

Effect of headache websites on locus of control and self-efficacy of readers

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Abstract

Objective: Could a website be developed that would be more evidence-based and lead to readers having more positive cognitions (locus of control, self-efficacy) with respect to managing their headaches than the current websites?

Method: A new website was developed based on learning to cope with headache triggers rather than the traditional advice to avoid all triggers. An existing, commonly accessed, influential website was used for comparative purposes, that was equal in length and equivalent in readability to the new website. Sixty-two participants (42 female, 20 male) who had suffered from frequent headaches for at least 12 months, were randomly assigned to reading one website or the other, followed by completing the following measures: Headache Management Self-Efficacy Scale; Headache-Specific Locus of Control Scale; and a Survey including questions on confidence and optimism with respect to managing headaches.

Results: Analyses indicated that readers of the ‘coping’ website compared to the traditional website had higher self-efficacy ($p < .001$), and lower chance locus of control ($p < .001$). The difference between the groups on internal locus of control was not significant when family wise error adjustments were made ($p < .04$). Readers of the ‘coping’ website felt more confident in managing their headaches ($p < .006$), more optimistic in managing their headaches ($p < .003$), and more optimistic that their headaches might decrease in frequency, intensity and duration ($p < .001$).

Conclusions: Websites need periodic revision as the research literature unfolds, and website designers should take into account the cognitive impact of websites.

Key words: Migraine, headache, websites, triggers, self-efficacy, locus of control.

Effect of Headache Websites on Locus of Control and Self-Efficacy

The growth in use of the World Wide Web has been exponential since it was established 25 years ago. It was estimated that in 2009, 25% of the world's population had access to the internet, with 50% having access in Europe and 74% in North America (Webb, Joseph, Yardley, & Michie, 2010). In the USA, internet usage increased from 14% in 1995 to 87% in 2014 (Fox & Rainie, 2014). One of the major uses of the internet is for finding health information and it has been estimated that 59% of adults in the USA looked online for health information in the last year (Fox & Duggan, 2013).

In the headache domain, as for other disorders, the internet is used in a number of ways. One use is to find information and advice about the disorder, and all the major headache and migraine associations (e.g., American Headache Society, International Headache Society, European Headache Federation) have websites that serve this purpose. A second use is online support groups (OSGs) also referred to as 'virtual communities'. There are hundreds of headache-related OSGs, some specific to a particular headache type, and some with many registered members. For example, *Clusterheadaches.com*, for 'ClusterHeads', currently has 10,493 members. A range of mobile software/smartphone applications has been developed to assist individuals who suffer from headache and migraine (Liu, Holroyd, Zhu, Shen, & Zhou, 2010). Internet-based treatments have been developed for headache and migraine, in adults and children (Bromberg, Wood, Black, Surette, Zacharoff, & Chiauzzi, 2012; Devineni & Blanchard, 2005; Trautmann & Kroner-Herwig, 2010).

It is commonly advocated in the headache literature that headache sufferers should try to avoid the triggers of their headaches and make lifestyle changes that will result in less exposure to triggers, collectively referred to as 'headache hygiene'. For example, "comprehensive migraine treatment programs emphasize awareness and avoidance of trigger factors as part of the therapeutic regimen" (Friedman & De Ver Dye, 2009). One of the

‘seven elements of good headache management’ listed by WHO is “identification of predisposing and/or trigger factors and their avoidance through appropriate lifestyle change” (World Health Organization, 2006). Not surprisingly, this advice has found its way onto many headache websites. For example, the website of the American Headache Society lists 20 triggers to avoid, and advocates the following lifestyle changes: (i) get regular sleep; (ii) eat regular meals; (iii) get moderate amounts of routine exercise; (iv) drink plenty of water; (v) limit caffeine, alcohol and other drugs; and (vi) reduce stress. These changes are clearly targeted at reducing exposure to triggers (stress, dehydration, too little or too much sleep, fasting, etc.).

There is very limited evidence that advising avoidance of triggers results in fewer headaches and this approach to trigger management has been criticised in three recent reviews (Martin, & MacLeod, 2009; Martin, 2010a; Martin, 2010b). Space limitations do not permit including all the arguments in the reviews but consideration of cognate literatures reveals that short exposure to anxiety-provoking stimuli can increase subsequent anxiety responses to these stimuli, but prolonged exposure results in decreased subsequent anxiety responses (Eysenck, 1979). It is short exposure, resulting from attempts to avoid, or escape from, anxiety-eliciting situations, that underlies the maintenance of fears and phobias. Therapeutic approaches that involve prolonged exposure to anxiety triggers have been used with great success to treat a wide range of anxiety disorders (Barlow, 2004). Driven by an analogy between the triggers of anxiety and the triggers of headaches, it has been demonstrated in a series of studies that short exposure to some headache triggers (visual disturbance, noise, stress) leads to sensitisation to the triggers, whereas prolonged exposure leads to desensitisation (Martin, 2000; Martin, 2001; Martin, Reece, & Fordyce, 2006; Martin, Lae, & Reece, 2007).

