Pseudoscience: a case study of a South African lifestyle magazine, and a survey of its usage

by

Lin (Linda Carol) Besaans

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Supervisor: Prof. George Claassen

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Abstract

Across the globe scientists are taking issue with pseudoscience, as well as the role of the media in promoting it. Articles based on pseudoscience, especially those relating to Complementary and Alternative Medicine (CAM) that fall outside the realms of orthodox medicine, are common in all forms of media, but especially in women's health and lifestyle magazines.

Scientists are quite vociferous in their condemnation of CAM for both ethical and safety reasons, since neither the therapies nor the remedies associated with CAM practices have been proven to be efficacious, or even safe. In fact, some of the therapies and advice offered by CAM practitioners are dangerous and, in some instances, may even be life threatening. Nevertheless, the media continue to promote CAM, and the public continues to support it – despite the warnings and denunciation by scientists.

This is an exploratory study to determine the prevalence of pseudoscience, generally, in South African women's health and lifestyle magazines, and to uncover the reasons the public supports it. The magazine *Longevity* is used as an example of this type of publication, and a content analysis is used to illustrate the prevalence of pseudoscience articles and adverts in South African media, while field research, in the form of personal interviews, attempts to determine the reasons people support CAM in spite of its denunciation, as well as the media's role in fostering this support.

Both mainstream science and pseudoscience are described, while a literature review reveals the scientific perspective of CAM, provides examples of the more popular forms of CAM and the dangers inherent in them, as well as the ways in which science and pseudoscience in general, are handled by the media. Using the hypodermic needle theory, plus the results of the content analysis and field research, this study shows that media promote pseudoscience because it pays; the public support CAM because they believe it works; and that that belief is primarily the result of public disillusionment with the practice of orthodox medicine, rather than the result of media's promotion of CAM, as scientists contend.

Opsomming

Wetenskaplikes van regoor die wêreld het ’n probleem met pseudowetenskap, sowel as die rol wat die media speel om dit bevorder. Artikels gebaseer op pseudowetenskap, veral dié met betrekking tot Aanvullende en Alternatiewe Medisyne (AAM), wat buite die grense van ortodokse medisyne val, is algemeen in alle vorme van media, maar veral in gesondheid-en lewenstyltydskrifte vir vroue.

Wetenskaplikes is baie uitgesproke in hul veroordeling van AAM om beide etiese en veiligheidsredes, omdat nóg die terapie nóg die middels wat verband hou met AAM praktyke bewys is om doeltreffend, of selfs veilig te wees. Trouens, sommige van die terapieë en advies wat aangebied word deur AAM beoefenaars is gevaarlik, en in sommige gevalle selfs lewensgevaarlik. Tog hou die media aan om AAM te bevorder, en die publiek om dit te ondersteun – ten spyte van die waarskuwings en veroordeling deur wetenskaplikes.

Hierdie narvorsing is ’n verkennende studie om die voorkoms van pseudowetenskap in Suid-Afrikaanse vroue se gesondheid- en lewenstyltydskrifte te bepaal, en die redes te ontbloot waarom die publiek dit ondersteun. Die tydskrif *Longevity* word gebruik as ’n voorbeeld van hierdie tipe publikasie, en ’n inhoudsanalise word gebruik om die voorkoms van pseudowetenskaplike artikels en advertensies in die Suid-Afrikaanse media te illustreer, terwyl navorsing in die veld, in die vorm van persoonlike onderhoude, poog om die redes te bepaal waarom mense AAM ondersteun, ten spyte van veroordeling, sowel as die rol wat die media speel in die bevordering van hierdie ondersteuning.

Beide hoofstroom wetenskap en pseudowetenskap word beskryf, terwyl ’n literatuuroorsig die wetenskaplike perspektief van AAM ontbloot, voorbeelde van die meer populêre vorme van AAM word verskaf asook van die gevare daaraan verbonde, sowel as die maniere waarop wetenskap en pseudowetenskap in die algemeen, hanteer word deur die media. Met behulp van die spuitnaald teorie, plus die resultate van die inhoudsanalise en navorsing in die veld, bewys hierdie studie dat die media pseudowetenskap bevorder, want dit betaal; die publiek ondersteun AAM omdat hulle glo dit werk; en dat daardie geloof primêr die gevolg is van openbare ontnugtering met die beoefening van ortodokse medisyne, eerder as die gevolg van die media se bevordering van AAM, soos wetenskaplikes beweer.

This work is dedicated to Allan Sztab.

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Chapter 1

Introduction

This research was prompted by the fact that, globally, scientists are concerned by media's uncritical reporting and coverage of pseudoscientific claims, and that they hold the media responsible for pseudoscience's rising popularity among the public (Goldacre, 2009: 251; Kruglyakov, 2002; Offit, 2013: 6; Park, 2001: 26; Pigliucci, 2010: 85; Sagan, 1996a: 17; Singh & Ernst: 2009: 310). The media have a powerful public influence and print media, particularly, tend to portray a very positive and simplistic view of pseudoscience theories (Singh & Ernst, 2009: 314-321). Scientists are adamant that the media's portrayal of pseudoscience is anything but the truth, and that many of the practices they actively promote are not only unproven, but may endanger health and lives (Offit, 2013: 5; Singh & Ernst, 2009: 295-302).

Personal observation reveals that most health and lifestyle magazines in South Africa, particularly those aimed at women, contain articles on pseudoscience. These articles are not restricted to magazines, but have become pervasive in most forms of media (Kruglyakov: 2002). However, despite the fact that scientists constantly warn the public against pseudoscience (Goldacre, 2009: 335; Park, 2001: 15; Pigliucci, 2010: 57), the media persistently promote it (Goldacre, 2009: ix-x; Park, 2001: 10; Pigliucci, 2010: 84), and audiences continue to support those media, as well as pseudoscience practices, most especially complementary and alternative medicine (hereafter referred to as CAM) (Harvey, 2008: 7; Ernst & White, 2000: 32). CAM forms an integral part of pseudoscience and, for the purpose of this study, includes any kind of treatment that is not practised by orthodox medicine, and for which scientific evidence is lacking. Since there are currently in excess of one thousand known CAM practices (Shapiro, 2009: 1), these are not listed in this study. However, a full description of pseudoscience, plus examples of the more popular forms of CAM, is provided.

Although scientists accuse the media of profiting from the scientific ignorance of readers (Goldacre 2009: 224,225; Lipps, 1999: 3), media practitioners feel that scientific illiteracy, on the part of journalists and audiences, is to blame (Claassen, 2011: 364). Nevertheless, publications that contain pseudoscience continue to appear on bookstore shelves and in supermarkets, and books on CAM regularly feature on bestseller lists of, for example, *The New York Times.* Thus, they are clearly fulfilling some need in their audience. And, while research has been conducted in the United

States (Astin, 1998: 1548) and in the United Kingdom (Ernst & White, 2000: 32) to determine why the public continues to support pseudoscience – especially CAM – despite scientists' public denunciation, no such research has been published in South Africa. However, Claassen (2014) has recently published a book on CAM in a South African context.

This research project comprises two separate components. The first component is to illustrate the prevalence of pseudoscience, generally, in a South African women's health and lifestyle magazine. To achieve this, quantitative research, in the form of a content analysis, is conducted on *Longevity* magazine, which is used as a representative example of this type of media. Since it is CAM that scientists are most concerned about, the second component is to determine the reasons South Africans continue to support therapies that have been publicly denounced as being dangerous (Singh & Ernst, 2009: 348; Harvey, 2008: 7; Offit, 2013: 5), and also to establish the media's role in promoting this support. A thorough literature survey reveals the reasons scientists feel the way they do about pseudoscience; provides a historical perspective on CAM, and exposes the foundations on which the more popular forms of CAM are based; it also describes the dangers inherent in CAM; describes ways in which the media promote it and, finally, provides various theories for the beliefs we hold.

Mainstream science and pseudoscience: what is the difference?

Mainstream science

Essentially, science is proven knowledge that is acquired from observations and experiments (Chalmers, 1985: 1). It is from these, that the laws and theories that comprise scientific knowledge are derived (Chalmers, 1985: 3). To achieve these laws and theories, the number of observations must be large, they must be repeated under a variety of conditions, and the results under all conditions must remain consistent with the law so derived (Chalmers, 1985: 4).

Perhaps the most frequently used definition of science may be Popper's (1963): 'the criterion of the scientific status of a theory is its falsifiability, or refutability, or testability'. By this, he meant that all theories in science can be 'falsified', or proven wrong, if and when new information is discovered that conflicts with the original observation or experiment (Pigliucci, 2010: 2). In other words, when a scientist has an idea, or a hypothesis as it is generally called in science, which does

not stand up to rigorous testing explained above, the hypothesis is abandoned – this is how science progresses (Hood, 2009: 60). Although scientists have criticised Popper's view as being too simplistic since some theories cannot be falsified (Carroll, 2013; Pigliucci, 2010: 3), his statement was made in relation to pseudoscience and is, thus, relevant to this study.

Wilson's (1998: 53) definition is a little more definitive than Popper's: 'science is the systematic enterprise of gathering knowledge about the world and organizing and condensing that knowledge into testable laws and theories'. These laws and theories form the foundation of scientific knowledge, and are achieved by means of the scientific method. This is a methodical and systematic investigation used in science that is based on evidence, and not merely on opinion or personal experience (Babbie & Mouton, 2001: 6). As Shermer (1997: 20) puts it: 'Through the scientific method, we aim for *objectivity*: basing conclusions on external validation. And we avoid *mysticism:* basing conclusions on personal insights that elude external validation'.

Some scholars (Cousins, 1979: 121) believe that the scientific method is the most important characteristic of science, and describe it as 'a way of thinking systematically, a way of assembling evidence and appraising it, a way of conducting experiments so as to predict accurately what will happen under given circumstances, a way of ascertaining and recognizing one's own errors, a way of finding the fallacies in long-held ideas'. Put simply, the scientific method involves the measurement of repeated observations, and requires certain steps to be followed (Babbie & Mouton, 2001: 8), all of which ensure that another researcher applying the same method will obtain similar, quantifiable results. The results are then used to establish universal laws, which are used by researchers to control and predict certain phenomena (Babbie & Mouton, 2001: 8). 'It is the evidence that matters, and as limited as it may be, the scientific method is the best tool we have for determining which claims are true and which are false' (Shermer, 1997: XVII).

The success and credibility of science is based on researchers obeying two rules:

- 'Expose new ideas and results to independent testing and replication by other scientists.

- Abandon or modify accepted facts or theories in the light of more complete or reliable experimental evidence' (Park, 2001: 39; American Physical Society).

These rules provide science with a self-correction mechanism that differentiates it from other kinds of knowledge (Park, 200l: 39; Shermer, 1997: 124). This sometimes leads to new results that invalidate old ones, so previously held scientific theories may change (Hood, 2009: 60; Park, 200l: 39; Shermer, 1997: 124), which correlates with Popper's view on 'falsifiability'. As Campbell (2002: 7) states, a core feature of science is that it proceeds by constantly questioning its own assumptions. Thus, in science, few claims are accepted as final (Shermer, 1997: 124; Wilson, 1998: 59), and the 'truth' of science does not imply infallible or unchangeable knowledge, merely facts that are true and valid at the time they are discovered (Babbie & Mouton, 2001: 8; Shermer, 1997: 124).

'In science, knowledge is fluid and certainly fleeting. This is at the heart of its limitations. It is also its greatest strength' (Shermer, 1997: 124). Unfortunately, this aspect of science is often viewed with suspicion by a public who do not understand its dynamic nature. As a result, they tend to seek certainties and assurances that science cannot offer and, consequently, turn to pseudoscience that does offer them (Pavić, 2013: 152; Park, 200l: 39; Shermer, 1997: 5). And, apparently, purveyors of pseudoscience are quick to exploit science's honesty with regard to its failures and limitations, and use it to their own advantage (Tallis, 2007: 7).

Finally, Lawler (2014) explains science as being empirical. It is not to be satisfied with dogma or opinion or, '[a]s Socrates repeatedly explains, it's not to rely on hearsay evidence' (Lawler, 2014). And therein lies the crucial difference between science and pseudoscience – one is factual, the other is anecdotal.

Pseudoscience

'Pseudo' means fraudulent or false and, thus, 'pseudoscience' literally means 'false science' (Westre, 2010). Lipps (1999: 1) defines pseudoscience as theories that claim to be scientific, but which have never been scientifically tested. Rather, these theories are based on 'selected or inadequate evidence, false authority, unsupported beliefs' (Lipps, 1999: 1), rationales or philosophies (Ernst, 1993: 44), as well as myths (Claassen, 2014: 59) such as the one dating back to 16th century Europe, when it was believed that having sex with a virgin would cure sexually transmitted diseases, and

which continues to be perpetuated in South Africa today (Earl-Taylor, 2002). Anecdotes provided in support of a claim do not make it science – these are told by fallible, human storytellers, whereas science is based on controlled experiments (Shermer, 1997: 48) and observations (Chalmers, 1985: 1) as described above.

Popper's statement, provided earlier, is sometimes referred to as the 'demarcation problem', since it attempts to draw the line between science and pseudoscience (Carroll, 2013). Popper intended it to assist the public in distinguishing between the two because he believed pseudoscience is 'too common and damaging, for an open society to afford ignorance on the matter' (as cited in Pigliucci, 2010: 2). As explained, science progresses by eliminating wrong theories (Hood, 2009: 60). In contrast, pseudoscience does not progress because its theories are manipulated to fit any particular or desired situation (Pigliucci, 2010: 3), they are also vague and malleable (Davidson: 1999), and are framed in ways that make them difficult to prove (Sagan: 1996b). Furthermore, in contrast to Popper's statement that all scientific theories can be 'falsified' or proven wrong, pseudoscience 'includes hypotheses that cannot be proven false' (Lindeman, 1988: 257). For example, those who believe in the supernatural accept these beliefs until they are disproven but, as Hood (2009: 60) says, it is impossible to disprove anything' because you cannot say that something does not exist, nor can you say that it will never exist in the future. Also, pseudoscience uses science to support its claims – for example, in South Africa, the manufacturer Solal, renowned for its anti-aging remedies, has claimed that the anti-aging effects of resveratrol contained in their anti-aging pill, and which is found in earthworms and flies, can be extrapolated to humans' despite the fact that its safety in humans has not been established (Camcheck, 2013).

Essentially, then, pseudoscience is any theory that has no evidence to support it. These theories generally form the foundation for CAM and, in addition to there being no evidence to support them, they have also never been subjected to the same stringent tests required of orthodox medicine (Ernst, 1993: 44; Harvey, 2008: 7; Loxton, 2007; Pavić, 2013: 149; Singh & Ernst 2009: 36). The principles underlying CAM are not dissimilar from any other pseudoscience, and are derived from 'intuition, anecdote and tradition, which means that CAM is based on personal opinions, the opinions of others and the opinions of our forefathers' (Singh & Ernst 2009: 347). In this sense, traditional beliefs may present a challenge in certain societies since the belief system of one society may be perceived as pseudoscience by

another (Claassen, 2011). For instance, in South Africa, traditional healers are dissatisfied that the Medicines Control Council is willing to register many forms of CAM, but not traditional African medicine (Njanji, 2014). In the Council's defence, it does become difficult to register medicines that are prescribed by 'spirits', or which entail the use of vaginal secretions or the scrapings from armpits (Doctors for Life International). However, there is no place for political correctness in science, and the same principle applies to traditional medicine as to any other – if there is no scientific evidence for a theory, it is regarded as pseudoscience.

According to Park (2001: 67), CAM consists of 'a bewildering array of untested and unregulated treatments, all labelled alternative by their proponents. Alternative seems to define a culture rather than a field of medicine – a culture that is not scientifically demanding. It is a culture in which ancient traditions are given more weight than biological science, and anecdotes are preferred over clinical trials'. This statement is echoed by Shapiro (2009: 35) who argues that CAM is either unproven or disproven, and that the 'evidence' for it is purely anecdotal, with patient testimonials taking the place of evidence.

Some medical professionals are quite outspoken about CAM: 'There is no alternative medicine. There is only scientifically proven, evidence-based medicine supported by solid data or unproven medicine for which scientific evidence is lacking' (Fontanarosa & Lundberg, 1998: 1618). This statement seems to confirm the feelings of the majority of scientists and orthodox medical practitioners with regard to CAM (Offit, 2013: 6; Goldacre, 2009: xi; Singh & Ernst 2009: 347; Bowditch, 2008: 30), while some (Bowditch, 2008: 32) feel so strongly about the unsubstantiated claims made by CAM practitioners, they prefer to call it SCAM.

