not only a cognitive process, but also a social process."^{89(p275)} They can play an important role in educating and supporting peoples' health behaviour changes⁹⁰ as well as moderating the potential negative effects of DTCA and its persuasion process on individuals' decision making, consistent with consumer socialisation theory that highlights the influence of socialisation agents in consumers' decision-making process.^{89,91,92}

Since social and economic disparities can result in health behaviour and health inequalities,⁵¹ health promotion policy should also consider social determinants in addition to motivating individual actions for changing unhealthy behaviours.⁵² Previous research discussed that rules which may harm individuals' health should be changed.⁹³ In line with existing research,⁹⁴ the findings of this study suggest that the current rules on DTCA are not sufficient to protect consumers, and reinforce the need for tighter control and regulatory actions on DTCA. This study also proposes that the government should focus on increasing individuals' health literacy, monitor advertising of lifestyle medicines and ensure that DTCA is more beneficial than harmful, to help individuals make informed decisions. It is hoped that this controversial, but powerful, medium can be utilised to improve the wellbeing of society.

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