From a practical perspective, it is not possible to completely avoid all potential headache triggers as they are so diverse; and attempting to do so could result in a very restricted lifestyle (Kelman, 2007). Marcus (2003) pointed out that the effort to avoid every potential headache trigger may itself be stressful. Furthermore, advice to avoid triggers may lead to reduced internal locus of control for headaches, with attendant adverse effects on self-efficacy, particularly concerning one's perceived capacity to cope effectively with triggers (Marlowe, 1998). French et al. (2000) found that self-efficacy was positively associated with the use of positive psychological coping strategies to prevent and manage headaches.

The reviews proposed that counselling avoidance of all triggers should be replaced with a philosophy of *Learning to Cope with Triggers* (LCT), whereby triggers that are potentially harmful should be avoided, but for other triggers, planned exposure should be used to promote desensitisation and increased tolerance for triggers. Exposure is generally seen as the strategy of choice for triggers such as stress and negative affect, and sensory triggers (e.g., visual disturbance, noise). Avoidance is generally seen as the strategy of choice for triggers such as hunger, dehydration and lack of sleep. The parameters of exposure to triggers (length of exposure and trigger intensity) are manipulated such that they fall short of precipitating significant headaches. In a recently completed study, LCT was found to result in a 35.9% reduction in headaches compared to a 13.2% reduction for advice to avoid all triggers (Martin et al., 2014). LCT has been illustrated in a series of three case studies (Martin, Callan, Kaur, & Gregg, in press).

With respect to information provided on headache internet sites, common statements include that migraine is a genetic disorder, there are inherited differences in susceptibility to triggers, migraine is associated with changes in the brain, and that there is no cure for migraine. Whilst most headache specialists would presumably defend the veracity of these statements, how do headache sufferers interpret them and what is the consequent impact? Do

such statements lead to headache sufferers concluding that they have no control over their headaches and never will, and that there is nothing they can do to help themselves – they will always suffer from their headaches (‘it’s all in the genes/brain, and there is no cure’)? If this is how the information is interpreted, it is hardly providing a service to the community.

In summary, a case can be made that headache internet sites are providing advice which is not evidence-based, and information that is likely to lower internal locus of control and self-efficacy, and decrease optimism in managing headaches. On the basis of these concerns, we developed alternative advice and information for a website. The advice on trigger management was an abbreviated version of LCT and included four strategies: (i) Experiment (some factors that you think are headache triggers may not be); (ii) Avoid (there are some triggers that are best avoided); (iii) Stress (stress is the most common trigger of headaches and generally trying to avoid ‘stressors’ is not the best way to manage stress); and (iv) Exposure (it is possible to reduce the capacity of some triggers to precipitate headaches by ‘graduated exposure’ to the triggers). The approach was referred to by the acronym EASE and the information developed for the website is included as Appendix I.

The study reported here compared readers’ response to the EASE website with readers’ response to a frequently used, authoritative website, WebMD (reasons for selection of this site given subsequently) with the following hypotheses. Reading the EASE website compared to reading the WebMD website would be associated with:

1. Higher self-efficacy.
2. Higher internal locus of control, lower chance locus of control, and lower health care professional locus of control.
3. More confidence and optimism in terms of managing headaches.

Method

Participants

Participants were recruited from the Headache Register of Headache Australia (<http://headacheaustralia.org.au>). The Register has approximately 3,000 registrants, and is used for informing registrants of developments in headache research. A flyer and explanatory statements were advertised on the Headache Australia website and distributed to registrants on the Register. Participants were required to meet the following criteria: (i) minimum of 6 headaches per month; (ii) minimum headache chronicity of 12 months; (iii) pattern of headache symptoms stable over the last 6 months; and (iv) aged 18 years or older.

A convenience sample of 62 participants was recruited for the study. The sample constituted the 62 individuals who volunteered for the study as all volunteers met all the selection criteria. Participants were allocated to the two groups by an unrestricted random allocation method. Thirty-one participants were assigned to Group 1, where they viewed content from the WebMD website (Website 1), and 31 participants were assigned to Group 2, where they viewed the EASE website (Website 2). The demographic and headache characteristics of participants are presented in Table 1. The mean age of participants in Group 1 was 43.3 years ($SD = 11.8$) and for Group 2 was 40.8 years ($SD = 12.2$).

