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BRIEF REPORT

Impact of Brand or Generic Labeling on Medication Effectiveness and Side Effects

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Objective: Branding medication with a known pharmaceutical company name or product name bestows on the drug an added assurance of authenticity and effectiveness compared to a generic preparation. This study examined the impact of brand name and generic labeling on medication effectiveness and side effects. **Method:** 87 undergraduate students with frequent headaches took part in the study. Using a within-subjects counterbalanced design, each participant took tablets labeled either as brand name “Nurofen” or “Generic Ibuprofen” to treat each of 4 headaches. In reality, half of the tablets were placebos, and half were active ibuprofen (400 mg). Participants recorded their headache pain on a verbal descriptor and visual analogue scale prior to taking the tablets, and again 1 hour afterward. Medication side effects were also reported. **Results:** Pain reduction following the use of brand name labeled tablets was similar in active ibuprofen or a placebo. However, if the tablets had a generic label, placebo tablets were significantly less effective compared to active ibuprofen. Fewer side effects were attributed to placebo tablets with brand name labeling compared to the same placebo tablets with a generic label. **Conclusions:** Branding of a tablet appears to have conferred a treatment benefit in the absence of an active ingredient, while generic labeled tablets were substantially less effective if they contained no active ingredient. Branding is also associated with reduced attribution of side effects to placebo tablets. Future interventions to improve perceptions of generics may have utility in improving treatment outcomes from generic drugs.

Keywords: placebo effects, nocebo effects, branding, generic medication, side effects

Branding medication with a known pharmaceutical company name or product name endows the drug with an added assurance of authenticity, scientific research, and efficacy (Chandler & Owen, 2002). Branding is so entrenched in our medical care that in medical consultations drugs are most frequently referred to by their brand name, even when generic versions are available (Steinman, Chren, & Landefeld, 2007). There is some evidence that branding can increase the effectiveness of both active and placebo medication (Branthwaite & Cooper, 1981).

While generic medicines are now commonplace in most countries, many patients view them negatively compared to branded alternatives (Iosifescu, Halm, McGinn, Siu, & Federman, 2008), believing them to be of inferior quality and producing more side effects than the branded alternative (Al Ameri, Whittaker, Tucker, Yaqoob, & Johnston, 2011; Babar et al., 2010; Himmel et al., 2005). Patients also view generics as less powerful and less suitable for treating serious illnesses than branded medication (Figueiras, Cortes, Marcelino, & Weinman, 2010; Hassali, Kong, & Stewart, 2007). Despite these negative views of generics, blinded randomized controlled studies generally do not support the idea that generic drugs are less safe or effective than their brand-name counterparts (Howland, 2010).

Negative perceptions of generic drugs can lead to expectations of reduced efficacy and increased risk of side effects for generic medications in comparison to their branded counterparts, reducing the placebo and increasing the nocebo components of treatment (Barsky, Saintfort, Rogers, & Borus, 2002; Stewart-Williams & Podd, 2004; Stewart-Williams, 2004). A switch to generic medication has been implicated in a medication health scare (Faasse, Cundy, & Petrie, 2009), and has also been shown to reduce the placebo effect and increase side effects (Faasse, Cundy, Gamble, & Petrie, 2013). Generic drug use is also related to increased rates of nonadherence to treatment (Phillips et al., 2007; Ringe & Moller, 2009). This may

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explain some of the reported disparities between branded and generic treatment outcomes in terms of increased medical utilization (Labiner et al., 2010), and the increased risk of death or major health events after changing to a generic (Phillips et al., 2007).

Despite the increasing use of generic drugs in health care there has been virtually no experimental research into the effect of generic and brand name labeling on medication efficacy and side effects. The aim of the current study was to investigate how branding influences drug effectiveness and side effect reporting. The hypothesis that using an established brand name would increase the effectiveness of both ibuprofen medication and placebo medication for treating headaches compared to generic labeling was tested. The prediction that generic labeled ibuprofen and placebo would produce more side effects than the same branded tablets was also assessed.

Method

Participants were recruited to take part in a study purportedly investigating how well different formulations of ibuprofen medication work in the treatment of headache. The research received ethical approval from the University of Auckland Human Participants Ethics Committee (reference 9097). Participants provided written consent to participate in a trial of different ibuprofen formulations in the treatment of headaches, were unaware that there were placebo tablets involved in the study, and were fully debriefed at the conclusion of data collection.

Participants

Participants were recruited from undergraduate students from the University of Auckland who self-identified as experiencing frequent headaches in response to e-mail and poster advertisements. To take part, students had to be aged 16 years and over, able to read and write in English, and experience at least one headache per fortnight. Exclusion criteria were those that would contraindicate ibuprofen use. Participants were informed that they may experience some medication side effects. A total of 121 students expressed interest in participating. Nine were excluded because they had diagnosed asthma, and 25 later declined to participate. Eighty-seven participants completed the baseline session, and 81 completed the four treatment conditions. There were no significant demographic or headache-related baseline differences between completers and noncompleters. Only the data from completed participants are included in the analyses.