Conclusion

The definitions provided in this chapter provide clear lines of demarcation between true science and pseudoscience. However, many other practices besides CAM fall within the realms of pseudoscience, including astrology, creationism, intelligent design, as well as supernatural phenomena such as religion, communications with the dead, and mind control. Although some readers may find the fact that these practices are included in pseudoscience contentious they, nevertheless, fit the definition provided, since none of them has ever been scientifically proven. In fact, science itself is not immune to the practice of

pseudoscience, as will be illustrated later in the vaccination scandal attached to a mainstream scientist, Andrew Wakefield. While the facts in this study are relevant to most pseudoscience, the study focuses on CAM because science and orthodox medicine consider these practices potentially harmful, if not lethal, and they hold the media responsible for their rising popularity. Thus, the implication is that the media are promoting, and profiting from, theories that are not only fraudulent, but may actually endanger people's lives. The literature review, which follows, is an attempt to uncover the scientific and historical facts about CAM, to determine the media's role in promoting it, and to establish the reasons that people believe the things they do.

Chapter 2
Literature Review

The emergence and rise of CAM

Complementary and Alternative Medicine, generally known as CAM, and its products have been around for a long time:

'We'll drink a drink a drink
To Lily the Pink the Pink the Pink
The savior of the human race
For she invented medicinal compound
Most efficacious in every case' (Lyricsmode).

Although the author of this song is unknown, it was originally sung by The Scaffold in the late 1960s, and is based on the folk song 'The Ballad of Lydia Pinkham' (Songfacts), about a woman regarded as the 'queen' of patent medicine (Loxton, 2007). In 1875, Pinkham created a business empire based on the sales of a herbal concoction aimed at women, and which claimed to relieve "all of those Painful Complaints and Weaknesses so common to our best female population" (Loxton, 2007). As appears to be the case with many CAM remedies, the advert claimed it was a cure for almost anything (Shermer, 2002: 41), including tumours: "98 out of every 100 women who take the medicine for the ailments for which it is recommended are benefited by it. This is a most remarkable record of efficiency. We doubt if any other medicine in the world equals it" (Loxton, 2007).

This claim led to the lyrics of the song, 'she invented medicinal compounds, most efficacious in every case'. However, Dr Harriet Hall (cited in Loxton, 2007) who is regarded as a 'quack medicine expert', says of Pinkham, 'we have no idea whether her product was effective or safe, since it has never been properly tested'. CAM therapists are frequently referred to as 'quacks', which, in English, refers to someone who claims to have knowledge of subjects in which he is actually ignorant. It stems from the Dutch word *kwakzalver,* which refers to someone who boasts about their 'supposedly healing salves' (Shapiro, 2009: 25). Today, there are websites dedicated to exposing the truth and dangers attached to CAM practices, e.g. Quackwatch, and South Africa's own CAMcheck. Nevertheless, when it comes to CAM, little appears to have changed because now, over a hundred years later, similar remedies are still being concocted and marketed by CAM practitioners, with

unverified claims similar to Pinkham's, and no obligation to prove whether their product/therapy works or is even safe (Adams, 2008:26; Ernst, 1993:44; Fontanarosa & Lundberg, 1998: 1618; Harvey, 2008: 7; Loxton, 2007; Park, 2001: 67; Shaw, 2009: 2).

But CAM has a history way beyond 'Lily the Pink' – in the form of herbal medicine – for which there is evidence dating back 5 000 years (Singh & Ernst 2009: 235); acupuncture – possibly as far back as the second century BC (Singh & Ernst 2009: 59l); and homeopathy – 1790 (Singh & Ernst 2009: 119). While Ayurveda, a dominant form of traditional medicine practised in India, but now also popular in the West, claims to have 'originated with the origin of the universe' (quoted by Shapiro, 2009: 72).

In the early days of medicine, 'balance' was important to health (Shapiro, 2009: 6). Balance was 'either within the individual, or between the individual and the whole of nature or even the universe' (Shapiro, 2009:6), and a host of risky medical procedures, such as bloodletting, were undertaken to restore it (Singh & Ernst, 2009: 118). Today, a similar idea of 'balance' constitutes a major component of CAM (Shapiro, 2009:7). Most CAM therapists claim to restore balance and, thereby, the patient's health (Shapiro, 2009:7). 'Bring your mind into balance and your body will follow' is a typical CAM statement (Shermer, 2002: 42).

The concept of balance also emerged as part of the youth culture of the 1960s that questioned authority, including medicine (Shapiro, 2009: 17). The so-called hippies of that era searched beyond science and religion for some sense of purpose in life (Shapiro, 2009: 17). This was expressed as 'holism' or the theory that matter and reality comprise a whole that is greater than the sum of its parts (Shapiro, 2009: 17). However, the concept of holism actually originated with Hippocrates (Cousins, 1979: 111), considered the father of orthodox medicine, who freed medicine from superstition and incorporated it into science (Sagan, 1996a: 11). Hippocrates believed that the body naturally heals itself, and any treatment that may hamper this process should be avoided (Cousins, 1979: 111). Although Hippocrates' principle of holism has been reiterated by medical scientists throughout history (Cousins, 1979: 112), CAM has adopted it and uses it to describe their claim that they treat the 'whole' person (Shapiro, 2009: 29; Singh & Ernst 2009: 270), not merely the disease (Campbell, 2002: 9). In CAM, holism takes into account the patients' diet, lifestyle and emotions (Campbell, 2002: 9) as well as their personal life, sense of well-being,

life purpose, and is often based on spirituality (Astin, 1998: 1552; Pavić, 2013: 149). Viewing patients in this 'holistic' way seems to cater to the human need for treatment and attention, and many patients use CAM even when they are not ill, merely to keep their 'energy in balance' (Shapiro, 2009: 19).

In fact, a World Health Organization review revealed that more than half of users use CAM when they are not ill to keep their 'energy in balance' (Shapiro, 2009:19). Practitioners of CAM often refer to 'energy' and, while it is generally held to mean the life force, there is no consensus among them on what it is or how it works, although there have been some vague analogies with modern physics (Campbell, 2002: 11). Magical beliefs are one of the fundamental differences between CAM and orthodox medicine, a factor that is evidenced by the belief in supernatural forces, variously called vitalism, life force, balance, etc., which are universal in CAM (Shapiro, 2009: 230).

Two separate surveys conducted on CAM users, one in Britain and one in the United States, revealed the following similar results: respondents chose CAM because they liked it; found it relaxing; used it to promote their health and wellbeing; and found it to be more in line with their values, beliefs and philosophies towards health and life (Astin, 1998: 1548; Ernst & White: 2000: 32). Fitzpatrick (2002: 59) believes that a general decline in sources of social comfort – such as religion – causes people to turn to CAM, especially when they experience medical doctors as insensitive and unsympathetic. In fact, CAM seems to offer the kind of 'care' that can substitute for religion: 'just as religious doctrine can make life more tolerable by offering scientifically unverifiable promises that bring psychological benefits, so does alternative medicine' (Lawson, 2007). Or, as Thomas Szasz (1973: 115), the Hungarian-born American psychiatrist put it: 'Formerly, when religion was strong and science weak, men mistook magic for medicine; now, when science is strong and religion weak, men mistake medicine for magic'. In fact, there is even a view that CAM may actually be usurping religion: 'As participation in organised religion dwindles, the alternative practitioner has appropriated the caring, listening role of the parish priest' (Shapiro, 2009: 20). Also, in a world where people don't always understand technology, and are often frightened and disappointed by it, the 'spiritualism' implicit in CAM becomes an 'easy sell' for their practitioners (Offit, 2013: 43).

When it comes to 'spiritualism', the majority of CAM therapies are closely aligned with the New Age Movement (Offit, 2013: 239). While the New Age Movement is similar to traditional religions in accepting the existence of a 'supernatural realm', it differs in that it specifically 'denigrates reason and implicitly exalts magic' (Langone, 1993). It is further described as 'an eclectic collection of psychological and spiritual techniques that are rooted in Eastern mysticism, lack scientific evaluative data, and are promoted zealously by followers of diverse idealized leaders claiming transformative visions' (Dole, Langone, Dubrow-Eichel: 1990). The New Age Movement fosters belief in magic, mysticism, folk religion, ancient superstitions, and is said to provide the public – most especially the gullible – 'easy answers to difficult problems' (Dole, Langone, Dubrow-Eichel: 1990). Further characteristics associated with the New Age are 'cultic techniques of persuasion and control'; 'psychological manipulation and coercion' employed in the courses they offer and which purport to stimulate personal growth, personality, mental ability; the use of cultic practices such as channeling ('a way to hear what's on the mind of dead people'(Sagan, 1990)); as well as the use of a complexity of terms, including natural healing, energy, force, astrology, rebirthing, spiritualism, etc. (Dole, Langone, Dubrow-Eichel: 1990) - many of which readers may recognise from the history of CAM provided earlier.

Apparently the world is 'witnessing an epidemic of alternative medicine', offering more than a thousand different alternative therapies, all with one thing in common – most don't work (Offit, 2013: 6; Shapiro, 2009: 1; Singh & Ernest, 2009: 338), and those that do work as a result of the placebo effect, which is discussed below. Surveys show that, in many countries, more than half the population use some form of CAM, and the annual global spend on CAM reveals that it is the fastest-growing area of spending in medicine (Singh & Ernst, 2009: 10). Although many CAM therapies are currently referred to as 'New Age' medicine, there is nothing new about them – 'healers' have been selling placebos for centuries (Offit, 2013: 239), as described above. The placebo effect is when a treatment works because the patient believes it works – a phenomenon well documented in science (Hood, 2009: 173; Singh & Ernst, 2009: 297). The word comes from Latin, and means 'I shall please' and, classically, a placebo would have been a sugar tablet prescribed to placate a patient (Cousins, 1979: 50). In contrast to the placebo effect is the nocebo effect that may develop in response to the warned, potential side effects of a particular treatment

or drug (Rankin 2013). While nocebo effects are not pertinent to this study, the physiological effects of placebos are described in greater detail later.

The problem orthodox medicine has with CAM practitioners 'selling' placebos is that they are lying to their patients, and making them pay for something which may make them feel better, but is not a cure (Singh & Ernst, 2009: 295-302). In addition, when it comes to CAM, the remedy or treatment that induces the placebo may be harmful (Singh & Ernst, 2009: 295-302), as discussed below. While orthodox medicine also induces the placebo effect, it is not 'selling' the placebo, it is selling a remedy which is registered and proven to work – the placebo is merely a bonus (Singh & Ernst 2009: 301).

One theory regarding the rise of CAM is that modern society has become obsessed with health (Cant, 2002: 22). Despite the fact that we live longer, healthier lives than ever before, people constantly complain of malaise, pain and fatigue, for which there is no apparent cause (Fitzpatrick, 2002: 59). This has led to the term the 'worried well', and CAM feeds off this preoccupation with health 'by soothing but not curing', and by providing false hope in the form of simplistic remedies (Jenkins, 2002b, 78). According to Shapiro (2009: 196), these 'fad conditions' are highly contagious and spread through the internet, rather than in the old-fashioned way of physical contact. This is supported by Professor Edward Shorter of the University of Toronto who, in a media interview, describes how new illnesses make their debut among educated people because of their access to medical media. These middle- and upper-class people are the first to observe apparent symptoms in themselves or their children and, from here, the ailments radiate to become epidemic in the population (McLaren, 2003).

The problem with fad conditions (of which fibromyalgia is one) mentioned above, is that when orthodox medicine is unable to find an underlying cause for the 'illness', these people frequently reject the evidence, and claim there is a conspiracy to conceal it (Shapiro: 203-208). According to Shapiro (2009: 208): 'It is in exactly this superstitious environment that alternative medicine thrives'. While CAM is quick to point fingers at orthodox medicine and at the pharmaceutical industry for profiting on illness, and constantly instils this belief in its patients, CAM is very successful at 'inventing, detecting and treating illnesses and conditions that orthodox medicine and even the pharmaceutical industry cannot identify' (Shapiro: 2009: 214). Barrett & Jarvis (2005) argue that his kind of 'invented disease' provides CAM a 'slick' way of

attracting customers, since we all experience non-disease-related symptoms at various times in our lives.

Practices that were called quackery or fringe medicine in the middle of the last century were renamed alternative medicine in the 1960s, then in the 1990s renamed complementary medicine, inspired by the belief that alternative medicine could be used together with orthodox medicine, and complement it (Shapiro, 2009: 1). Today, this is termed 'integrated medicine' (or, in the USA, integrative medicine), and appears to be increasingly popular among general practitioners (Singh & Ernst 2009: 324), and among nursing professionals (Hehir, 2001), albeit with considerable disapproval from colleagues more inclined towards science and orthodox medicine (Hehir, 2001; Singh & Ernst 2009: 324).

However, in general, there is currently an enormous schism between orthodox medicine (and by implication, science) and CAM practitioners. While CAM practitioners accuse scientists of being oppressive and closed to new ideas (Shmakin, 1996), and of being paid off by the pharmaceutical industry (Novella, 2012a), scientists consider practitioners of CAM to be defensive, feel that they accuse scientists of conspiracies, and that they attack scientists when their theories are disproved (Novella, 2012a; Sagan, 1996a: 25). But Fitzpatrick (2002: 76) cautions that CAM's growing popularity reveals a loss of confidence in modern science and medicine, and forebodes a return to the superstitions and theories that science transcended over a century ago. This sentiment is shared by Dawkins (2007) who, in his documentary *Enemies of reason*, warns that a war is being fought against reason, with health becoming 'a battleground between reason and superstition'. He argues that so long as society continues to indulge unproven 'healing magic' in the form of alternative medicine whose unproven claims challenge the known laws of physics, 'tried and tested scientific medicine is under attack' (Dawkins, 2007). Ernst (2013) has also cautioned that, by encouraging people to believe in 'mystic energies', CAM undermines rationality and could ultimately harm society. Becker (1976: 143) is equally outspoken: 'the talent to mystify others is the queen of tyranny', and has warned that these 'talents and the processes of mesmerization and mystification' have to be exposed by science (1976: 165).

Some examples of the more popular forms of CAM

Homeopathy is considered the 'gateway drug of the complementary medicine habit' because it is usually the first alternative remedy people try (Shapiro, 2009: 76). It is also the most commonly used form of CAM globally, its popularity is rising (Singh & Ernst, 2009: 117), and its use is covered by some medical health schemes (Novella, 2012a). It was founded in 1790 by Samuel Hahnemann, a distinguished German physician, who became disenamoured with the way medicine was practised at the time (Singh & Ernst, 2009: 17). By chance, he discovered that by taking the treatment prescribed for malaria when he was well, induced the symptoms of the disease (Singh & Ernst, 2009: 119).

As a result, Hahnemann invented his own form of 'medicine' based on the theory that like cures like (Fienberg, 2001; Singh & Ernst, 2009: 117) or, as he termed it, the Law of Similars (Shapiro, 2009: 80). Thus, a substance that causes symptoms in a healthy person is used to treat similar symptoms in an ill person (Hood, 2009: 171; Singh & Ernst, 2009: 117). Thanks to this Law, he called his medicine '*Homöoopathie* which, roughly translated from the Greek, means 'similar suffering' (Singh & Ernst, 2009: 120). However, owing to the toxic nature of the substances used and their resultant side effects, Hahnemann began diluting them and discovered that, the more he diluted them, the fewer side effects there were (Fienberg, 2001; Shapiro, 2009: 83). This led him to the conclusion that less is more, a term he expressed as the Law of Infinitesimals (Shapiro, 2009: 83), and Hahnemann's Second Law of Infinitesimals states that 'the more dilute the dose the more effective the treatment (Hood, 2009: 172). In fact, the end product of homeopathic remedies is so dilute that it contains no active ingredients (Hood, 2009: 172; Novella, 2012a; Singh & Ernst, 2009: 125), a fact homeopaths defend by claiming that water has 'memory' (Ball, 2004; Singh & Ernst, 2009: 34). Currently, 'the typical homeopathic dilution is 30C: this means that the original substance has been diluted by one drop in a hundred, thirty times over' (Goldacre, 2009: 33). However, homeopathic dilutions of 200C and higher, are available (Goldacre, 2009: 33). Homeopathic dilutions are then frequently manufactured into sugar tablets (Hood, 2009: 172; Singh & Ernst, 2009: 125), from which whatever might remain of the original tincture soon evaporates (Shapiro, 2009: 97).

Hahnemann also discovered that when his remedies were transported in a horse-drawn carriage, the vigorous shaking of the carriage intensified their potency,

and he called this combination of dilution and shaking 'potentization' (Singh & Ernst, 2009: 121). Thus, each dilution of a homeopathic remedy underwent certain rituals – vigorous shaking (Singh & Ernst, 2009: 125), or rapping it a hundred times against some firm but elastic object, which Hahnemann believed released 'dynamic forces' called succussion or dynamism, from the dilutions, and which were preserved and intensified in subsequent dilutions (Shapiro, 2009: 83).