Insert Table 1 about here

As an incentive to take part in the study, participants were entered into a draw with two prizes: an iPod shuffle (value \$55); and two movie tickets (value \$27).

The research was in accordance with the Helsinki Declaration of 1975, as revised in 2000, and was approved by the XXX University Human Research Ethics Committee.

Selection and development of the website for comparison with the EASE website

The comparison website was identified using two systematic search methods. The first strategy used was searching the word ‘headache’ in the most commonly used search

engine, Google (Alexa, 2010; Morahan-Martin, 2004). Only the word 'headache' was used in the search engine, because studies in health-seeking behaviour have found that the majority of health seekers have limited search skills, and used crude terminology to begin their searches (Morahan-Martin, 2004; Berland et al., 2001). When typing 'headache' in Google (International), the ten most relevant websites were displayed in accordance with Google's PigeonRank™, these being: Wikipedia; Medinenet.com; WebMD; MedlinePlus; National Headache Foundation (NHF); Medical News Today; National Health Service (NHS); National Institute of Neurological Disorders and Stroke; and American College of Physicians.

To determine the level of popularity and recognition of the headache information websites, two well-known traffic estimation services were used to obtain statistics on the websites. Alexa was used to determine the estimated percentage of internet users who may have visited the website during a three-month period (Alexa, 2010). Two of the important features of Alexa that were used in the systematic review, were its ability to measure a site's reputation (by the number of other sites linking themselves to the site in question) and popularity. Popularity of a website is referred to as an Alexa Traffic Rank (ATR), and the rank is calculated using a combination of average daily visitors and page views over the given time period. The website with the highest combination of visitors and page views is given the rank of 1. Estimated visits per day were determined using a free statistical engine statbrain.com (Statbrain, 2008). Statbrain.com provides an estimate of number of visits on a website, but does not provide an exact visitor number.

The second strategy used was identifying which of the websites was the most influential. This meant identifying the website that was referenced or linked the most, out of the most commonly accessed websites. The authoritative headache websites were: American Headache Society; International Headache Society; World Headache Alliance; Migraine Trust; Migraine Action Association; Headache Australia; European Headache Federation;

Migraine Awareness Group: A National Understanding for Migraineurs (MAGNUM); British Association for the Study of Headache; and WebMD.

Based on the systematic methods used, the top ten most commonly accessed and influential headache websites were: Wikipedia: Headache; WebMD: Migraines & Headaches Health Center; Migraine Trust; National Institute for Neurological Disorders and Stroke; NHS; NHF; MedlinePlus: Migraine; MAGNUM; eMedicine Health: Migraine Headache; and American Headache Society.

Wikipedia was eliminated as a comparison website as it had limited information compared to other websites and did not address all of the three topics addressed above (cause, treatment and trigger management). In addition, Wikipedia is a website written collaboratively by anonymous internet volunteers, and therefore does not allow their contributors to identify themselves. This makes it difficult to evaluate Wikipedia against the standards set by Silberg et al. (1997).

WebMD (<http://www.webmd.com/migraines-headaches/guide/default.htm>) was chosen as the comparison website because it is the third most commonly accessed headache website, behind MedlinePlus and Wikipedia. Unlike MedlinePlus, WebMD had authors contributing specifically for WebMD. All of MedlinePlus content is linked from other websites. WebMD is also a more influential website than MedlinePlus as it is the most linked site out of the ten most commonly accessed sites (except for Wikipedia).

Information from the WebMD website (Website 1) that directly related to the traditional view of genetic predisposition, and headache trigger management was extracted and laid out in summary format, so it would be comparable to the format for Website 2. The website content was not altered during the process, and was edited to match the length of EASE (Website 1 was 707 words, and Website 2 was 770 words). The content of Website 1 is included as **Appendix II**
Readability of the two websites

Tests of readability were used to check for comparability of the two websites in terms of semantic difficulty and syntactic complexity. The Readability Test Tool was applied using

the following readability formulas: Flesch Reading Ease (Flesch, 1948), Flesch-Kincaid Grade Level (Kincaid, Fishburn, Rogers, & Chissom, 1975), Gunning Fog Index (Gunning, 1952), Simplified Measure of Gobbledygoo (McLaughlin, 1969), Coleman-Liau Index (Coleman & Liau, 1975), and Automated Readability Index (Smith & Senter, 1967). The Readability Test Tool was used because the software was able to make an estimate by taking an average across several well-established formulas. This allows the test to yield a reliable readability estimate compared to other readability software programs, such as Microsoft Word, that could only assess two formulas. This is important because it has been found that readability formulas at times can produce drastically different results depending on material tested (Lundgren & Garret, 1984; Mailloux, Johnson, Fisher, & Pettibone, 1995). The formulas used in the Readability Test Tool are the most reliable and consistent in readability tests (Mailloux, Johnson, Fisher, & Pettibone, 1995; Meade & Smith, 1991).