Procedure

Participants completed a baseline questionnaire and received four doses of ibuprofen medication to take away to treat their next four headaches. Time to complete the study varied according to headache frequency. Participants were asked not to take any other medications to treat their headache until after they completed the questionnaire. Participants received a \$20 gift voucher for their participation.

Materials

Tablets. Four doses of medication were given to participants to treat their next four headaches. Two of the doses had a brand name label (Nurofen), and two were labeled as generic (Generic Ibuprofen). One of each of the brand name and generic labeled medications contained identical active ibuprofen tablets (2×200 mg tablets), and

the others contained placebos. This resulted in four conditions: branded active, generic active, branded placebo, and generic placebo. Condition order was randomized.

Baseline questionnaire. Participants completed a questionnaire assessing their experience of headaches, general health, symptom reporting, and demographic information. Typical headache frequency, duration, and pain intensity were assessed, as well as usual medical and nonmedical headache treatment strategies. Participants were also asked how many times they had visited their family doctor over the past year, and how they would rate their health compared to other people their age with response options of *poor*, *fair*, *good*, and *excellent*. Symptoms experienced over the past week were assessed using a modified General Assessment of Side Effects scale (Petrie, Faasse, Crichton, & Grey, 2014), that included an additional eight symptoms identified as common ibuprofen medication side effects. Participants rated 52 symptoms as *not present* (0), *mild* (1), *moderate* (2), or *severe* (3). Participants also reported their age, sex, and ethnicity.

Medication questionnaires. An identical headache questionnaire was completed for each of the four medication-treated headaches that participants experienced. Prior to taking medication participants were asked to complete two questions about their headache pain adapted from the short-form McGill Pain Questionnaire (Melzack, 1987): circle a verbal descriptor of the intensity of the headache pain that they were experiencing from *no pain* (1) to *excruciating* (6); and a visual analogue scale rating from *no pain* (0 cm) to *the worst possible pain* (10 cm). Participants were then instructed to take the study tablets to treat their headache, and wait 1 hour before completing the postmedication ratings. These included the same two headache pain items and their experience of 21 possible medication side effects rated as: *not present* (0), *mild* (1), *moderate* (2), or *severe* (3).

Statistical Analysis

All analyses were conducted using SPSS version 22. Linear mixed effects analyses were utilized to assess the relationship between the repeated measures of medication branding (brand name or generic) and tablet ingredient (active ibuprofen or placebo) on the outcome measures of change in headache pain (verbal descriptor scale) and side effect scores. Pretreatment headache pain was entered as a covariate in the model for the assessment of change in headache pain. Planned comparisons using a Bonferroni correction were used to investigate whether branding had differential effects on treatment outcomes in active ibuprofen and placebo tablets. An overall significance level of $p < .05$ was used.

Results

Sample Characteristics

Participants had a mean age of 20.8 years ($SD = 3.5$), were predominantly (83%) female, and of European (60%) ethnicity. They reported visiting a general practitioner on average 3.2 times during the previous year ($SD = 2.5$), and rated themselves as relatively healthy ($M = 2.8$, $SD = 0.7$). At baseline, participants estimated their usual headache pain intensity to be moderate ($M = 3.3$, $SD = 0.6$, range 2–5). 60% of participants reported previous ibuprofen use for headaches. Prior to treatment the four headaches did not differ in pain intensity or duration.

Pain Relief

The model showed a significant main effect of ingredient, $F(1, 79.87) = 13.40, p < .001$. Active ibuprofen resulted in significantly larger reductions in pain ($M = -1.36, SE = 0.07$) than placebo tablets ($M = -1.01, SE = 0.07$). Generic or brand name labeling did not demonstrate a significant main effect, $F(1, 80.49) = 1.63, p = .21$. There was a nonsignificant trend toward an interaction effect between ingredient and labeling, $F(1, 75.30) = 2.90, p = .093$.

Planned comparisons demonstrated no significant difference between branded active ($M = -1.34, SE = 0.10$) and generic active tablets ($M = -1.37, SE = 0.09$) with regard to pain reduction, $p = .77$. Branded placebo use resulted in greater pain reduction ($M = -1.14, SE = 0.09$) than generic placebo ($M = -0.88, SE = 0.10$), $p = .054$ (see Figure 1). Branded active and branded placebo tablets did not differ with regard to pain reduction, $p = .13$. However, generic active tablets provided significantly greater pain relief than generic placebo tablets, $p < .001$. A similar pattern of pain relief results was seen using the visual analogue pain rating scale.

Side Effects

There was no significant main effect of tablet ingredient on side effect scores, $F(1, 82.82) = 0.01, p = .92$. Participants reported similar side effect scores from active tablets ($M = 3.18, SE = 0.44$) and placebo tablets ($M = 3.21, SE = 0.30$). There was not a significant main effect of label on side effect scores, $F(1, 76.91) = 0.15, p = .70$. Similar side effect scores were reported after brand name ($M = 3.15, SE = 0.35$) and generic labeled tablets ($M = 3.24, SE = 0.35$). There was a significant interaction effect between tablet ingredient and label, $F(1, 81.06) = 5.38, p = .023$. Planned comparisons revealed that generic labeled placebo tablets were associated with significantly higher side effect scores ($M = 3.53, SE = 0.38$) than brand name labeled placebo tablets ($M = 2.90, SE = 0.29$), $p = .048$ (see Figure 1). When tablets contained active ibuprofen there was not a significant difference

between side effect scores of brand name ($M = 3.41, SE = 0.47$) and generic labeled tablets ($M = 2.95, SE = 0.46$), $p = .16$.