A third and, perhaps, less well known doctrine of homeopathy is Hahnemann's claim that at least seven eighths of all chronic disease are caused by what he termed 'psora' or, as it is more commonly known in layman's terms, 'itch' (Holmes, 1842). According to Hahnemann, 'this psora is the sole true and fundamental cause that produces all the other countless forms of disease'. Included in the list of ailments claimed to be caused by this 'itch' are: hysteria, insanity, idiocy, madness, cancer, gout, asthma, deafness, cataract, pains of every kind, and paralysis (Holmes, 1842). Oliver Wendell Holmes, the author referenced here, was a physician and professor of anatomy and physiology at Harvard (Randi, 2002), who wrote his essay in 1842 in an attempt to expose the flawed foundations upon which homeopathy is based, and to provide scientific evidence for its total inefficacy. The essay was also presented to the public in two lectures during the same year (Randi, 2002), and provides an indication of how long scientists have been attempting to caution the public about homeopathy.

The rituals involved in homeopathy are said to be an attempt to restore the patient's 'vital force' to its normal, healthy balance (Singh & Ernst 2009: 130). This vital force is likened to the 'spirit' that permeates the body, and determines one's wellbeing (Singh & Ernst 2009: 130). Thus, a homeopath treating someone with an ear infection would consider all physical and mental symptoms, then prescribe something to restore the patient's 'vital force', whereas an orthodox doctor would prescribe an antibiotic to kill the bacterium (Singh & Ernst 2009: 130). In fact, finding the correct homeopathic remedy is so complex and delicate that a patient consulting several homeopaths is likely to receive different remedies from each one (Singh & Ernst, 2009: 127). As a result of the large variety of treatments and remedies involved in homeopathy, homeopaths frequently resort to dowsing, a practice that involves swinging a pendulum above a shortlist of possible remedies, to ensure they have selected the correct one (McCarney, Fisher, Spink, Flint & van Haselen, 2002: 189; Singh & Ernst, 2009: 130). The practice of homeopathy has not changed in two

centuries, and similar rituals to those just described continue to be practised in the profession today (Singh & Ernst, 2009: 117).

There is also a lesser known but more sinister aspect to homeopathy that was practised by the Nazis during World War II, when the ashes of the spleen, testes and skin of murdered Jews was potentised in the homeopathic manner described, and sprayed across the Reich to rid it of Jews, in much the same way that the ashes of rabbits had been sprayed in agricultural areas to, apparently, rid them of rabbit infestations (Treuherz, 1992: 9). But many feel that homeopathy's most 'pernicious legacy' is Hahnemann's invention of the world 'allopathy' to describe orthodox medicine. The word is derived from Greek and means a medicine that treats symptoms with remedies that suppress or oppose them (Shapiro, 2009: 98). Although the term may have been somewhat accurate in his day (and it must be remembered that Hahnemann was also a medical doctor), considering orthodox medicine's advances in terms of treating bacteria and viruses, this analogy is no longer true. However, the term continues to be used by homeopaths in a pejorative manner, and is considered extremely offensive by practitioners of orthodox medicine (Shapiro, 2009: 98).

Considering the facts provided above, it seems little wonder that the United Kingdom government's 2010 review of homeopathy concluded that it is essentially witchcraft, and that its underlying principles are tantamount to magic (Novella, 2012a), a sentiment echoed by many others in orthodox medicine (Donnelly, 2010). 'Homeopathy is – sugar pills. They are placebos on which the equivalent of a magical ritual has been cast. Active ingredients, which themselves are as fanciful as fairy dust (Novella, 2012a), are diluted into non-existence' (Novella, 2012a; Offit, 2013: 39). While homeopaths claim to be able to treat the same ailments as orthodox medicine does, no evidence has been found to support this claim (Novella, 2012a; Singh & Ernst, 2009: 338) as evidenced by many studies, including the following:

- a meta-analysis of the clinical effects of homeopathy 'found little evidence of effectiveness of any single homeopathic approach on any single clinical condition' (Linde *et al.,* 1997: 834);
- in a critical overview of homeopathy, Jonas, Kaptchuk and Linde (2003: 393) found that: 'There is a lack of conclusive evidence on the effectiveness of homeopathy for most conditions';

- in their study to determine whether the clinical effects of homeopathy are merely placebo effects, Shang *et al.* (2005: 730), concluded that: 'there was no convincing evidence that homeopathy was superior to placebo';
- five meta-analyses of homeopathy cited by Goldacre (2007a): 1672-1673) in *The Lancet,* all of which produced the same result – that homeopathy has no significant benefit over placebo (only one of these, Shang, is listed here – see above);
- evidence provided by various scientists for the British House of Commons 2010 Science and Technology Committee report on homeopathy (Evidence Check, 2010);
- the Homeopathy Review of the Australian Government's National Health and Medical Research Council (National Health and Medical Research Council, Australian Government, 2014).

Acupuncture claims to have originated in China, but the oldest evidence for it was found in Europe in the remains of a 5 000-year-old-man bearing tattoos on his body that were found to correspond to acupuncture points (Singh & Ernst, 2009: 58). Despite the claim that it is Chinese, acupuncture has not always been popular in China and, in the early nineteenth century, was banned from the medical academy by the emperor, only to be revived by Mao Zedong in the mid-1960s (Colquhoun & Novella, 2013: 1360). It only became popular in the West as a result of a media report in which a journalist claimed to have had acupuncture in China to relieve postoperative pain (Colquhoun & Novella, 2013: 1360). Shortly after this, rumours in the West abounded that patients in China had undergone open heart surgery without anaesthesia, using only acupuncture (Colquhoun & Novella, 2013: 1360). However, these, and similar, more recent claims, have proven to be false, and Chinese demonstrations of this were also found to be faked (Colquhoun & Novella, 2013: 1360; Singh & Ernst, 2009: 66).

Acupuncture procedures involve the insertion of fine needles under the skin at particular points, and are claimed to be successful in treating a variety of ailments. Although the 'original' number of acupuncture points was 360 (Hall, 2009a; Offit, 2013:29) and was determined by the number of days in a year (Offit, 2013: 29), the number is now in excess of 2 000 (Hall, 2009a). Acupuncture is founded on the claim

that health is related to the life force called Ch'i, which is said to flow in pathways called meridians through the body (Singh & Ernst, 2009: 60). The number of meridians differs between acupuncture therapists, but may be anything from nine to eleven (Hall, 2009a), although early Chinese physicians chose the number twelve because China has twelve great rivers (Offit, 2013: 29). Needles are inserted at particular points in the body where, it is claimed, they remove blockages to the life force (Singh & Ernst, 2009: 60).

Although the principles involved in acupuncture are as unscientific as any other form of CAM, somehow it has gained credibility and, consequently, more research has been done on it than on any other form of CAM (Colquhoun & Novella, 2013). However, research has shown that there is no scientific evidence for the existence of points on the body that respond to acupuncture (Hall, 2009a), nor is there evidence for Ch'i or meridians (Singh & Ernst, 2009: 107), and clinical trials to determine the efficacy of acupuncture have proved nothing more than a placebo effect (Offit, 2013: 224; Colquhoun & Novella, 2013; Singh & Ernst, 2009: 107).

Although a World Health Organisation (WHO) report issued in 2003 claimed that acupuncture was effective, the report was found to be biased owing, perhaps, to their political correctness in the area of alternative medicine which, in this case, may have been construed as criticism against China (Singh & Ernst, 2009: 95). Since the WHO report, many research attempts have attempted to verify the claims made by acupuncture therapists, but the conclusion is that when acupuncture is effective, it is merely acting as a placebo as mentioned (Colquhoun & Novella, 2013; Offit, 2013: 224; Singh & Ernst, 2009: 113). Sham needles, acupuncture needles (Singh & Ernst, 2009: 112), and even toothpicks that don't penetrate the skin (Novella, 2009), have shown to produce the same results. This conclusion led to the Oxford Centre for Evidence-Based Medicine's verdict: 'Clinical bottom line. Acupuncture is no better than a toothpick for treating back pain' (Colquhoun & Novella, 2013). Or, 'In layman's terms, acupuncture does not work – for anything' (Novella, 2013b).

Chiropractic therapy was discovered by Daniel Palmer in 1895 when he claimed to restore a deaf man's hearing by 'racking' his spine into position (Offit, 2013, 40; Singh & Ernst, 2009: 193). Shortly after this, Palmer claimed to cure someone of heart trouble by adjusting a spinal vertebra (Singh & Ernst, 2009: 194). Palmer believed he had discovered a new medical technique, which he called

'chiropractic', based on two Greek words that meant 'done by hand' (Singh & Ernst, 2009: 195). Moreover, he refused to acknowledge the role of germs in disease (Singh & Ernst, 2009: 197), and believed that spinal manipulation could cure all disease (Offit, 2013: 40; Singh & Ernst, 2009: 195), since he claimed that ninety-five percent of them were caused by displaced vertebrae (Singh & Ernst, 2009: 195), which he called 'subluxations' (Singh & Ernst, 2009: 197).

Chiropractic is based on three principles: that displacement of bones causes all disease (the subluxation referred to earlier); that this interferes with nerve function; and that removing the interference allows a vitalistic force called *Innate* to heal the body (Hall, 2009b). In orthodox medicine, a true subluxation is a partial dislocation and these do exist. Chiropractic theory claimed that subluxations are misaligned bones but, when these failed to show on x-rays, chiropractic subluxation had to be redefined accordingly (Hall, 2009a).

However, Palmer also claimed that the idea for chiropractic was revealed to him 'from the other world' during a séance when he believed he was communicating with a dead physician (Shapiro, 2009: 137). As a result of obtaining his ideas from the 'other world', Palmer declared chiropractic a religion, and himself as the leader (Shapiro, 2009: 138), likening himself to Christ, Mohamed, and a number of other religious leaders (Singh & Ernst, 2009: 197).

Chiropractic treatment consists of spinal manipulation and, in more than a century, research has provided no evidence to support any of the theories attached to chiropractic (Singh & Ernst, 2009: 204), and little evidence that treatment was beneficial (Offit, 2013: 40; Singh & Ernst, 2009: 204), except when used for relief of back pain – a method also used in orthodox medicine (Hall, 2009b). However, there is no evidence that chiropractic subluxations exist, therefore, they have never been shown to interfere with the nervous system, nor have they been shown to cause disease, and there is no evidence that chiropractic manipulations can maintain or restore general health (Hall, 2009b). This fact is supported by the study conducted by Mirtz, Morgan, Wyatt and Greene (2009) who, in their research to review evidence of the chiropractic subluxation construct and its significance as a causal factor concluded that: 'No supportive evidence is found for the chiropractic subluxation being associated with any disease process or of creating suboptimal health conditions requiring intervention'. And, 'this lack of supportive evidence suggests the subluxation construct has no valid clinical applicability'.

Chiropractic manipulations are not risk-free (Offit, 2013: 244). There is scientific evidence to support the fact that chiropractic neck manipulations are associated with stroke: 'a correlation between stroke and cervical manipulation has been reported with increasing frequency'; and 'patients undergoing spinal manipulative therapy need to consent to the possible risk of stroke or vascular injury from the procedure' (Paciaroni & Bogousslavsky, 2009: 112).

Where is the danger in pseudoscience?

So what harm could possibly come from popping a few sugar pills, having your spine manipulated, or having a few needles placed under your skin? After all, many of these treatments, for example acupuncture and homeopathy, have been around for decades, if not centuries (Singh & Ernst, 2009: 57, 118) and, as a result, are defended and have achieved some kind of credibility in society (Bowditch, 2008: 30). But orthodox medicine remains firm on this: while all CAM therapies are capable of generating a placebo effect, this does not justify their use, since every CAM treatment carries risk (Offit, 2013: 5; Singh & Ernst, 2009: 352). Thus, CAM is not as innocuous as it may first appear, and is not 'everything to gain and nothing to lose' (Shermer, 2003).

According to Pigliucci (2014) 'pseudoscience maims and even kills people'. This statement requires further investigation of the facts. Michael Shermer, a vociferous critic of pseudoscience and founding publisher of the magazine *Skeptic*, which attempts to debunk pseudoscience, and who briefly delved into CAM before he became sceptical, provides his own testimony: 'As I discovered during my personal odyssey in the world of alternative health and fitness therapies and gadgets, often the evidence is weak, the background and credentials of the claimants are questionable, and the therapy or gadget almost never does what it is supposed to do' (Shermer, 1997: 22). But being fooled by gadgets merely hurts our pride and our pockets, whereas:

- 'chiropractic manipulations have torn arteries, causing permanent paralysis (Offit, 2013: 5);
- acupuncture needles have caused serious viral infections or ended up in lungs, livers or hearts (Offit, 2013: 5);

- dietary supplements have caused bleeding, psychosis, liver dysfunction, heart arrhythmias, seizures, and brain swelling (Offit, 2013: 5);
- some megavitamins have been found to actually *increase* the risk of cancer' (Offit, 2013: 5);
- the website *'what's the harm'* (what's the harm, 2014) compiles lists of cases in which homeopathy and other forms of CAM have been implicated in illness and/or death;
- while a study conducted on Ayurvedic products available for sale in the United States, found that 20 percent of them contained dangerously high concentrations of lead, mercury, or arsenic (Saper *et al.*, 2004: 2868), and a report by Ernst (2002: 891) has confirmed this to be the case in many other countries besides the United States.

According to Richard Dawkins, scientist and author: 'scientific medicine is *defined* as the set of practices which submit themselves to the ordeal of being *tested*. Alternative medicine is defined as that set of practices which cannot be tested, refuse to be tested, or consistently fail tests' (in Diamond, 2001: xv). Thus, orthodox medicine is strictly regulated so that patients know – at least to some degree – what the efficacy and side effects of their prescribed medicines are, as well as their interactions with other medications (Fontanarosa & Lundberg, 1998: 1618; Harvey, 2008: 8; Loxton, 2007; Pavić, 2013: 149; Singh & Ernst 2009: 36). CAM therapies and products, on the other hand, are not subjected to the same strict regulations and control that orthodox medicine is (Fontanarosa & Lundberg, 1998: 1618; Harvey, 2008: 7; Singh & Ernst, 2009: 340). In fact, CAM therapists appear not only uninterested in determining the safety and efficacy of their remedies, but they also fail to see the importance of this (Singh & Ernst 2009: 348).

Harvey (2008: 7), adjunct associate professor at the School of Public Health, La Trobe University in Australia, quotes a professor of complementary medicine from Southern Cross University in Australia as saying that recommendations to test the efficacy of CAM medicines were 'ill-conceived and totalitarian in nature' and that it would 'lead to the decimation of the complementary medicine sector'. Further evidence of this reticence was recently displayed in the United Kingdom where manufacturers of homeopathic remedies have agreed to re-label their products 'confectionary' to avoid having to conform to the regulations for safety and efficacy

attached to licensed medicines (Robbins, 2012). A further indictment of CAM practitioners is that when they are provided with evidence that their treatments are ineffective or even unsafe, they continue prescribing them regardless of the evidence (Singh & Ernst 2009: 348). In South Africa, the CAMcheck website provides information on the pharmaceutical giant, Dischem (as well as other organisations), that continues to market and sell a variety of CAM products despite the fact that the claims pertaining to them are either false and/or unsubstantiated (Steinman & Geffen, 2011).

In October 2010, the South African minister of health confirmed that more than 155 000 unregistered medicines were available in South Africa that had not been subjected to any form of testing regarding their quality, safety or efficacy (Claassen, 2014: ix. Translated from Afrikaans). However, *Times Live* (2014) recently reported that, in November 2013, new regulations were gazetted (Government Gazette Notice R. 870 of 15 November 2013) that require proof regarding the safety and efficacy of alternative medicines. Recently, the Health Products Association of South Africa, which represents 114 companies that produce these products and who have a combined turnover of approximately R7 billion, are challenging this decision in court with the confession that, if it is enforced, they will be forced to withdraw 60 percent of their products (*Times Live*, 2014).

But it appears that CAM practitioners are not merely reticent, claims against them extend to libel and other signs of aggression. Recently, Edzard Ernst, a former Professor of Complementary Medicine at a British University that subjects CAM claims to scientific testing, was the target of an internet smear campaign sponsored by a company that manufactures homeopathic remedies because they rejected his scientific findings (Lewis, 2012; Novella, 2012a). In fact, Ernst is quite open about the aggression displayed by homeopaths when confronted on the issue of evidence (Singh & Ernst 2009: 6l): 'They bully, they smear, to the absolute top of the profession, and they do anything they can in a desperate bid to *shut you up*, and avoid having a discussion about the evidence. They have even been known to threaten violence.' In Europe, The Society of Homeopaths has threatened to sue bloggers who criticise homeopaths, and university courses that offer alternative medicine refuse to provide information about what they teach in their courses (Goldacre, 2007a). Ernst (Singh & Ernst 2009: 62) claims that, among all CAM therapists, homeopaths are a 'uniquely angry breed', while Randi (2003) believes that homeopathy 'will survive

any contrary evidence, simply because there is a huge commercial aspect to its continued existence'. In South Africa, Dr Steinman (CamCheck), Prof. Roy Jobson, Kevin Charleston, The Association for Dietetics in South Africa, and others have been threatened with lawsuits by, among others, the CAM company, Solal (CamCheck).