Comparable scores on the Readability Test Tool were found for the two websites. The average score for Website 1 was 10 which suggests that it could easily be understood by individuals aged 15 to 16 years. The average score for Website 2 was 11 which indicates that the materials could easily be understood by individuals aged 16 to 17 years. Hence, all the participants in this study should have been able to understand the materials on both websites.

Measures

Headache Management Self-Efficacy Scale (HMSE). The HMSE is a 25-item scale for which participants rate their confidence in their ability to prevent and manage headaches (French et al., 2000; Martin, Holroyd, & Rokicki, 1993). The HMSE has excellent internal consistency, with Cronbach α at 0.90.

Headache-Specific Locus of Control Scale (HSLC). The HSLC is a 33-item scale with Internal, Health Care Professionals, and Chance subscales (Martin, Holroyd, & Penzien, 1990). The Internal subscale measures the belief that factors influencing headache episodes

and headache relief are internally controlled. The Health Care Professionals subscale measures the belief that headache frequency, severity and relief are controlled by health care professionals. The Chance subscale measures the belief that headache episodes and headache relief are influenced by chance. Reliability and construct validity for HSLC have been found to be adequate, with Cronbach α at 0.88, 0.86 and 0.84, for the Health Care Professionals subscale, Internal subscale, and Chance subscale, respectively (Martin et al., 1990).

Survey questions. Six statements were included to gauge reactions to the websites including confidence and optimism with respect to managing headaches (see Table 3). Participants responded to each statement by rating the degree to which they agreed or disagreed with it on a 7-point scale (strongly disagree, moderately disagree, slightly disagree, neither agree nor disagree, slightly agree, moderately agree, strongly agree).

Procedure

Participants had to first complete the online consent form. Upon completion of the form, participants were automatically redirected to either Website 1 or Website 2. Participants were advised that no time limit was set for them studying the website. Once the participant had completed reviewing the website content, a link at the bottom redirected the participant to the online Questionnaire Package. The Questionnaire Package, powered by Qualtrics, was split into four blocks: (i) demographic and headache questions, such as age, gender, and headache-type; (ii) Headache Management Self-Efficacy Scale; (iii) Headache-Specific Locus of Control Scale; and (iv) six survey questions. Data were downloaded from the Qualtrics server and inputted into SPSS computer software for statistical purposes.

Results

The data was screened for the assumption of normality. Whilst violation of normality was seen for Self-Efficacy, Health Care Professionals and Chance subscales, as sample sizes were robust (> 30) and participants were randomly allocated to equal number of groups, departure from normality was tolerated (Hills, 2005). Screening of the data did not reveal any univariate or multivariate outliers (all $z < 3.29$).

A MANOVA was undertaken to explore the effect of website on Self-Efficacy, and the three subscales of the Locus of Control Scale. The variance-covariance matrices were homogeneous, Box's $M = 18.75$, $F(10, 17211) = 1.74$, $p > .001$, and hence the Pillai's Trace was utilised. The Pillai's Trace is less susceptible to violations of assumptions. Levels of Self-Efficacy and Locus of Control subscales were significantly dependent on which website participants viewed, Pillai's Trace = .30, $F(4,57) = 6.20$, $p < .001$. Levene's Test of Equality of Error Variances was not significant with α adjusted to .001, and therefore the null hypothesis that the variances are equal was retained ($p > 0.001$). Although there is risk for possible biases as a consequence of potential heterogeneity of variance for setting the α level lower than .025 (or even .01), since the data was not normally distributed, α was set to an extreme level of .001 due to the unduly sensitive nature of the Levene's Test (Tabachnick & Fidell, 1996). Standard deviations are noted in Table 2.