Discussion

The current study found that branded tablets worked similarly well at reducing headache pain whether or not they contained an active ingredient. In contrast, generic tablets that contained a placebo were significantly less effective than generic tablets that contained an active ingredient. The results show branding to confer a treatment benefit in the absence of an active ingredient. Branding was also associated with differences in side effect attribution. Participants attributed significantly fewer side effects to brand name tablets containing placebo compared to the same placebo tablets with a generic label.

The addition of branding to the study medication may have reassured participants that the tablets were safe and efficacious and provided pain relief in the absence of any pharmacological effect of the drug (Chandler & Owen, 2002). More negative views of generic compared to brand name drugs may have influenced outcomes via the direction of attention, with more attention being paid to pain relief and less to side effects after taking brand name tablets (Faasse et al., 2013).

Ibuprofen and other pain-relieving medications have inherently fast and identifiable effects, providing information to consumers that the drug is working. Many commonly prescribed medications, including those prescribed to treat hypertension, cholesterol lowering statin drugs, antidepressants, and synthetic thyroid hormone replacement medications, do not have an easily identifiable rapid effect. Thus, for many medications it is likely that a process more similar to that seen in the placebo treatment condition occurs, in which branding has a larger impact on medication efficacy and side effects. Additionally, there is evidence that patients perceive generics as less appropriate for treating serious illnesses; therefore, as headache is a relatively minor condition (Figueiras et al., 2010), branding may have more influence in drugs used to treat more serious conditions. Future research would benefit from investigating different conditions and medications which do not have such rapid and identifiable treatment effects.

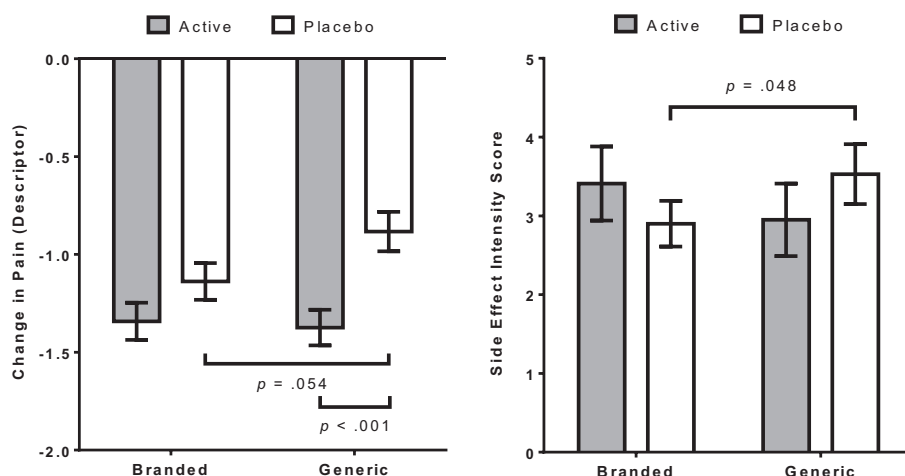


Figure 1. Bar graph showing mean (SE) change in pain scores on the pain descriptor scale (left) and total side effect scores (right) following branded or generic labeled headache treatment with either active ibuprofen or placebo tablets.

The current study is limited by the student sample as well as participants' familiarity with ibuprofen and the use of a known brand, which may have resulted in preexisting expectations about the medication. In contrast, the generic labeling was relatively plain. The efficacy and side effects experienced in response to a novel treatment may be more strongly influenced by medication branding. The findings may also be limited by a potential floor effect in pain reduction due to mild-to-moderate pretreatment headache pain. The study is strengthened by the within-subjects counterbalanced design, and enhanced ecological validity from participants taking their medications in daily life. It may be that in situations where participants need to take medications for longer time periods to treat serious conditions, the implications of a treatment being less efficacious or resulting in more side effects are much greater, and the effect of branding may be enhanced.

Branding is a salient part of daily life in the Western world (Zhang, van Doorn, & Leeflang, 2014), and brand names appear to hold the power to increase efficacy and decrease side effects of medications. As many countries move toward containing health care costs by switching to generic medicines, the potential impact of such changes needs to be addressed (Cheema et al., 2012; Godman et al., 2010). The additional placebo effect associated with branding has the potential to enhance medication effectiveness, which may subsequently be lost during a switch to a generic alternative (Faasse et al., 2009, 2013). Additional side effects experienced and attributed to the medication after taking a generic labeled tablet may drive patients to seek health care, but the symptom complaints may not be caused by the medication per se (Petrie et al., 2014; Verbrugge, 1985). More research attention should be directed toward understanding the influence of a loss of branding on treatment outcomes.

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