'Alternative medicine is not only founded on lies and falsehoods' (Shapiro, 2008), it can be harmful, as described above (Ernst, 1993: 44; Offit, 2013: 5; Sessions: 2013; Shapiro, 2008). Furthermore, patients who use CAM have no protection since the products and therapies attached to them are available almost anywhere and from anyone, regardless of their credentials (Singh & Ernst, 2009: 340) or, in most cases, lack of them (Shapiro, 2009: 20; Singh & Ernst, 2009: 333). And even those who do claim to have qualifications are not what they seem since degrees, including PhDs, are available from non-accredited internet correspondence courses (Shapiro, 2009: 20), as is the case with 'Dr' Gillian McKeith, who sells diet books and herbal sex pills, and whose 'PhD', which she claimed to have obtained in nutrition from a reputable American college was, in fact, obtained from a non-accredited American correspondence college (Goldacre, 2007b). The British Advertising Standards Authority found the fact that she calls herself a doctor and claims to have a PhD, is both untruthful and unsubstantiated, and she has been barred from using the titles in future (Goldacre, 2007b). Although some countries require CAM practitioners to regulate their respective professions, this is not universal (Cant, 2002: 29). Thus, it appears that CAM is essentially fraudulent, since its therapists are self-appointed and mostly unregulated, and its remedies unproven, disproven or even dangerous. As Singh and Ernst (2009: 340) point out: 'if any conventional doctor made such ludicrous promises and offered similarly unproven and even risky remedies, then he or she would be struck off or would perhaps end up in the dock'.

Despite all the above, many users claim that CAM remedies are effective (Singh & Ernst, 2009: 296; Ernst, 1993: 45). Since there is no scientific evidence for its efficacy, from the literature it appears there are three main reasons that CAM appears to be effective:

- the placebo effect (Hood, 2009: 173; Singh & Ernst, 2009: 297), which has been mentioned before;
- the 'illness' is self-limiting and would have cleared up within a few days, with or without any kind of treatment (Bowditch, 2008: 32;

Colquhoun, 2007: 635-636; Singh & Ernst, 2009: 296). In fact, research reveals that up to 90 percent of patients who seek medical help are suffering from self-limiting disorders, which would resolve on their own with time (Cousins, 1979: 55);

- pure coincidence – illness symptoms tend to fluctuate and if CAM is used when symptoms are at their worst, generally, things can only improve. The improvement is then ascribed to CAM (Singh & Ernst, 2009: 281-284).

But, in spite of their purported success among users, Ernst (1993: 45) believes CAM's unsubstantiated claims and its use of untested remedies is morally unethical (Ernst, 1993: 44).

An important discovery that revolutionised medicine was the germ theory that emerged in Europe during the 1850s, when it was discovered that other living organisms such as viruses cause infections in humans (Shapiro, 2009: 14). Vaccines, antibiotics, and better general hygiene are the consequences of this knowledge (Offit, 2013: 32; Sagan, 1996a: 13) and, from the beginning to the end of the twentieth century, human life spans in the developed world have increased by thirty years as a result (Offit, 2013: 32). In contrast, a principle common to CAM is the rejection of germ theory and its associated discovery that bacteria, allergens, or viruses have a negative influence on the human body (Singh & Ernst 2009: 130).

Many CAM practitioners believe that viruses, bacteria and germs naturally occur in the blood, and their function is to 'clean up old, diseased tissues' (Wilder, 2006). Wilder owns the website, *Healing Naturally by Bee*, wherein she states: 'Germs, all micro-organisms, (viruses, bacteria, fungi and everything in-between) are the result, not the cause of disease!' And 'if the Germ Theory of Disease were true we would ALL have ALL of the bugs ALL of the time since they are "everywhere" and so would all other life on Earth have them, i.e. plants, animals, insects, birds, etc., so life on Earth could not have happened' (Wilder, 2006). Considering this argument, it seems little wonder that science and orthodox medicine feel that 'the concept of an alternative type of medicine is a throwback to the Dark Ages' (Singh &Ernest, 2009: 348).

Associated with CAM's rejection of germ theory is a recurrent theme that its methods are 'natural' (Campbell, 2002: 3). The claim does not necessarily refer to the techniques and the substances used, but from the theory that humans should not

become ill, and ought not to suffer at all, as described above. CAM claims to facilitate this state of perpetual health by removing the blocks that hinder recovery (Campbell, 2002: 3). But Campbell (2002: 5) believes that this is the worst feature of CAM because disease is an unkind reality, and the theory creates expectations in patients which can only lead to disappointment.

From a scientific perspective, CAM's rejection of germ theory ignores the basic principles of evolution. 'Humans are locked in an evolutionary arms race with the bacteria, viruses and other organisms that make us ill' (Martin, 1998: 286). Pathogens and other disease-causing organisms are subject to similar selection pressures as humans are and, as we evolve defence mechanisms to protect ourselves from them, so the organisms evolve to counteract those defences (Martin, 1998: 286). Sometimes humans are ahead in this race but, frequently, the pathogens are ahead owing to their ability to rapidly produce new generations each of which modifies its genetic structure to overcome the defences raised by our immune systems (Martin, 1998: 300). Orthodox medicine attempts to keep abreast with this competition by developing new drugs and treatments, and through research projects aimed at finding countermeasures to overcome microbial measures (Sagan, 1996a: 14).

While science never claims to be perfect or complete, through evidence it consistently brings us closer to the truth (Singh & Ernst, 2009: 347). Evidence is the distinguishing factor between science and pseudoscience, and orthodox medicine and CAM, and is the reason orthodox medicine is called 'evidence based medicine' (EBM). The philosophical origin of EBM dates back to the early 19th century, and is defined as 'the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients' (Sackett, Rosenberg, Gray, Haynes & Richardson: 1996: 71). The evidence is obtained during randomised clinical trials when patients are observed, and their reactions to treatments are monitored to establish efficacy and safety (Pavić, 2013: 149; Singh & Ernst, 2009: 36). These trials form the very foundation of medicine, and it is thanks to them that society has antibiotics, vaccines and other medical treatments that save the lives of ordinary people every day (Singh & Ernst, 2009: 88).

One of these vaccines, against mumps, measles and rubella – also known as the MMR vaccine – is considered one of modern medicine's most important discoveries and, 'in its first five years, the programme ha[d] already reduced the annual number of deaths from measles in Africa by 91 per cent, from over 400 000 to

36,000' (Singh & Ernst, 2009: 227). Yet, despite this, most alternative therapists, notably homeopaths, discourage parents from immunising their children (Goldacre, 2009: 325; Singh & Ernst, 2009: 226). Consequently, many parents – especially in the United Kingdom, Australia and the United States of America – are refusing to vaccinate their children, and the incidence of both measles and mumps has increased to epidemic proportions in all three countries (Goldacre, 2009: 325; Marron, 2013:17; White, 2014: 269). These parents, or 'vaccine refusers' as they have come to be known, pose a serious risk to everyone's health, not merely their own children's health since, historically, measles and its related complications are known to be more deadly than polio (Marron, 2013:17).

The advice of homeopathic and other CAM therapists not to vaccinate is based on two beliefs. The first is a fraudulent study linking MMR with autism in children, conducted by Andrew Wakefield and others and published in the medical journal *The Lancet* (Goldacre, 2009: 294; Wakefield *et al..,* 1998 (637-641). Despite the fact that this study was retracted by the journal, (*The Lancet,* 2010), and Wakefield was eventually struck from the British medical register on counts of fraud and misconduct, homeopaths and other CAM therapists continue to perpetuate this dangerous myth by advising parents not to vaccinate their children (Goldacre, 2009: 323; Gorski, 2010). The second belief is their rejection of germ theory (Bowditch, 2008: 32), mentioned above.

A further concern with homeopathy is their rejection of the use of proven malarial prophylactics. Alarmed by the number of travellers returning to the UK with malaria, the London School of Hygiene and Tropical Medicine, discovered that these patients had all used homeopathic malarial prophylactics and, on further investigation, found that 'of ten randomly selected homeopaths operating in London, all of them recommended taking homeopathic preventive treatments alone' (Hood, 2009: 173; Jones, 2006). Thus, although homeopathic remedies may not actually be dangerous, when they are used instead of proven medicine, they can kill – for example when unproven homeopathic vaccines are used for deadly diseases in children (Fienberg, 2001), and when unproven homeopathic prophylactics are used for malaria (Hood, 2009: 173; Jones, 2006) that have resulted in a number of deaths from the disease (Jones, 2006). In South Africa, defaulting on treatment for tuberculosis (TB), has been linked with the rise of multi-drug and, now, extensively drug resistant TB. Concern has been expressed that patients with these forms of TB are being visited by

homeopaths in training from the Durban University of Technology which, in its course brochure, claims that the cure for these strains of TB lies in homeopathy, and that these patients may be inspired by visiting homeopaths to default on their TB medications (Meena, 2014).

Spinal manipulation conducted by chiropractors may result in dislocations and fractures (Singh & Ernst, 2009: 212), and even stroke or death when applied to the neck (Singh & Ernst, 2009: 344). More than 700 cases of serious complications resulting from chiropractic have been documented in medical literature (Singh & Ernst, 2009: 217), including several instances of stroke and death (Shapiro, 2009: 145; Singh & Ernst, 2009: 344), as well as torn arteries and paralysis (Offit, 2013:5). In addition to the dangers inherent in chiropractic therapy are the x-rays required by chiropractors before treatment (Singh & Ernst, 2009: 210). X-rays are associated with a higher risk of developing cancer, especially spinal x-rays, which require high dosages of radiation (Shapiro, 2009: 147; Singh & Ernst, 2009: 211). There is only one form of chiropractic that has, so far, not been associated with any type of injury – NUCCA. NUCCA is practised by members of the National Upper Cervical Chiropractic Association, and is designed to 'restore body balance and normalize the flow of healing messages from the brain to all parts of the body'. NUCCA is merely designed to restore 'balance' and, ironically, the therapy is conducted without ever touching the patient, and without ever manipulating the spine (Shapiro, 2009: 152).

Of special concern regarding chiropractors is their claim to be able to treat children's ailments, such as bedwetting, ear infections, learning disorders, etc., with spinal manipulation (Singh & Ernst, 2009: 220). Besides the fact that there is no evidence for these claims, orthodox medicine is concerned about the long-term effect of manipulating immature spines (Singh & Ernst, 2009: 220). In fact, Singh, one of the authors quoted here, was sued by the British Chiropractic Association for exposing their unethical claims regarding children's health (Boseley: 2010). *The Guardian* supported Singh, funded his legal advice, and offered to pay for the Association's costs if Singh agreed to settle out of court (Boseley, 2009). But the Association eventually dropped the libel charge due to an enormous outcry from the science community in support of Singh, and which led to drastic reforms in the United Kingdom's libel laws (Boseley: 2010). However, the chiropractic profession has been 'aggressive in expanding its scope of practice, including treating children and infants', despite lack of evidence regarding its efficacy or safety (Novella, 2013a). For

example, a baby died of asphyxiation after a chiropractor stuck balloons into its nose to 'properly align the bones of the skull' (Offit, 2013: 244). Recently, in Australia, a baby's neck was broken by a chiropractor. Although the incident was reported to the Chiropractic Board of Australia, the Board closed the case, kept it secret from the public, and allowed the chiropractor to continue practising (Medew & Corderoy, 2013).

The ancient medical principle of *Primum non nocere*, or first do no harm, remains relevant in orthodox medicine today (Shermer, 2003), although the dangers inherent in modern drugs sometimes undermine this (Cousins, 1979: 112-113). But, while it is commonly believed that 'natural' is harmless, the literature abounds with examples of freely available 'natural' herbal remedies, prescribed by CAM therapists, that interfere with the efficacy of life-saving drugs such as those prescribed for cancer, blood pressure and cardiac problems (Shermer, 2003), and for interfering with the metabolism of certain prescription drugs (Shapiro, 2009: 107; Singh & Ernst, 2009: 255). Herbal medicine, punted as being natural – and by implication better than orthodox medicine – is notorious for having been adulterated with drugs to increase its efficacy; many are prone to heavy metal contamination while others, such as *ephedra* (used by slimmers and banned in most countries, but available on the internet) are so toxic that users have died as a result of using them (Singh & Ernst, 2009: 249-255.) Nevertheless, herbal medicine continues to be unregulated and untested, and what little research has been done on it, has been unable to support claims made for its efficacy (Shapiro, 2009: 108).

In support of the dangers inherent in CAM is the report of a woman from Colorado in the United States who, towards the end of 2013, died as a direct consequence of using the alternative treatment cesium chloride to shrink a breast tumour (Nierenberg, 2014). Cesium chloride is regularly recommended by alternative therapists as a treatment for cancer, although there is no evidence that it works (Nierenberg, 2014). In fact, the only scientific evidence for cesium chloride is that it has serious, life-threatening side effects, and that many people have died from taking it, yet it remains freely available online and in stores that sell dietary supplements (Nierenberg, 2014). The fact that this type of CAM treatment is freely available, supports Singh & Ernst's (2009: 340) concern, mentioned earlier, regarding the availability and safety of CAM remedies, and the credentials of their practitioners.

A further concern regarding CAM is that its use may also cause patients to delay seeking proven methods (Harvey, 2008: 9; Sessions: 2013). CAM therapists commonly prescribe treatments to patients with serious diseases like cancer and diabetes, and who should be receiving orthodox medical treatment and advice (Singh & Ernst, 2009: 227). 'Faddism and untested alternative methods not only can do direct harm but can also create delays in the employment of proven methods' (Sessions: 2013). A Professor of Pharmacology from the University College of London (Colquhoun, 2007: 635-636) recently stated, 'It is one thing to tolerate homeopathy as a harmless 19th century eccentricity for its placebo effect in minor self-limiting conditions like colds. It is quite another to have it recommended for seriously ill patients. That is downright dangerous'.

Apparently, cancer patients are more likely to use CAM than anyone else, and as many as 75 per cent of women with breast cancer use it (Shapiro, 2009: 158). A study conducted on cancer patients in the United Kingdom revealed that almost a third of them use CAM - predominantly herbal treatments following their diagnosis (Posadzki, Watson, Alotaibi: 2012: 5). The study also revealed that, regardless of their claims, no CAM treatments were effective in curing cancer, while CAM used for supportive or palliative care provided few convincing results but, more importantly, all the treatments carried some risk (Posadzki *et al.*: 2012: 5).

Following the diagnosis of potentially life-threatening diseases and conditions, fear may make patients turn to CAM (Shafiq, Gupta, Kumari, Pandhi, 2003: 294; Landier & Tse, 2010: 566). One study of cancer patients who used CAM alongside orthodox medicine, revealed that their survival time was actually shorter and, especially cruelly, those whose initial prognosis had been good (Riseberg, Vickers, Bremnes, Wist, Kaasa & Cassileth: 2003: 372). More alarming, though, are the cancer patients who eschew orthodox medicine altogether, and which have resulted in reports of advanced, untreated cancer that has spread uncontrollably, causing associated disfigurement that orthodox medicine has not seen in more than a century (Shapiro, 2009: 160).

Unfortunately, it is also in the field of cancer that CAM exhibits its greatest hostility towards orthodox medicine, accusing doctors, researchers, and the pharmaceutical industry of operating a 'cancer industry' for profit, and of stifling alternative medicine for their own ends (Shapiro, 2009: 165). While CAM practitioners refer to surgery, radiotherapy and chemotherapy as 'slash, burn and

poison', they refer to their own remedies as 'the natural cures they don't want you to know about' (Shapiro, 2009: 166). But orthodox medicine refutes this accusation, saying that if a natural, plant-based cure were found, synthetic derivatives would be manufactured, and may even have better properties than the original, as is the case with Taxol, a chemotherapy drug originally extracted from the yew plant (Shapiro, 2009: 166), in the genus *Taxus*. The CAM industry regularly alludes to the fact that CAM is safe and does not have the side effects associated with certain orthodox medical treatments (Shapiro, 2009: 166). What they fail to point out is that orthodox medicine acknowledges the fact that certain treatments (e.g. those for cancer and rheumatoid arthritis) have serious side effects, but that they represent the only hope of cure/relief since there are no scientific alternatives (Martin, 1998: 259). CAM and its associated theories imply that we are all responsible for our own health and, in this way, confer blame on the victims who, perhaps out of a sense of guilt for bringing this crisis upon themselves, then feel obliged to try any therapy that offers relief and/or miracle cures (Shapiro, 2009: 160-162). CAM profits from this by using emotionally-laden words to suggest some value for which there is no medical evidence – for example, the Breast Cancer Haven in the United Kingdom, which offers a comprehensive range of CAM therapies, describes itself as 'a place where miracles can happen'(Shapiro, 2009: 162).