A power analysis using the G*Power software indicated that a large effect size ($d > .50$) would require at least an n of approximately 34 participants to obtain statistical power at the recommended .80 level for multivariate analysis (Faul, Erdfelder, Lang, & Buchner, 2007). Post hoc analysis revealed the statistical power to detect the large effect ($d = .43$) of the website on Self-Efficacy, and the three subscales of the Locus of Control Scale was greater than .99. In reviewing the univariate effects, the statistical power for the dependent variables self-efficacy and chance exceeded .99 and .97 respectively, for detecting large effect sizes (d

= .63, $d = .51$). However, the effect sizes were moderate for Health Care Professionals and Internal Locus of Control subscales ($d < .24$), with lower statistical power ($1-\beta < .46$). Thus, there was more than adequate power at large effect size level, but less than adequate statistical power at the moderate to small effect size level. With respect to the first hypothesis, the test of Between-Subjects Effects revealed that Self-Efficacy was significantly associated with the type of website viewed, ($F(1,60) = 24.13$; $p < .001$; $\eta_p^2 = .29$). With respect to the second hypothesis, the Chance subscale was significantly associated with the type of website viewed ($F(1,60) = 15.61$; $p < .001$; $\eta_p^2 = .21$). There was no significant difference for the Internal subscale once family wise error adjustments were made ($F(1,60) = 4.26$; $p = 0.04$; $\eta_p^2 = .07$). There was no significant difference for the Health Care Professionals subscale ($F(1,60) = 3.48$; $p = .07$; $\eta_p^2 = .06$).

Means and standard deviations for this data, and the results of the MANOVA are presented in Table 2. In summary of these results, viewing the EASE website was associated with significantly higher Self-Efficacy and lower Chance Locus of Control, relative to viewing the WebMD website. The results on the other two Locus of Control subscales favoured the EASE website but did not reach the required extreme α level of .001. Differences on Internal Locus of Control were significant at .04.

Insert Table 2 about here

With respect to the third hypothesis, independent t-tests were conducted with α set at .05 on the six survey questions. The normality assumption was met for Group 1 on the 'confidence' question, but not for the other questions. Whilst violation of normality was seen for most of the questions, as sample sizes were robust (> 30) and participants were randomly allocated to an equal number of groups, departure from normality was tolerated (Hills, 2005).

Screening of the data did not reveal any univariate or multivariate outliers (all $z < 3.29$). Equal variances were assumed as Levene's Test was not significant ($> .05$) for all survey questions.

Means and standard deviations for the survey questions, and the results of the t-tests, are presented in Table 3. Inspection of this table reveals that the group viewing the EASE website had a higher mean score on all six questions, with highly significant differences on the questions relating to 'confidence', 'optimism', and 'frequency/intensity/duration', and a trend on 'recommendation'.

Insert Table 3 about here

Discussion

Review of information and advice provided on headache websites led to the suggestion that it was not fully evidence-based, and could have a negative impact on locus of control and self-efficacy, and optimism and confidence in managing triggers and headaches, for headache sufferers who read the information. A new website was developed to counter these problems based on an abbreviated version of *Learning to Cope with Triggers* (EASE). This website was compared with an existing commonly accessed, influential website (WebMD) that was of equal length and equivalent reading difficulty, in terms of the reactions of adults who had suffered from frequent headaches for at least 12 months.

Hypotheses 1 and 3 were fully supported, and hypothesis 2 was partially supported. The mean scores on the 10 variables measured were superior for the EASE website compared to the WebMD website, with differences reaching statistical significance for the Locus of Control Chance subscale, Self-Efficacy, 'confidence', 'optimism', and 'frequency/intensity/duration'. The difference on the Locus of Control Internal subscale was

not significant at the conservative alpha level of .001 chosen for the analysis but was significant at the usually chosen alpha level of .05. Also, there was a trend for a difference on 'recommendation' (i.e., $p < .07$). These results indicate that after reading the EASE website compared to the WebMD website, participants believed that their headaches and headache relief were less influenced by chance, they had more confidence in their ability to prevent and manage headaches, and they were more optimistic that their headaches might decrease in frequency, intensity and duration. As self-efficacy has been shown to moderate the impact of stressful events on headaches (Marlowe, 1998), and self-efficacy is positively associated with the use of positive coping strategies to prevent and manage headaches (French et al., 2000), these outcomes of reading the EASE website material should be beneficial in terms of improvement in headaches. Changes in headache self-efficacy and locus of control are regarded as essential for the success of self-management interventions for migraine (Seng & Holroyd, 2010).

With respect to advice to avoid all triggers of headache and migraine, although this has been standard for many years, since the three reviews criticising this approach were published (Martin, & MacLeod, 2009; Martin, 2010a; Martin, 2010b), some support for the alternative approach of *Learning to Cope with Triggers* has appeared in the literature. For example, the European Federation of Neurological Societies guidelines on the treatment of tension-type headache include "Identification of trigger factors should be performed, as coping with trigger factors may be of value (Martin & MacLeod, 2009)" (Bendtsen et al., 2010). In a review article, Gaul et al. (2011) state "The focus should not only be on avoidance of headache triggers, but the therapy also working on active management and coping of headache (Martin, 2010a)". Panconesi, Bartolozzi and Guidi (2011) note "A controlled exposure, which is the philosophy of 'coping with triggers', seems particularly worthwhile with food triggers (Martin, 2010b)", and flag the cited reference as a paper "Of major

importance". These statements represent a landmark shift in the literature. Parenthetically, the chronic pain literature has gone in a similar direction driven by fear-avoidance models of chronic pain (e.g., Crombez, Eccleston, Van Damme, Vlaeyen, & Karoly, 2012), with, for example, some success demonstrated with interventions that target pain-related fear using exposure (Leeuw et al., 2007).

Of course, the findings of this study are only suggestive of changes that should take place to advice and information with respect to headaches on the internet. The design only involved testing the two groups after exposure to a website, on the assumption that the groups did not differ before the intervention. Testing before and after the intervention would have enabled checking this assumption and investigating how much change came about as a result of viewing the websites. This would have increased substantially the burden of taking part in the study and hence a larger incentive might be required to encourage people to volunteer and complete the study. The design would also have been strengthened by having a third group complete the measures twice but viewing a 'control' for the website information (e.g., reading the same length and difficulty of material but with no headache content) between the two completions, as this would control for completing the measures twice.

The sample in the study was small, although large enough for statistically significant findings to emerge. The sample size did not allow sub-analyses that could investigate factors that might predict readers' reactions to the two websites (e.g., headache diagnostic type or medication usage). The study looked at reactions to internet sites on various scales, and whether this would translate to behavioural change is unknown, let alone whether it would translate into clinical benefits. The empirical literature on the best way to manage headache triggers is still at an early stage. The conclusions drawn are based on a comparison between EASE and WebMD, and different results may have been found if an alternative traditional website had been used, although the various headache websites have much in common.

Nevertheless, websites need to be evidence-based and this does mean periodic revisions as the research literature unfolds. This study also suggests that websites should take into account the way members of the community will interpret the information on the site and the impact it will have on them. It is not enough for experts to be satisfied that the content of websites is accurate as members of the community might draw different conclusions from the information provided than was intended by those who contributed the information, and members of the community might act in accordance with the inferences that they have made.

The results of this study should be viewed as preliminary, and further research is needed with pre-testing as well as post-testing, a control group, and a larger sample.

As people around the world use the internet more and more to help them with health problems, more research is needed to find out what information and advice is most beneficial to the different seekers of information.

Key points

What is already known about this topic

- Internet websites that present information on headaches encourage readers to avoid the triggers of their headaches, state that migraine is a genetic disorder, and that there is no cure for migraine.
- Evidence is accumulating that a philosophy of learning to cope with triggers is superior to an approach that simply encourages avoidance of all triggers.
- The advice given on headache websites is not only out-of-date but is also likely to result in lower internal locus of control, reduced self-efficacy, and decreased optimism in managing headaches, which in turn is likely to have an adverse effect on headaches.

What this topic adds

- Reading a website that advocates learning to cope with triggers rather than avoidance of all triggers is associated with beliefs that headaches are less influenced by chance, more confidence in capacity to prevent and manage headaches, and more optimism that headaches may decrease.
- The cognitive impact of the coping website should translate to benefits in headaches in the future.
- Websites should be updated accordingly.

Authors

The authors are both psychologists. The primary author has been engaged in headache research for over 40 years and the other author has recently completed her Masters degree in health psychology.

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Table 1

Demographic and Headache Characteristics of Participants

Variable		<u>Group 1 - WebMD</u>		<u>Group 2 - EASE</u>		Total
		Number	Percentage	Number	Percentage	
Gender	Female	21	68%	21	68%	42
	Male	10	32%	10	32%	20
Age (years)	18-28	3	10%	5	16%	8
	29-39	10	32%	14	45%	24
	40-50	10	32%	5	16%	15
	51-61	6	19%	5	16%	11
	62-72	2	6%	2	6%	4
Headache type	Tension-type	10	32%	6	19%	16
	Migraine	21	68%	24	77%	45
	Other	0	0%	1	3%	1
Length of headaches (years)	1 to 2	0	0%	4	13%	4
	2 to 3	2	7%	0	0%	2
	3 to 4	4	13%	6	19%	10
	4 to 5	8	26%	3	10%	11
	More than 5	17	55%	18	58%	35