While there is mounting scientific evidence that the mind has an effect on the immune system (Martin, 1998: 81-116), it does not offer any magical cure for illness (Martin, 1998: 260), and bears no resemblance to the simplistic explanations offered by CAM who use it to their own advantage. Cancer, especially, has provided a profitable resource for them with their claim that the disease is the result of wrong thinking and not loving oneself enough, and that it is simply remedied by love and the right attitude (Martin, 1998: 256-259). The implication that sick people are to blame for their illness and even their failure to recover, is reminiscent of religious dogma that views disease as divine punishment for some perceived 'sin' (Martin, 1998: 256-259). The resultant guilt may become a greater problem than the disease itself, and be even more difficult to treat. Cancer patients are especially vulnerable to feelings of guilt and depression, and faith in magic cures may cause them to reject life-saving therapies. While orthodox medicine is not a cure-all, it still offers more chance of survival for those with cancer and other life-threatening diseases (Martin, 1998: 256-259).

Considering all the above, it seems justified that scholars of orthodox medicine feel that science needs to 'unmask the charms of junk science, exposing its parasitic nature, how it lives off the gaps in orthodox science, exposed by the latter's honesty, and dresses itself up in borrowed language, without any idea of the provenance within which that language operates' (Tallis, 2007: 10).

But, despite all this, science does not reject CAM therapies out of hand. *The Scientific Review of Alternative Medicine* is a 'peer-reviewed journal dedicated entirely to the scientific, rational evaluations of unconventional health claims' ('The Scientific Review'). Professor Edzard Ernst, quoted several times in this study, is a medical doctor who practised orthodox medicine then trained to be a homeopath and included alternative remedies in his medical treatment (Singh & Ernst, 2009: 174). Ernst is also the world's first professor of alternative medicine (Singh & Ernst, 2009: 11), and has conducted more scientific research into CAM than any other researcher (Shapiro, 2009: 253). He and his team have dedicated almost two decades to conducting research to determine which CAM treatments work and which do not. However, their overriding conclusion is that 'most forms of alternative medicine for most conditions remain either unproven or are demonstrably ineffective, and several alternative therapies put patients at risk of harm' (Singh & Ernst, 2009: 338).

But Ernst's research also raises the argument of who has to prove what, and to whom? Shermer (1997: 50) argues that the person making the extraordinary claims must prove to the experts and the community that his or her belief is more valid than the ones everyone else accepts. 'The scientific community cannot be expected to test every fantastic claim that comes along, especially when so many are logically inconsistent. If you want to do science, you have to learn to play the game of science' (Shermer, 1997: 50). However, Fitzpatrick (2002) believes that the process of subjecting alternative therapies to scientific investigation is doomed because, although numerous trials have proved that these remedies do not work, the results are merely ignored or denied by those who practise them – examples of which have already been described in this study. Moreover, publication bias in alternative therapy journals is high – in the year 2000 only 5% of studies published in these journals were negative, while observational studies that are little more than customer-satisfaction surveys, are presented in ways that make them appear scientific (Goldacre, 2007a).

Orthodox medicine has two fundamental aims: to postpone death from illness; and to reduce the suffering caused by body ailments (Tallis, 2007: 2). Clearly it has

achieved this to a great degree, but not completely, since research shows that both life expectancy and healthy life expectancy are increasing (Tallis, 2007: 2). Orthodox medicine does not claim to have all the answers, and its inadequacies are very apparent (Fitzpatrick, 2002; Fontanarosa & Lundberg, 1998: 1618), but that does not mean it should abandon its scientific principles (Cousins, 1979: 120) in favour of CAM. Diamond (2001: 30), who succumbed to cancer himself and posthumously published a book based on his experience, argues: 'Often medicine doesn't work, or doesn't work as perfectly as we'd like. It has nasty side-effects or works only for a short while or sometimes doesn't work at all', but the fact remains that it is thanks to modern medicine that we are healthier, experience less pain, and live longer than any generation before us. While some patients claim to resort to alternative remedies because of the unsympathetic attitude of medical doctors, there are other patients who also describe their doctors as 'brusque and unsympathetic' (Offit, 2013: 2), and who have experienced hospital systems as 'bureaucratic and incompetent', yet they continue to reject alternative medicine (Fitzpatrick, 2002), as Diamond did until he died.

Many people with dreaded diseases like cancer and coronary heart disease may fail to obtain relief or a cure from mainstream medicine, and are actively encouraged by friends and family to try some form of CAM (Fitzpatrick, 2002). But, as Shermer (2003) points out, when a loved one is dying, or when mainstream medicine cannot cure, the choice is not 'between scientific medicine that doesn't work and alternative medicine that might work' (Shermer, 2003). There is only mainstream medicine that has been tested and alternative medicine that has not been tested (Shermer, 2003). As one patient put it, 'just because orthodox medicine doesn't work is no reason to resort to witchcraft' (Fitzpatrick, 2002).

While some may shrug off CAM and ask whether it matters if people want to be duped, Sabbagh (1991: 255) believes it does – not only because CAM is essentially dishonest, but because the user's choice may also affect the health and lives of others – and he mentions two cases to support this. The first is a child with treatable leukaemia who died as a result of her parents refusing chemotherapy and using a homeopath instead. The second is a woman who was being treated by a CAM practitioner for constipation but who, in reality, had infectious tuberculosis. The woman subsequently died, but only after she had spread her infectious sputum to everyone around her.

Although CAM practitioners regularly accuse orthodox medicine of being in the pockets of the pharmaceutical industry (Novella, 2012a), CAM itself has become big business, with billions being spent on it annually in the global market – and this despite the fact that it is mired in controversy owing to unsubstantiated claims regarding its safety and efficacy (Tanaka, Kendal & Laland: 2009). A common feature of CAM marketing practices is to denigrate orthodox medicine – a wise practice considering that surveys have revealed that a regular reason for people turning to CAM is their disappointment with orthodox medicine (Goldacre, 2007a). Furthermore, as mentioned previously, CAM is closely aligned with the New Age movement, which is renowned for having a strong profit motivation, a fact that is evidenced by the abundance of popular books, courses and workshops, etc. available on the subject (Dole, Langone, Dubrow-Eichel: 1990).

Thus, CAM not only offers false hope to the 'most desperate and vulnerable in society' (Singh & Ernst, 2009: 348), it also risks our health, our pockets, and leaches funds, which could be better spent on scientifically proven treatments, from health services that fund it (Shapiro, 2009: 1-3). 'It is an unfortunate truth that there is money in pseudoscience, particularly medical pseudoscience. Money both attracts charlatans and also funds their activities, which includes marketing pseudoscience and defending their claims from scientific scrutiny. In this way the game is rigged in favour of pseudoscience' (Novella, S. 2011a).

Media coverage of science and pseudoscience

Media's selection of programmes, of news, and even of staff, plays an important role in shaping audience reality (McCombs and Shaw, 1972:176). A number of factors influence media organisations and what they provide their audience in terms of content. These factors include, but are not restricted to, the advertisers, the target audience, the need for profit, and the particular media market, (McQuail, 2011: 276). While journalists generally have some autonomy, media owners ultimately set the policy for content, and decide what should be included and what should be excluded (McQuail, 2011: 291). This, plus the fact that profit plays an important role in decision-making (Croteau, Hoynes & Milan, 2010: 144), makes it clear that media content can never be entirely objective (Croteau *et al.*, 2010: 133). Thus, economics rather than ethics often drives journalism (Fourie, 2010: 204), and content is determined by giving preference to certain issues, while ignoring others (Croteau *et*

al., 2010: 186). Furthermore, the coverage of health issues is known to be popular in the media, especially because of the advertising it attracts (Croteau *et al.*, 2010: 67), while 'diet and exercise have also become a huge consumer market' (Cant, 2002: 22). And, although certain media information, especially regarding health, purports to be in the interests of the audience, advertising is always in the interests of the media. However, for advertising to be successful, media still has to reach their intended audience and, to do this, they may garner audience trust by reporting on health issues, (McQuail, 2011: 473), which they know to be popular.

Scientists are united in their view that what the media offer its audience as 'science' is dominated by myths, pseudoscience, and outright lies (Daempfle, 2013: 7; Lipps, 1999: 4). Furthermore, Sagan (1996a: 28) believed that media's enormous influence is responsible for the 'dumbing down of America', and defended this statement by pointing to their constant provision of credulous programmes on pseudoscience in what he called a 'celebration of ignorance'. Scientists also accuse the media of presenting pseudoscience in a manner that makes it appear scientific (Kruglyakov, 2002; Lipps, 1999: 2), and accuse media personnel of being scientifically illiterate and ignorant (Goldacre (2009: 224,225; Lipps, 1999: 3).

While scientists feel that media represent the perfect platform for transmitting accurate science news and for educating the public about science (Daempfle, 2013: 12; Lipps, 1999: 1), they believe that media prefer to report pseudoscience because both they and their audience understand it, it is sensationalist, and it sells (Daempfle, 2013: 29; Lipps, 1993: 3). Sagan (1996a: 8) concurred, arguing that the media consistently fail their audience by filtering out true science and offering them a 'cheap imitation' instead. Moreover, he (Sagan, 1996a: 17) attributed the rise and popularity of pseudoscience to the co-operation and connivance of the media. The New Age movement, which is strongly associated with virtually all forms of pseudoscience, has stimulated enormous media attention and, today, most media are guilty of featuring reports on ghosts, Satanism, crystals, astrology, etc. (Dole, Langone, Dubrow-Eichel: 1990).

Dawkins (1997) goes so far as to accuse leading columnists in the media of constantly 'attack[ing] science - - and not always from a vantage point of knowledge.' He quotes one of these columnists as proclaiming: 'Scientists don't know and nor do I – but at least I know I don't know'. And the same columnist again, 'Despite their access to copious research funds, today's scientists have yet to prove that a quark is

worth a bag of beans. The quarks are coming! ….. Run for your lives …! Yes, I know I shouldn't jeer at science …. Can you eat quarks?' Dawkins believes that audiences are forced to notice these repetitive attacks, and that they provide the media the 'influence and power' to undermine science (Dawkins, 1997).

Kruglyakov (2002) believes that media's coverage of pseudoscience is irresponsible, and holds them responsible for pseudoscience's popularity and its influence on society. One can understand his feelings considering the MMR scare described earlier, and the fact that the media profited from employing scare tactics despite the fact that the fears they preyed on were based on a fraudulent study, and that their scaremongering endangered the health and lives of children globally (Singh & Ernst, 2009: 231; White, 2014: 269). Goldacre (2009: 291) is quite vehement in this respect, laying the blame for the MMR scare solely on 'the hundreds of journalists, columnists, editors and executives who drove this story cynically, irrationally, and wilfully onto the front pages for nine solid years'. White (2014: 270) concurs that the media have played 'a particularly important role in disseminating misinformation and sensationalizing the vaccination debate', by 'publishing erroneous evidence, indulging in celebrity testimony, and balancing credible science with fear-based anecdotes'. Media persistently display the tendency to present 'balanced' information – but this is usually at the expense of accurate scientific evidence or, as Mnookin (2011) prefers to phrase it, 'the media's habit of giving every story two sides long after one has been discredited'. These serious indictments by scientists (as well as media scholars) against the media are the reasons for this study.

With regard to the MMR scare and the media, some may well question how Wakefield's paper managed to escape the rigours of the peer review system. This system, whereby a study is checked by the editorial team before it is submitted to several external reviewers of similar discipline, is considered integral to the scientific method (O'Callaghan, 2013; Smith, 2006: 178), and approximately 80% of studies submitted to journals are rejected (O'Callaghan, 2013) as a result of it. Although flaws do exist in the system (O'Callaghan, 2013; Smith, 2006: 178-182), this particular instance was purely a poor editorial decision since four of the six reviewers had rejected the paper (O'Callaghan, 2013). Ultimately, though, the many self-correcting mechanisms inherent in the scientific method exposed the truth – groups who tried to reproduce the work failed, Wakefield's hypothesis failed, *The Lancet*

retracted the paper, Wakefield's fraud was exposed and he was struck from the British medical register (O'Callaghan, 2013).

As Diamond (2001: 3) says: '[s]cience, which was going to save us all in the Sixties, gets a pretty bad press these days'. Part of the problem is that science is not an easy subject to communicate effectively in any medium – newspaper or television (Pigliucci, 2010: 85). This is exacerbated by the fact that science seldom has important breakthroughs, and does not feed media's requirement for ground-breaking news (Goldacre, 2009: 236), which is ultimately what sells their product. A South African survey revealed that both journalists and scientists are critical of science reporting, and that they believe the majority of journalists are not sufficiently educated to report on science (Claassen, 2011: 356). However, science comprises a variety of very different fields and, as Hood (2009: 59) puts it, 'even scientists from one discipline can be completely unintelligible to those from another'. Moreover, scientists are notorious for being poor at communicating their subject, and the survey quoted by Claassen (2011: 362), showed that they are also reluctant to communicate with the media. In fact, within the scientific community itself, scientists are often criticised for attempting to make science understandable to the public at all (Lipps, 1999: 6).

Most science coverage in the media is on health because people want to know what will kill or cure them but, unfortunately, the greatest advances in medicine ended in the 1970s and, although medical research has not stopped, new discoveries are slow (Goldacre, 2009: 233). Thus, the media cannot run stories such as, 'Cancer: still no cure' (Diamond, 2001: 31). In contrast to orthodox medicine, pseudoscience lends itself to any medium (Pigliucci, 2010: 85), because it provides the media with a continual stream of miracle stories that audiences love, with no evidence except anecdote to back them up (Diamond, 2001: 31). According to Diamond (2001: 32), who spoke out against CAM until his death from cancer, it is media's 'constant drip, drip, drip [of miracle stories] which undermines our faith in real medicine, in real science'. In fact, Dawkins (2007) sees the media's predilection for reporting on CAM as nothing more or less than free advertising. It is thanks to this constant feeding of so-called 'health' information and the 'intense advertising of alternative medicine' that authority has shifted from the physician to the media, with the result that people are more likely to believe information obtained from the media than from their physicians (Hoffman, 2007: 312). In this way, media play an important part in

shaping people's perception of their health and how they should be caring for it (Hoffman, 2007: 312).

The changeable nature of scientific theories referred to earlier, also frequently confuses the public who, for example, are cautioned to choose margarine over butter, only to be told the opposite years later. As Sagan says (1996a: 28): 'We have also arranged things so that almost no one understands science and technology. This is a prescription for disaster'. And he (Sagan1996a: 17) believes that the media make pseudoscience more accessible and attractive than science by 'providing easy answers'. This is supported by Singh and Ernest's (2009: 315-320) belief that the media present a positive and simplistic view of CAM, and create or exaggerate benefits that do not correspond with the evidence. Furthermore, they argue that the media are not only driven by profit but they lack discipline, and so they do whatever is required, including scaremongering, to sell their products (Singh & Ernst, 2009: 320). Media's handling of the MMR scare, as described earlier, bears testament to this.

Scientists also accuse the media of using celebrities to make public statements about scientific matters they know nothing about (Pigliucci, 2010: 88). For example, during the MMR vaccination debacle described earlier, many reporters concentrated on celebrities and public officials expressing emotional and anecdotal opinions rather than on the scientific facts of the case (White, 2014: 271). This not only sensationalised the situation, but helped in perpetuating misinformation regarding the MMR vaccine which, at the time of this writing, continues to create confusion among parents and risk innocent lives. Since celebrities are generally highly visible and have earned a certain amount of public trust, when they comment on scientific matters, the public believes them (Pigliucci, 2010: 88). For example, Oprah Winfrey, celebrity and former TV host who, although renowned for her charitable work, is accused of being consistently anti-science and anti-reason by ethicist Tariq Moosa (2013).

'Winfrey has allowed her powerful platform to be the fertile soil for many modern day weeds of thinking ….. quack medicine and its practitioners, pseudoscientific babble under the guise of science, and even "therapy" that is, in fact, entertainment – not actual help vulnerable people need' (Moosa, 2013). And, while Moosa (2013) does not expect the likes of Winfrey to host science shows, he feels she should be criticised for flooding the media with 'nonsense as truth'. 'We must

acknowledge that nonsense doesn't become true because it's your lover, your best friend, your favourite celebrity' (Moosa, 2013).

Thus, celebrities are not only used by the media to sell products, they also offer 'medical' advice, and we buy into whatever they happen to be promoting because we trust them (Claassen, 2014: 75; Offit, 2013: 111-112). In addition, when it comes to medicine, we perceive them as being able to afford the best treatment available so, if the rich and famous are using or promoting a particular treatment, we assume it to be the best (Singh & Ernst, 2009: 302). In fact, Loxton (2007) argues that CAM's success lies in their aggressive marketing. Driven by the media and aimed chiefly at women, it sows fear of mainstream medicine by depicting it as cold and mercenary, whereas their own, also for-profit products, are presented as natural, comforting and personal (Loxton, 2007). Surveys of CAM users worldwide support this – users tend to be 'middle-aged, middle-class, educated women with a high disposable income' (Ernst, 1993: 44; Shapiro, 2009: 218), and Shapiro (2009: 218) believes that CAM offers them a way to take control, and to be touched physically and emotionally at a point in their lives when many women say they feel invisible. In addition, marketing executives are profiting on CAM's strong appeal with women by promoting beauty products as medicinal rather than cosmetic, and by the use of pharmaceutical-sounding ingredients (Shapiro, 2009: 219). However, if media organisations refused to accept adverts for products claiming results for which there is no scientific evidence, the market for these products would soon crash (Claassen, 2014: ix. Translated from Afrikaans).

What drives our beliefs?

Despite modern advances in science, science literacy is declining globally (Daempfle, 2013: 13) and, according to Sagan (1996a: 9), 95 per cent of Americans are 'scientifically illiterate'. Claassen (2011: 364), a science communication specialist, attributes this decline to the poor standard of teaching in schools – in South Africa and abroad. The results of a survey mentioned earlier revealed that South African audiences are gullible when it comes to media reports of science, and that they also believe in miracle cures (Claassen, 2011: 361). Sagan (1996a: 19) suggests that pseudoscience is embraced by society in the exact proportion that true science is misunderstood precisely because humans have a natural tendency to believe in miracle cures and other supernatural phenomena. This belief in supernatural

phenomena can be traced back to the most primitive human societies (Hood, 2009: 56) where the 'most unashamed pretender to supernatural powers was …. the medicine man, or shaman', (Becker, 1976: 47), providing further strength to Singh & Ernest's (2009: 348) argument that CAM, with its associated practices and theories, is a throwback to the dark ages.

According to Daempfle (2013: 13), critical thinking, which is an aspect of science literacy, is absent in the scientifically illiterate. Instead, these people have a groupthink mentality which draws them to whatever is popular and, as a result, they will always be prey to false science (Daempfle, 2013: 13). Many scholars agree that poor education is to blame for anti-scientific thinking (Abbas Raza, 2014; Claassen, 2011: 364; Daempfle, 2013: 13), and surveys have revealed high levels of scientific illiteracy as well as anti-scientific beliefs in adults (Abbas Raza, 2014). But Abbas Raza (2014) argues that learning scientific facts does not prevent irrational thinking – this view is supported by Walker, Hoekstra and Vogl (2013) who also claim that students are 'taught *what* to think but not *how* to think'. Abbas Raza's (2014) solution is that students be taught 'applied rationality', which would teach them to override instincts, intuition, confirmation bias, and provide some foundation for probability and statistics.

Confirmation bias is a common human failing, and can be described as 'the tendency to pay more attention to evidence that supports what you already believe' (Koerth-Baker, 2013). Apparently, it is not an easy failing to overcome and cannot merely be drowned by facts. Although the internet, 'where no view is too outrageous to masquerade as fact' (Mnookin, 2011), also provides access to high quality information, its emergence appears to have exacerbated the tendency towards confirmation bias (Koerth-Baker, 2013). White (2014: 271) explains how the 'social network approach' enables like-minded individuals to connect through the internet and how an 'overflow of information coupled with peer pressure' can perpetuate any information – whether accurate or not. She (White, 2014: 271) provides the example of how computer technology, misinformation, conflicting scientific studies and a group of wealthy, well-educated parents created an anti-vaccination campaign that has resulted in enormous numbers of unvaccinated children, unnecessary deaths, and the re-emergence of measles epidemics – a disease that vaccinations had kept under control or even eradicated.

But people may also be conned by pseudoscience because it is intentionally pitched at the media (Park, 2001: 26), and psychologists have discovered that information which is commonly available takes on greater significance in our minds (Goldacre, 2009: 251). Also, we are naturally attracted to interesting and unusual information, and sensationalist articles on miracle cures are more meaningful than abstract information we don't understand (Goldacre, 2009: 251, 252). In addition, humans learn through repetition, and by reinforcement from society, which is why the endorsements of celebrities are frequently more persuasive than is scientific evidence (Claassen, 2014: 75; Goldacre, 2009: 253). In this respect, testimonials from friends and family regarding the perceived efficacy of a CAM treatment further promote its use. Although these recommendations are often motivated by a sincere desire to help, few people who make them have the knowledge to rule out coincidence or the placebo effect (Barrett & Jarvis, 2005) in their purported success.

Sagan (1996b) believes that in desperate situations, we readily abandon our innate scepticism because pseudoscience 'speaks to powerful emotional needs that science often leaves unfulfilled'. Thus, pseudoscience makes us easy prey for those who tell us what we want to hear, it also feeds our need for a sense of power and inspires the New Age philosophy that 'wishing makes it so' (Sagan, 1996a: 18). Offit (2013: 43) believes CAM practitioners specifically appeal to the idea that you can control your health without medical doctors telling you what to do: 'The offer of control in a healthcare system where patients feel little or no control is irresistible'. Barrett & Jarvis (2005) argue that CAM specifically appeals to people's emotions by promising them better health and a longer life. Thus, 'what sells is not the quality of their products, but their ability to influence their audience. To those in pain, they promise relief. To the incurable, they offer hope. To the nutrition-conscious, they say, "Make sure you have enough." To a public worried about pollution, they say, "Buy natural"'.

But Shermer (1997: 6, 7) believes that hope is what drives us all, scientists included. 'Hope is the belief that circumstances will get better. It's not a wish for things to get better – it's the actual belief, the knowledge that things will get better'. Or, as Archer (2013) puts it, 'hope, is often the only thing between man and the abyss'. Hope is also the emotion that drives the placebo effect. According to Cousins (1979: 56), the fact that placebos have no physiological effect on patients who know

they are only receiving a placebo, confirms the human body's capacity to 'transform hope into tangible and essential biochemical change'.

People are also becoming frustrated with high technology medicine they often don't understand, with the hopelessness of dread diseases, and with orthodox medical doctors who appear to have little empathy (Ernst, 1993; 44). Orthodox medical doctors are frequently perceived as being 'uncaring and dictatorial, offering unnatural remedies with intolerable side effects', whereas alternative therapists are seen to 'provide natural remedies instead of artificial ones, comfort instead of distance, and individual attention' (Offit, 2013: 2). Cousins (1979: 137) believes that time is an issue and is what patients need most from their doctors: 'time to be heard, time to have things explained, time to be reassured, time to be introduced by the doctor personally to specialists or other attendants whose very existence seems to reflect something new and threatening'. Yet time is the one thing that doctors find most difficult to manage (Cousins, 1979: 137). Dawkins (2007) speaks of CAM patients being made to feel the centre of attention, of 'cossetting' and of being 'pampered' by CAM therapists who spend an hour with each patient in 'return for a healthy fee', then contrasts this with patients on the British National Health who can expect only eight minutes from orthodox medical practitioners.

Shermer (2002: 42) describes CAM as 'feel-good' medicine that appeals to our emotions, and asks that we compare it with 'feel-bad' orthodox medicine and its associated reality of large, impersonal hospitals buzzing with instruments, and staffed with disinterested physicians. Cousins (1979: 116) echoes this by attributing the resurgence of CAM to public rejection of the 'distant, exclusive and impersonal nature' of orthodox medicine. The perception is that a 'holistic' CAM emphasises 'human contact and human warmth', while orthodox medicine is perceived as 'cold and unappealing' (Cousins, 1979: 116). In addition, Dawkins (2007) believes the media feed public fear by wildly exaggerating the risks of orthodox medicine, while simultaneously churning out reams of positive information on CAM. A further argument for the popularity of CAM is that the patient holds a central and equal position in the consultation and, as a result, they feel they have more control (Jenkins, 2002b: xviii). Fitzpatrick (2002: 76) feels that if all CAM achieves is to return empathy to the orthodox medicine, it will have served a purpose. Otherwise, its growing popularity reveals a loss of confidence in modern science and medicine, and

a return to superstitions and theories that science transcended over a century ago (Fitzpatrick, 2002: 76).

Most patients who use CAM say they don't merely want drugs that suppress symptoms, they want to find the 'cause' (Campbell, 2002: 9). The paradox is that, while CAM practitioners claim to find the cause of disease, orthodox medicine claims that CAM merely treats the symptoms with placebos (Campbell, 2002: 9). Thus, the placebo effect seems to be an important factor when it comes to belief in CAM, since many of the ailments treated by CAM are responsive to it (Shapiro, 2009: 232). The placebo effect works for a wide range of health conditions, and scientists have observed that, although it affects the patient's mind, it also causes physiological changes in the body (Singh & Ernst, 2009: 80). Placebos are believed to affect the endocrine system, and their effects may be even more powerful than the drugs they are used to replace (Cousins, 1979: 51). However, they have no physiological effect on patients who are aware they are only receiving a placebo (Cousins, 1979: 56), since their effect is the result of conditioning – just consulting a doctor or taking a pill may induce it (Singh & Ernst, 2009: 82). The placebo effect is also explained by expectation theory – if we expect to benefit from a treatment, we are more likely to do so (Singh & Ernst, 2009: 82). Furthermore, the placebo effect can be enhanced by, for example, giving an injection instead of a pill, or when the doctor wears a white coat instead of a T-shirt (Singh & Ernst, 2009: 82). Currently, placebos are used in medical trials to compare the effects of real drugs (Cousins, 1979: 50).

From the above, it becomes clear that the placebo effect can be highly misleading when it comes to assessing the true efficacy of a treatment (Singh & Ernst, 2009: 83), although its effect on an individual will depend on their belief system and personal experiences (Singh & Ernst, 2009: 82). Owing to CAM therapists penchant for being attentive (Offit, 20-13: 2) and, thereby, gaining the trust of their patients, they appear especially capable of evoking the placebo response (Evans: 2004: 157). However, since the placebo effect 'arises out of the patient's confidence in the treatment' (Singh & Ernst, 2009: 77), it is not restricted to CAM (Singh & Ernst, 2009: 81). But, as Shapiro (2009: 237) puts it, 'CAM practitioners learn to do it better because, in truth, it is all they have'.

While scientists blame the media for pseudoscience's popularity, and media specialists blame scientific illiteracy, as mentioned before, research indicates that those audiences most dependent on pseudoscience are educated, affluent, and middle-

aged (Ernst, 1993: 44; Shapiro, 2009: 218). In fact, a World Health Organization review shows a similar pattern of CAM use in all developed countries 'with middle-aged, middle-class educated and/or wealthy women always constituting the larger user group' (Shapiro, 2009:19). According to Cousins (1979: 117) it is precisely these higher levels of education that enable the public to inform themselves about their health. As a result, they no longer accept their doctor's decisions unquestioningly, but rather evaluate the doctor according to his/her willingness to engage in 'mutually respectful dialogue' (Cousins, 1979: 117).

Shermer (2002: 64) feels that belief in pseudoscience has nothing to do with education or intelligence since many believers hold post-graduate science degrees. He believes that part of the problem is that humans don't have a filter to sift fantasy from reality (2002: 64). As Sagan (1996b) says: 'As amusing as some of pseudoscience may seem, as confident as we may be that we would never be so gullible ….. [pseudoscience] has attracted a large number of accomplished people, some with advanced degrees in physics or engineering. These are not doctrines for nitwits. Something else is going on' (Sagan, 1996b).

Clearly there is something else going on because, according to Shapiro (2009: 217), CAM users are not concerned about plausibility, consistency, or even evidence. She argues that, in this way, CAM is much like religion – faith-based. Moreover, she points out that its followers are encouraged to venerate the 'life force' that is manifest in the form of 'healing energies', which CAM claims reside in nature and within their own bodies. Some feel that use of CAM is little more than self indulgence, and Shapiro (2009: 217) pulls no punches when she states: 'Disciples of the CAM faith must pay constant attention to these internal energies and to their own well-being in this cult of the self' (Shapiro, 2009: 217).

Besides the facts that women are more likely to use CAM than are men, and the middle class are more likely to use it than the working class, users tend to be more health conscious, more likely to be chronically ill and less likely to drink or smoke, but are not more prone to hypochondria than is the rest of the population (Cant, 2002: 19). Moreover, the majority use CAM for chronic conditions where orthodox medicine has little success (Cant, 2002: 21). Many users are also concerned about the side-effects of drugs and the fact that they are manufactured from 'chemicals', thus the apparent harmlessness and 'naturalness' of CAM becomes an important attraction (Cant, 2002: 24).

Sabbagh (1991: 247) believes that CAM shares much in common with the paranormal in that users have a desire to believe, just as users of the paranormal do. Moreover, supernatural beliefs such as astrology are often aligned with, or used in conjunction with CAM. Sabbagh (1991: 247) argues that when people seek help for an ailment or disease, they are thinking pathologically, which makes them believe things despite lack of any evidence – they 'hear' what they want to hear, and ignore anything that contradicts it. He refers to such irrational beliefs as psychopathology.

Sagan (1996a: 15) has some empathy with the public mistrust of science, owing to its association with war and weaponry, questionable corporate profits, and the perils involved in certain technologies: '[t]here's a reason people are nervous about science and technology', but this is no reason to reject it since, as he says, the 'sword of science is double-edged'. After all, wars may also be fought in our defence. Moreover, dishonesty in the pharmaceutical industry with regard to the efficacy and safety of certain drugs that is widely reported in books written by scientists (Goldacre, 2012; Goldacre, 2009) and regularly reported in the press (Kelton, 2013; Kollewe, 2014; Sukhija, 2013), is a further reason the public have developed a general mistrust of science. Nevertheless, many scientists find it puzzling that people are suspicious of science and the authority of scientists, yet remain credulous of CAM and the 'authority' of its practitioners (Tallis, 2007: 7-9). Tallis (2007) believes it is not merely CAM's exaggeration of the failures in science, or their false accusations of 'inhumanity', nor even its appeal to the 'cognitive primitive' in us – there are three other factors involved in its use:

- attaching authority to celebrities which, he believes could have catastrophic consequences when they wield sufficient power to 'influence science policy and practice'. This ties in with Moosa's comments regarding Oprah Winfrey, mentioned earlier;
- CAM's use of science terminology without any knowledge of its meaning but which is alluring to users because they believe they are understanding science;
- science is often regarded as being alien from our selves, and so it becomes easier to believe that an illness is the result of your astrological sign or your lifestyle rather than an unintelligible scientific explanation that makes your body seem alien from yourself.

The neuroscientist Bruce Hood (2009: 78) concurs with those authors who argue that education in science is no guarantee against a belief in unsubstantiated claims. In support of this is a report of Candace Pert, neuroscientist and author, who has rejected science to become a proponent of various forms of so-called New Age CAM and, perhaps more alarmingly, is also reported to support the theory that the MMR vaccine causes autism (Fitzpatrick, 2002). Thus, it is clear that educated and intelligent people also believe in unscientific theories, and Hood (2009: 7-36) calls our inclination to believe such myths our 'supersense' - something which is not within our control.

We believe things as a result of personal experience – we are naturally inclined to seek the cause of things by seeing patterns, purpose and causality where they do not exist, simply because we cannot accept the fact that events happen by chance (Hood, 2009: 17-77; Shermer, 1997: 7). Hood (2009: 261) explains that humans have two ways of thinking – one is intuitive, whereas the other provides for reason and logic. While these two systems generally work together, any kind of stress weakens our rational mind and forces our intuitive system to kick in (Hood, 2009: 261-271). And, although individuals may be more prone towards one way of thinking than another, it has no relevance to their intellect – a fact that explains why 'perfectly rational, highly educated individuals can still hold supernatural beliefs' (Hood, 2009: 260).

When it comes to CAM, it appears that '[f]acts will not shake the faith of a zealot' and that, exposing an audience to two opposing views, will merely fortify the beliefs they originally held (Krueger, 2014). This view ties in with the theory of cognitive dissonance, which shows that when we take sides (or have particular beliefs), the brain ensures that we 'justify and solidify' those beliefs by only seeking information that confirms it, while we deny, ignore or trivialise evidence that contradicts our beliefs. (Tavris, 2014).