Table 2

Descriptive Statistics for Self-Efficacy and Locus of Control, and MANOVA Results

Variable	Group	<i>n</i>	<i>M</i>	<i>SD</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>	η^2
Self-Efficacy					1	22458	24.13	.00	.29
	1 - WebMD	31	93.77	23.27					
	2 - EASE	31	131.8	36.33					
Locus of Control: Health Care Professionals					1	362.9	3.48	.07	.06
	1 - WebMD	31	29.19	9.77					
	2 - EASE	31	24.35	10.64					
Locus of Control: Internal					1	298.3	4.26	.04	.07
	1 - WebMD	31	38.39	6.88					
	2 - EASE	31	42.77	9.63					
Locus of Control: Chance					1	2415	15.61	.00	.21
	1 - WebMD	31	36.68	10.17					
	2 - EASE	31	24.19	14.36					

Table 3

Descriptive Statistics for Survey Questions, and t-test Results

Survey Question	Group	<i>n</i>	<i>M</i>	<i>SD</i>	<i>df</i>	<i>t</i>	<i>p</i>	<i>M^{diff}</i>	<i>SD^{diff}</i>
I feel confident in managing my headaches after viewing the website content.	1	31	3.87	1.648	60	-2.86	.006	0.46	.46
	2	31	5.19	1.973					
I feel optimistic in managing my headaches after viewing the website content.	1	31	3.87	1.727	60	-3.09	.003	-1.42	.46
	2	31	5.29	1.883					
I feel motivated to seek treatment for my headaches after viewing the website content.	1	31	4.65	1.427	60	-1.66	.103	-0.68	.41
	2	31	5.32	1.777					
I am optimistic that my headaches might decrease in frequency, intensity and duration after viewing the website content.	1	31	3.06	1.806	60	-4.27	.000	-2.00	.47
	2	31	5.06	1.879					
I am satisfied with the information provided on the website.	1	31	5.35	1.330	60	-1.64	.107	-0.58	.36
	2	31	5.94	1.459					
I am likely to recommend the website to others.	1	31	4.97	1.643	60	-1.85	.069	-0.77	.42
	2	31	5.74	1.653					

Appendix I: EASE (Website 2)

Headache triggers refer to anything that can lead to or aggravate a headache/migraine, and include stress, anxiety, flicker, glare, noise, certain foods, hunger, weather conditions, too little sleep, and for females the menstrual cycle. The traditional advice given by medical practitioners and on the internet has been that the best way of preventing headaches is to avoid these triggers. Although this advice sounds logical, it has been criticised in recent years on the grounds that there is no evidence it works, it is virtually impossible to follow given how common triggers are, and attempts to avoid triggers or escape from triggers may lead to reduced tolerance for triggers (sensitisation). Hence, avoidance could result in short-term gains but reduced tolerance may result in more headaches in the longer term. Evidence is now emerging that a better strategy may be a philosophy of ‘learning to cope with triggers’, whereby different triggers are managed in different ways. In some cases, avoidance may be the best approach but for other triggers the goal should be to desensitise or increase tolerance for the triggers which can be achieved by appropriate exposure strategies. Below are some general suggestions about trigger management followed by four specific strategies.

First, do not think that headache triggers are out there and hence headaches are inevitable for you. You should not approach life by trying to avoid all potential headache triggers which would result in a very restricted lifestyle. Headaches have a genetic component but are also a function of how you live your life (family relationships, work, recreational activities, etc). It is not easy to overcome a headache disorder but with effort it is possible for anyone to reduce their headaches to the occasional mild/moderate headache.

Second, a good starting point is to keep a record of your headaches and what you think may have triggered/aggravated them as this will help you to accurately identify the triggers. Remember that there are many different potential triggers and headaches may sometimes occur as a result of several triggers occurring at low levels of intensity (i.e., barely noticeable) around the same time so that the effect is additive.

Four strategies for managing headache triggers (EASE)

1. **Experiment** – some factors that you think are headache triggers may not be. If there is any doubt whether a trigger really can lead to headaches test whether it can by exposing yourself to a mild version of the trigger to see what happens. Foods are the best examples of factors that are often believed to trigger headaches when this is not the case. Do not ‘experiment’ in a way that sets you up for a severe headache.