Conclusion

The literature review has not only provided the scientific views on pseudoscience, but has also exposed the flawed foundations on which the more popular forms of CAM are based, the unsubstantiated claims made by its therapists, and the media's role in promoting it. Considering the estimate that up to 70 percent of patients in developed countries use CAM (Linde, K. *et al.* 1997: 834), and considering

the risks attached to these therapies as outlined in this review, it seems little wonder that scientists are alarmed at CAM's rising popularity and the media's role in promoting it. Although science should provide the foundation for our knowledge and wisdom, it is clear that beliefs in unscientific theories are still very common in society. Some may blame religion for this but, while all religion is based on supernatural beliefs, not all belief in the supernatural is based on religion (|Hood, 2009: 57). With regard to the rising popularity of CAM, Dawkins (2007) warns that 'reason has liberated us from superstition and given us centuries of progress. We abandon it at our peril'.

Chapter 3

Research theory, design and methodology

Theory

A **scientific theory** is not merely speculation about a phenomenon, it is a documented set of principles that explain the 'how' and 'why' of a particular phenomenon (Coyne, 2009: 15). Before a theory can be considered scientific, it 'must be testable and make verifiable predictions'; hence our observations of the real world must either support or disprove it (Coyne, 2009: 16). Thus, a scientific theory is only considered to be true when repeated testing confirms the theory, and there is no decisive evidence against it (Coyne, 2009: 16). Nevertheless, as recorded earlier in Popper's definition of science, a scientific theory is always falsifiable in the light of new evidence – this is the dynamic nature of science. While evolution is regarded by some (generally creationists) as merely a 'theory', various scientific methods – such as molecular biology and embryology have not only provided valid scientific evidence for it, but have enabled scientists to predict what they will find in both extant and extinct organisms (Coyne, 2009: 18). The results of the literature review suggest that the theories behind CAM and other pseudoscience have myth, opinion and misconstrued extrapolation from scientific publications as their foundation, while mainstream science and orthodox medicine have scientific theory in the form of evidence as theirs.

In contrast to scientific theory, a **theory** is a human account of something that is used to explain a particular phenomenon (Fourie, 2010: 104-111). Since it is a human account, a theory is not necessarily objective nor even correct, and there may be a number of theories to explain the same phenomenon (Fourie, 2010: 104). Furthermore, theory may not be systematic nor even logical, because it always relates to real-life situations (McQuail, 2011: 87). In mass communication research, **theories** are used to understand, explain, predict and control and, perhaps, reform media's relationships (Du Plooy, 2009: 35; Fourie, 2010: 103). These relationships may be with the media's audience, within the media institution, between media institutions, and with other institutions (Fourie, 2010: 116). These theories develop through a series of steps that are directly related to the researcher's personal perspective (Du Plooy, 2009: 20; Fourie, 2010: 105,106) concerning the power of the media, as well as their functions and effects on society (Fourie, 2010: 116). This perspective is called

a paradigm or an approach, and is aligned to the researcher's personal views regarding the power of media, and/or their functions and effects on society (Fourie, 2010:116). Two theoretical paradigms, the positivist and the critical paradigms, form the basis of all media research, and all theories used in media research are grounded in either one of them (Fourie, 2010:181). These are discussed briefly below.

The positivist paradigm

Also called the dominant paradigm, this paradigm is considered normative since it views society as being ideal and having a free market system (McQuail, 2011: 63). According to this paradigm, the media are expected to serve a purpose (Ekron, 2008: 84), which is to provide information, education and entertainment and, generally, to improve society (Fourie, 2010: 120). Although it views the media as a neutral social tool (Fourie, 2010: 121), it also acknowledges media's power to shape public opinion and trigger social change (Fourie, 2010: 121; McQuail, 2011: 66).

In research, the positivist paradigm is used to describe and explain the power of the media and their effect on behaviour and thinking (Fourie, 2010: 103), particularly with regard to politics and consumerism (Fourie, 2010: 228). This is called effect theory (Fourie, 2010: 103) which, initially, concentrated on media's power over its audience and viewed communication as a one-directional linear process of cause and effect (Du Plooy, 2009: 25). This linear process is sometimes referred to as the transmission model (McQuail, 2011: 71).

Research using the positivist paradigm usually involves quantitative research by means of content analysis, surveys, and experiments, and the results are reflected in statistics (Fourie, 2010: 228). Today, the paradigm remains relevant since it meets the needs of advertisers and others who believe in media's power over their audience (McQuail, 2011:75). Although effect theories fitted more within the behaviourist /deterministic and positivist paradigm, they have evolved to incorporate a more humanistic and critical approach which is described below (Fourie, 2010: 103).

The critical paradigm

As the name implies, the critical paradigm arose as a result of criticisms of a commercialised media – their questionable standards of truth, and their control by monopolies (McQuail, 2011: 67). Central to this paradigm is the concept of power (Fourie, 2010: 134; McQuail, 2011: 66), and the relationship between media's

ideology and their content (Fourie, 2010: 134; McQuail, 2011: 66). This paradigm also rejects the transmission model of communication and the assumptions of normative values (McQuail, 2011: 68) described in the positivist paradigm above. Thus, in contrast with the positivist paradigm, critical research concentrates on media's ideological manipulation of their audience, and their influence on behaviour and thinking (Fourie, 2010: 228).

An ideology is a system of meaning that defines and explains the world and that 'makes value judgements about that world' (Croteau *et al*., 2010: 153) or, as Fourie (2010: 131) puts it: 'ideology is the ideas and belief systems in terms of which individuals, society or group(s) in a society understand and interpret their political, economic, social and cultural realities'. Ideologies are not necessarily accurate reflections of reality and, in fact, often present a 'distorted version of the world' (Croteau *et al.*, 2010: 153). For example, capitalism is an ideology (Fourie, 2010: 133), as is the stereotypical portrayal of women (Croteau *et al.*, 2010: 156). Through sheer repetition, media texts suggest to their audience what is considered 'normal' or 'deviant' in society, as well as which ideas are acceptable and which are not (Croteau *et al.*, 2010: 157). Ultimately, ideology is a belief system (McQuail, 2011: 558). And, while media may not deliberately propagate a particular ideology, most media content does so by emphasising particular norms and values (McQuail, 2011: 559), and their particular ideology can be determined by what they include and exclude, as much as it can be by their actual content (Croteau *et al.*, 2010: 153).

Thus, according to this paradigm, media are seen to represent symbolic forms of expression (Fourie, 2010: 133) that communicate particular values, beliefs and attitudes (Fourie, 2010: 133). Media are believed to assign meanings to things (Fourie, 2010: 133), and to reproduce a selective and biased view of reality (McQuail, 2011: 101). Furthermore, the economic and political nature of the mass media are not viewed as neutral, and the paradigm is concerned with media domination – especially of gender, youth and culture (McQuail, 2011: 67).

The assumption that there is a close relationship between the media, politics and the economy (Fourie, 2010: 134), has led to the theory of critical political economy within this paradigm, and the belief that this determines media's ideology and content (Fourie, 2010: 135; McQuail, 2011: 94). As a result, both media content and audience are commodified because their ultimate goal is profit (Fourie, 2010: 136, 141; McQuail, 2011: 97).

Although the paradigm acknowledges that the audience is capable of interpreting content individually, media are believed to affect their thinking and opinions (Fourie, 2010: 134; McQuail, 2011: 67). Research using the critical paradigm uses the qualitative method (McQuail, 2011: 66) that uses field research to obtain information from the subject's perspective which, in turn, is used to understand patterns in observations (Du Plooy, 2009: 35)

Essentially, the deterministic (positivist) view is that media have a strong influence on public opinion and discourse (Fourie, 2010: 106), while the humanistic (critical) view is that, while this may be so, people remain free to make their own choices and decisions (Fourie, 2010: 106). However, paradigms are seldom mutually exclusive, and often borrow from each other to form a fusion of paradigms (Fourie, 2010:145). Thus, most positivist research includes some critical interpretation, while most critical research is supported by empirical data (Fourie, 2010:145). And, although effect studies generally use quantitative research techniques, they can also be used in critical research that uses qualitative methods to determine the power of the media to change society by means of ideological manipulation (Fourie, 2010: 22).

The hypodermic needle theory

The hypodermic needle theory is also sometimes referred to as the stimulus-response theory and the magic-bullet theory (Fourie, 2010: 232; Du Plooy, 2009: 25) and, since it is an effect theory (described below), it views the media as powerful and having a direct effect on its audience (Du Plooy, 2009: 25). As the name implies, media are compared with an intravenous injection (Croteau *et al.*, 2010: 231; Fourie, 2010: 232) – audiences are viewed as passive and helpless victims with media attitudes and values being injected into them that results in certain behaviour (Fourie, 2010: 232). The theory originated in the 1930s and arose as a result of the successful propaganda used during the First World War (Du Plooy, 2009: 25), and the very pervasiveness of media at the time (Shaw, 1979: 102).

Effect theories are used to explain media's effect on audiences, and the hypodermic needle theory is but one of them (Fourie, 2010: 232). Media effects are the consequence of what the media do – and may be intended or unintended, whereas media power generally refers to media having a planned effect (McQuail, 2011: 463). While it is widely accepted that the mass media have a powerful influence on opinion and behaviour, there is no consensus on the nature or extent of these effects (McQuail,

2011: 454). Audience trust and their respect for the source of information influence the effects that media have (McQuail, 2011: 470) as do repetition, consistency and lack of alternatives (McQuail, 2011: 468). It is also generally acknowledged that media have more influence during times of 'crisis or heightened awareness' (McQuail, 2011: 462), and that audiences become more dependent on media for information during times of uncertainty and change (Ball-Rokeach, 1998: 10).

Besides being based on the view that media directly affect audience behaviour (Croteau, *et al.*, 2010: 231; Du Plooy, 2009: 25; Fourie, 2010: 232), the hypodermic needle theory arose in an effort to explain media's effect on audiences during extreme circumstances (Fourie, 2010: 232). Although research in the last century supported the theory (Fourie, 2010:233), it has become discredited over the past fifty years, and has been replaced by the more modern agenda-setting theory (Shaw, 1979:96). The agenda-setting theory views the media as purposefully drawing attention to and placing significance on certain facts while withholding other information so that they achieve certain effects in their audience (Fourie, 2010:244; McQuail, 2011: 465; Shaw, 1979:96).

Currently, the hypodermic needle theory is viewed in relation to the time it was developed (Fourie, 2010:233). This was a time of extreme conditions and, although the world is not currently at war, global and personal conditions are extreme in many ways – all factors that may encourage people to seek solutions and hope in pseudoscientific thinking and superstition. According to Sagan (1996a: 29), whenever humans are confronted with adversity of any kind, we automatically revert to primitive thought patterns which allow pseudoscience and superstition to flourish because they provide us with a sense of control. Considering the facts presented in the literature review, the media appear to be guilty of promoting superstitions and untruth at a time when audiences may be vulnerable to pseudoscience. For this reason, this study uses the hypodermic needle theory as a possible explanation for the prevalence of pseudoscience in the media, and a possible reason for audiences supporting the various forms of it.

Research design and methodology

The research design is the plan of what and how data will be collected (Lemon, 1997: 38) – it must provide 'a clear statement of the research problem, procedures and techniques to be used for gathering information, the population to be

studied, and the methods to be used in processing and analysing data (Lemon, 1997: 40). All these factors are covered below.

Research requires identifying a problem, making observations about it, then interpreting those observations (Babbie & Mouton, 2011: 72). Qualitative research involves the formulation of a research question (Lemon, 1997: 36) and, although this study includes both quantitative and qualitative research, the primary aim of the study requires qualitative research and the corresponding question is: why do South Africans, as reflected by those who use CAM, continue to support it when it has been publicly denounced by science?

Exploratory studies are used to 'explore an unknown area of research', provide 'new insights', 'develop hypotheses' and confirm assumptions (Du Plooy, 2009: 50, 51). Besides a thorough literature review, exploratory studies include personal interviews and case studies (Du Plooy, 2009: 51). This research project is an exploratory study with two aims. The primary aim, as put in the research question above, is to determine why media audiences support pseudoscientific theories that have been discredited by science; while the secondary aim is to demonstrate the existence and prevalence of pseudoscience in the media by using the example of a health and lifestyle magazine. Two research studies were undertaken to achieve these aims – a quantitative study was used to collect numeric data, while a qualitative study was used to collect textual data. In media research, the use of two or more different data-collection methods, and the obtaining of data from multiple sources is referred to as triangulation, and is often used to prevent bias (Du Plooy, 2009: 40; Lemon, 1997: 42).

Quantitative designs are used to count variables (Du Plooy, 2009: 86). A variable is the particular characteristic or attribute of whatever object is being studied (Du Plooy, 2009: 73; Lemon, 1997: 39). The numeric data are obtained from content analyses, in which a particular theme is recorded, with each theme being relevant to a specific issue (Du Plooy, 2009: 871,214) which, in this case, is pseudoscience. *Longevity* was used as a case study for the content analysis owing to the fact that its tagline is 'live a longer, happier & healthier life', and the fact that it is representative of a health and lifestyle magazine. A content analysis, using pseudoscience as the thematic units of observation, was conducted on ten consecutive issues of *Longevity* magazine, which represents their publication output for a year. A case study 'involves the observation and in-depth analysis of a single system', in this case, *Longevity,* and

is often used in the early stages of a research study since it may lead to a testable hypothesis, or it can be used to obtain a particular outcome (Du Plooy, 2009: 180). A hypothesis is a tentative statement of solution to the problem guiding the study, and is usually used in quantitative research (Lemon, 1997: 36).

In media research, qualitative studies are used to obtain information where little or none exists, and to uncover trends or attitudes. The method of reasoning in this type of study is usually inductive since it is based on specific assumptions, and focuses on 'providing possible reasons for reaching particular findings' (Du Plooy, 2009: 89). Information is obtained by asking questions during interviews – when questions are used to collect data, the questions are based on assumptions that have already been established in the literature, and the responses are used to confirm particular theories, or to create new ones (Du Plooy: 2009: 88).

Qualitative studies interact with research subjects within their personal environment since this provides the researcher with an inside perspective of their world view and experience (Babbie & Mouton, 2001: xxx). When conducting interviews or surveys, the units of analysis are the people whose characteristics 'we wish to observe, describe and explain' (Lemon, 1997: 39). In other words, they are the individual respondents, and the information collected describes their opinions, beliefs and attitudes on a particular issue (Du Plooy, 2009: 148). In this study, respondents were restricted to those who use or have used CAM, and the questions aimed to determine where they obtain their information on CAM and why they use it.

When respondents are used to obtain qualitative data, a distinction is made between the target population and the accessible population – the target population is the population to which we want to generalise results, whereas the accessible population is one the researcher has access to (Du Plooy 2009: 109). The sample used in this study is a volunteer sample obtained from the accessible population since respondents were those who agreed to participate in the study (Du Plooy, 2009: 124) following an e-mail request. This kind of sample is called a non-probability or non-random sample because not everyone in the target population has an equal chance of being selected (Du Plooy, 2009: 122). It is used when it is difficult or impossible to obtain a random sample, but is also used for exploratory research (Du Plooy, 2009: 122) – both of which are applicable to the current study.

Although snowball samples are also considered non-probability samples (Du Plooy, 2009: 124), they were used in this study in an attempt to increase probability

since these samples were ones the author would not ordinarily have had access to. A snowball sample is analogous to a snowball gathering snow as it rolls down a hill, and refers to samples that are acquired as a result of primary responders providing the contact details of possible respondents who are known to them and who may be interested in participating in the study (Du Plooy, 2009: 124).

In this study, depending on their location in relation to the researcher, information was obtained from respondents by telephone or during face-to-face interviews. The units of analysis were media audiences who have used any form of CAM. Since the aim of qualitative research is to describe and understand human behaviour (Babbie & Mouton, 2001: 53), the interviews were used to ascertain the feelings, views and knowledge of the individual respondents (Du Plooy, 2009: 204). Qualitative content analysis is not reported in numeric terms, but is reported as descriptions (Du Plooy, 2009: 22). Thus, the results are recorded as dialogue which captures events as they happen, (Babbie & Mouton, 2011: 271).

When conducting interviews, problems may arise as a result of the wording of questions and, in this study, the recommendations of Du Plooy (2009: 149) were used when composing them. For instance, particular wording may lead to bias in the response (Du Plooy, 2009: 205). Thus, the questions asked were mostly open-ended, and worded to eliminate respondents' perception of bias on the part of the researcher, but also compliance on the part of the respondent (Du Plooy, 2009: 203). Compliance occurs when a respondent agrees with statements regardless of their content (Du Plooy: 2009: 203). Composition of the questions was guided by information in the literature review, as well as by the hypodermic needle theory described above, since the theory views the audience as passive and the consensus among scientists is that media are responsible for pseudoscience's popularity (Goldacre, 2009: 251; Offit, 2013: 6; Park, 2001: 26; Pigliucci, 2010: 85; Singh & Ernst: 2009: 310).