2. **Avoid** – there are some triggers that are best avoided. These tend to be the triggers that not only precipitate headaches but are bad for your health/well-being. Good examples here would be toxic fumes, lack of sleep, extreme hunger, and dehydration. Avoidance may be the best strategy for triggers that are relatively rare and extreme.
3. **Stress** – stress is the most common trigger of headaches and generally avoiding ‘stressors’ is not the best way to manage stress mainly because it is impossible to avoid all stressors. The approach here should be to learn to cope with stress – stress management. There are a range of skills that can be learnt to help with stress such as relaxation and ‘positive thinking’. A good strategy can be inducing mild stress by imagining being in a stressful situation and then practising the coping skills.
4. **Exposure** – it is possible to reduce the capacity of some triggers to precipitate headaches by ‘graduated exposure’ to the triggers. That is, exposing yourself to a trigger whereby the intensity of the trigger and duration of exposure to the trigger are challenging but fall short of a level where it would precipitate a significant headache. This enables desensitisation to take place and the build-up of tolerance for the trigger. As tolerance develops you can expose yourself to more intense versions of the trigger or for longer periods. This approach can work well for emotional triggers such as anxiety (for which it is the standard treatment), and ‘environmental triggers’ such as flicker, glare and eyestrain.

Appendix II: WebMD (Website 1)

Coping With Migraines and Headaches

Are Migraines Hereditary? Yes, migraines have a tendency to be hereditary. Four out of five migraine sufferers have a family history of migraines. If one parent has a history of migraines, the child has a 50% chance of developing migraines, and if both parents have a history of migraines, the risk jumps to 75%. The exact causes of migraines are unknown, although they are related to changes in the brain as well as to genetic causes. People with migraines may inherit the tendency to be affected by certain migraine triggers, such as fatigue, bright lights, weather changes, and others. For many years, scientists believed that migraines were linked to expanding and constricting blood vessels on the brain's surface. However, it is now believed that migraines are caused by inherited abnormalities in certain areas of the brain. There is no cure for migraines. However, there are many drugs available to treat or even prevent some migraines.

Headache Solution: Identify Triggers

Many migraines seem to be triggered by external factors. Possible triggers include: emotional stress, changing weather conditions, menstrual periods, excessive fatigue, skipping meals, changes in normal sleep pattern, sensitivity to specific chemicals and preservatives in foods. Migraine sufferers are generally highly affected by stressful events. During stressful events, certain chemicals in the brain are released to combat the situation (known as the “flight or fight” response). The release of these chemicals can provoke vascular changes that can cause a migraine. Repressed emotions surrounding stress, such as anxiety, worry, excitement, and fatigue can increase muscle tension and dilated blood vessels can intensify the severity of the migraine. If you can identify your most common triggers, you may be able to cut off headaches before they start. The best way to accomplish this is through a headache diary. Keep a daily log of foods you eat, stressful events, weather changes, and physical activity. Whenever you have a headache, record the time it starts and stops. This will help you find patterns, so you can try to avoid your personal triggers. For people susceptible to migraine triggers, the best way to prevent a headache is to avoid the triggers. Follow these tips:

- Watch what you eat and drink. If you get a headache, write down any food or drink you had before getting it. If you see a pattern over time, eliminate that item! Curb the caffeine. Excess caffeine (in any food or drink) can cause migraines. But be careful: Cutting back

abruptly may also cause migraines. Eat regularly. Skipping meals can trigger migraines in some people.

- Be careful with exercise. Although doctors advise getting regular exercise to stay healthy, exercise can trigger headaches. You may need to take an anti-inflammatory drug to prevent exercise migraines.
- Get regular sleep. Changes in your normal sleep habits can cause migraines. Being overly tired can also trigger migraines.
- Learn to cope with stress. Emotional upsets and stressful events are common migraine triggers. Anxiety, worry, fatigue, and excitement can intensify a migraine's severity. Learn to cope with stress better -- through counseling, biofeedback, relaxation training, and possibly taking an antidepressant.
- When the temperature changes, so does the likelihood of developing a migraine. Whether it's a heat wave or a cold snap, the change can trigger a headache. Sunny, hot days are another common culprit. Rain or changes in barometric pressure also may lead to headaches. While you can't change the weather, you can wear sunglasses on a bright day, minimize dehydration, and avoid midday sun.
- Over-the counter pain relievers such as acetaminophen, aspirin, ibuprofen, and naproxen are effective against many types of headaches. But avoid taking these drugs continuously, as this can result in medication overuse headaches or rebound headaches -- headache pain that returns as soon as the pills have worn off.