Although the majority of the questions are pre-determined, the interviews are largely unstructured, and respondents are encouraged to speak freely (Du Plooy, 2009: 199). Although questions of this nature may elicit lengthy replies that are difficult and time-consuming to transcribe (Du Plooy, 2009: 199), the problem was overcome by typing the responses on a laptop computer as they were being voiced. The income range used to classify South African low, middle and high income earners was obtained from the University of South Africa's Bureau of Market Research (2011). The full interview questions are in Annexure A.

Conclusion

This chapter has contrasted scientific theory with the theory used in media. It has explained the two theoretical paradigms used in media research, and has also explained the research process for this study, which includes both the dominant paradigm in the form of content analysis, and the critical paradigm in the form of field research. As mentioned before, most positivist research includes some critical interpretation, and most critical research is supported by empirical data (Fourie, 2010:145). While the hypodermic needle theory is essentially an effect theory used to explain the effects media have on their audience (Fourie, 2010: 232), in this study it is also used in the critical sense in an attempt to determine the possibility of an underlying ideology with regard to media's reporting of pseudoscience.

Chapter 4
Data and findings

Magazine selection

In line with scientists' concern regarding pseudoscience in the media, one of the aims of this study is to demonstrate its prevalence in South African women's health and lifestyle magazines. Among these magazines, *Longevity* was selected for two reasons. Firstly, because its tagline is 'live a longer, happier & healthier life' but, more importantly, because it regularly publishes articles authored by three renowned purveyors of pseudoscience, all of whom have been discredited by scientists:

- Patrick Holford, whom the magazine refers to as 'nutrition guru' (*Longevity* Edition I, 2013; editions VII, VIII, and IX, 2012), but who has been publicly denounced by science (Goldacre, 2009: 161-180). Although he claims to be a 'nutritionist', this is not a protected title in the United Kingdom (Rosseau, 2011) where he is based, and Holford has no scientific training in nutrition – but merely holds a diploma from the Institute of Optimum Nutrition, an institution he personally set up (Goldacre, 2009: 174; Lewis, 2008). Moreover, Holford owns a company that manufactures and sells nutritional supplements, and that promotes the use of a bracelet which, it claims, corrects 'energy frequencies'. (Goldacre, 2009: 174, 175; Rosseau, 2011);
- Dr Mehmet Oz, sometimes referred to as a 'TV alt-med guru' (Plait, 2014) who, despite being Professor of Surgery at an esteemed university in New York and who is, thus, considered the 'most credentialed of celebrity health promoters', has been publicly discredited by his scientific peers (Belluz & Hoffman, 2013; Novella, 2011b; Offit, 2013: 32-43) for promoting homeopathy and other pseudoscience practices such as 'reiki (Barrett, 2012) and communicating with spirits of the dead' (Barrett, 2012; Offit, 2013: 35, 36), and for promoting chiropractic, the use of faith healers, therapeutic touch as well as the theories of two world-renowned pseudoscience practitioners: Deepak Chopra and Andrew Weil (Offit, 2013: 35 - 39). Reiki is a pseudoscience (CAM) that claims to channel

'energy' into the patient and stimulate healing (Ernst, 2013). In trials, scientists could not prove the value of reiki (Lee, Pittler, Ernst, 2008: 947), and Ernst (2013) has declared reiki 'neither plausible, nor effective, nor harmless'. Furthermore, Oz is renowned for promoting his own pseudoscientific products (Belluz & Hoffman, 2013), and has been accused of providing his 'official seal of approval to absolute and total nonsense' (Crislip, 2011). Or, according to Schwarcz (2013), 'Miracles are pretty rare events. Except on television's *Dr. Oz Show* where they appear with astonishing frequency'. This thanks to his wizardly but unsubstantiated weight loss remedies – some of which are known to induce health problems. Hence Schwarcz's (2013) conclusion, 'Dr. Oz puts his facts on a diet when it comes to fattening up his television ratings'. More recently, Oz appeared in court on charges of deceptive advertising following his recommendation that viewers of his show use a certain diet pill if they cheat on their diets because, as claimed on his website, the pill is one of '3 ways to get your fat to eat itself' (Stanek, 2014);

- Dr John Demartini, New-Age pop-psychologist, author of several books, co-author and proponent of *The Secret* , and presenter of seminars, has been discredited by science (Smythe, 2007), and by consumer watchdogs because he has no qualifications in psychology (Harriman, 2012). Despite this, *Longevity* magazine introduces him as 'a human behaviour expert, author, educator, health professional and business consultant', when the truth is that Demartini dropped out of school at the age of fourteen thanks to a learning disability, and eventually completed some training in chiropractic (also a pseudoscience, as described earlier) before becoming involved in the public speaking that has led to his current fame (Schmidt, 2008). Demartini is a leading proponent of the 'law of attraction' philosophy (Guilliatt, 2012) which teaches that 'you bring about what you think about' (Demartini, 2007), included in which is the belief that both illness and healing are manifestations of the mind (Guilliatt, 2012).

Content analysis

Ten consecutive issues of *Longevity* (editions I – X of 2013), which represent the publication outputs for the year, were analysed for pseudoscience content. The analysis was not restricted to CAM, but included all forms of pseudoscience (as described before, these are claims and/or theories for which there is no scientific evidence). All articles, advertisements and advertorials promoting, prescribing, or containing reference to any form of pseudoscience were recorded as being pseudoscience. Each of these categories (articles, adverts, advertorials) has been compared with the total number and given as a percentage in Tables 1 and 2. The average pseudoscience content for the various categories over the ten issues published during 2013 has been illustrated as a pie chart in Figures 1, 2 and 3. These results are discussed in the next chapter, in the Discussion and Conclusion.

The analysis was conducted as follows:

- all articles, adverts and advertorials that contained any reference to a pseudoscience practitioner, therapy, procedure or product – including 'integrated' medicine, were considered pseudoscience. This included travel destinations that host spas, etc., that provide CAM therapies;
- only articles, adverts and advertorials in the magazine were analysed, editorials were excluded;
- only articles consisting of half a page or more were counted. Each of these was counted as one, while all articles shorter than half a page were excluded since these were usually included in collages of information;
- all adverts were counted, except those for *Longevity*. Adverts of half a page or less were counted as half, those consisting of one page were counted as one, those spread over two pages were counted as two, and so on, since the number of pages represents the amount of advertising space that has been sold by the publication.
- advertorials were any articles, (including travel destinations), that pertained to a single manufacturer or service provider. Only those that extended over half a page or more were recorded, since many products were presented in collages that pertained to several manufacturers,

while any that pertained to *Longevity* were excluded. Advertorials were counted in the same manner described above for adverts;

- most editions of *Longevity* (except Edition X) analysed contained an 'a to z professionals guide' of therapists at the back of each edition – none of these was included in the content analysis, since their scientific credentials are not always apparent, nor are the services they provide;
- for the purposes of this study, pseudoscience was not restricted to CAM, but included all forms of pseudoscience not specifically covered in this research, but which fall within the definition of pseudoscience provided.

Table 1: Content analysis - editions I-V

Content Analysis	Edition I	Edition II	Edition III	Edition IV	Edition V
Total Articles	15	20	17	16	20
Pseudoscience articles	10	11	11	7	6
% Pseudoscience articles	***67%***	***55%***	***65%***	***44%***	***30%***
Total adverts	21	23	23.5	29	31
Pseudoscience adverts	14.5	15	15	21	19.5
% Pseudoscience adverts	***69%***	***65%***	***64%***	***72%***	***63%***
Total advertorials	32	8.5	6	5	8
Pseudoscience advertorials	25	6.5	5.5	0	3
% Pseudoscience advertorials	***78%***	***76%***	***92%***	***0%***	***37.5%***

Table 2: Content analysis - editions VI-X

Content Analysis	Edition VI	Edition VII	Edition VIII	Edition IX	Edition X
Total Articles	20	19	20	14	17
Pseudoscience articles	6	6	8	5	7
% Pseudoscience articles	***30%***	***32%***	***40%***	***36%***	***41%***
Total adverts	30.5	25.5	32	23.5	16
Pseudoscience adverts	19	16	23	16.5	12
% Pseudoscience adverts	***62%***	***63%***	***72%***	***70%***	***75%***
Total advertorials	8.5	8	13.5	17	4
Pseudoscience advertorials	7.5	4	12.5	13	4
% Pseudoscience advertorials	***88%***	***50%***	***93%***	***76%***	***100%***

Figure 1: percentage pseudoscience articles over ten issues of *Longevity*, 2013

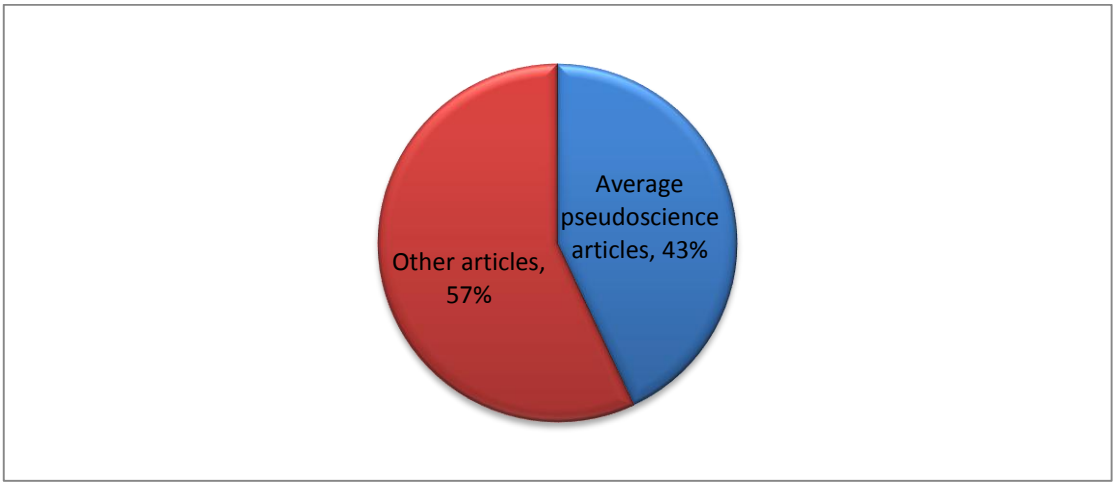


Figure 2: percentage pseudoscience adverts over ten issues of *Longevity*, 2013

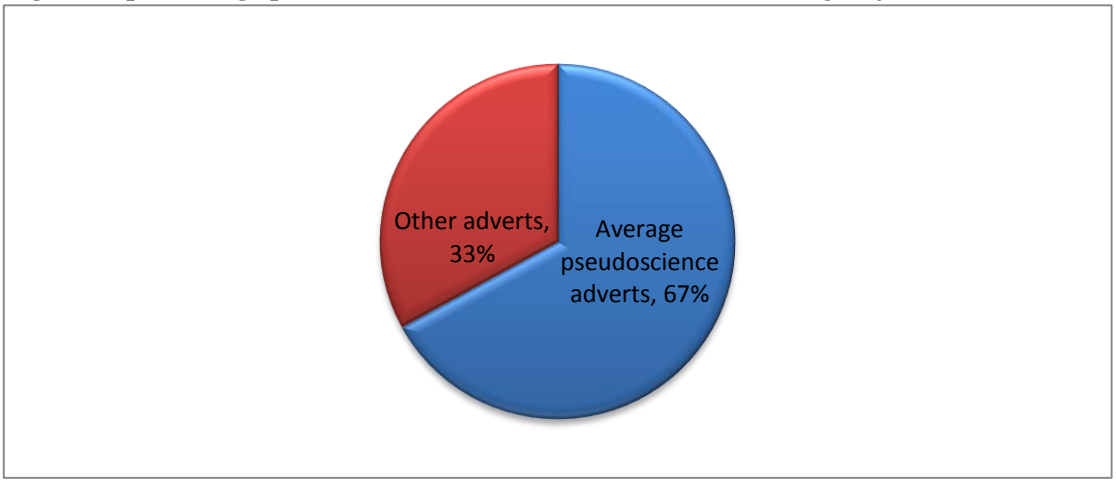
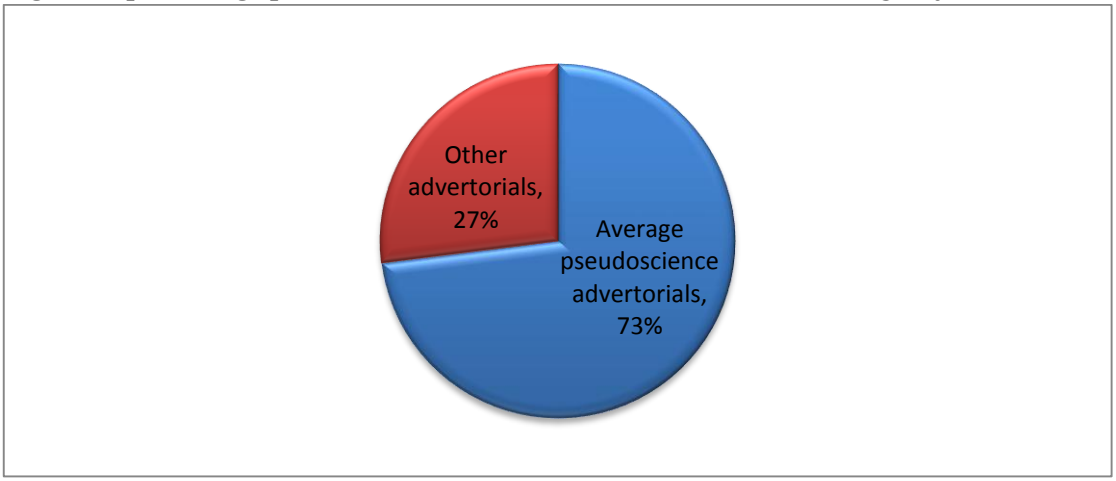


Figure 3: percentage pseudoscience advertorials over ten issues of *Longevity*, 2013



Telephonic and face-to-face interviews

Interviews were conducted both telephonically and face-to-face, depending on the location of the respondent. Respondents were volunteers who responded to an e-mail requesting participation from those who had consulted any type of alternative therapist. The e-mail was sent to friends, colleagues, and acquaintances, as well as to referrals obtained from the original respondents, and referrals from those referrals. For ethical reasons, all respondents interviewed were obliged to sign the Stellenbosch University's consent to participate in research. The results of the interviews have been incorporated in the next chapter, in the Discussion and Conclusion.

Discussion

Content Analysis of *Longevity*

Paging through the ten editions of *Longevity* brought to mind the words of an advertising executive quoted by Durning (1992: 120): 'It is our job to make women unhappy with what they have'. This is the goal of most marketing and consumerism – to make us feel bad because, the worse we feel, the more we buy (Warren, 2014). Advertising is notorious for promoting a 'beauty ideal', and for using 'attractive female bodies' to direct the viewer's attention to a product or service (Frith, Shaw & Cheng, 2005: 57). In fact, as Morrison (2014) points out, 'it's not uncommon to have difficulty deciphering what product is being advertised due to the focus being placed on the objectified woman'.

Years of debate on this subject have concluded that 'advertising creates unfair expectations in women because ads hold up an unattainable beauty ideal' (Frith, Shaw & Cheng, 2005: 67), and that the cumulative effect of this kind of advertising has a negative effect on women's self-esteem' (Frith, Shaw & Cheng, 2005: 57). Sadly, despite the irony of their tagline: 'live a longer, happier & healthier life, *Longevity* is no different in their consistent depiction of women with eternally young, flawless complexions. However, *Longevity* seems to avoid any slight to their conscience by also offering readers the opportunity to achieve these 'unattainable ideals' by featuring pseudoscience adverts and advertorials that promise eternal youth in the form of beauty products and procedures that claim to permanently enhance almost every aspect of the feminine form, including facial features, complexion, teeth, hair, odour, mass – its distribution and appearance.

It is common knowledge that marketers specifically target audiences that would be most interested in their products (Frith, Shaw & Cheng, 2005: 66), and the content analysis confirms that purveyors of pseudoscience, especially those who specialise in beauty products and procedures, perceive *Longevity* as a vehicle for promoting their products. However, media are not only reliant on advertising for economic success, they also rely on sales. Hence, the *Longevity* audience must represent a market for this type of pseudoscience, or the publication would not sell, and the advertisers would not target it. It is debatable whether the sheer volume of beauty-orientated pseudoscience adverts contained in *Longevity* is an indictment against the publication or its readers since, as Morrison (2014) states: 'We are completely immersed in a culture that condones the objectification of women *all* the

time! And when we allow it to happen, or at the very least when we tolerate its existence, we continue to give it our stamp of approval'.

While the pseudoscience of the cosmetics industry was not specifically covered in the literature review, 'questionable science claims' are rife in that industry (Emsley, 2004; Hughes, 2011), with certain major cosmetic giants having their adverts banned for making misleading or false statements regarding their research (Poulter, 2013; Hughes, 2011; Sweney, 2009), as well as for using computer trickery (Poulter, 2013) and other images to falsely enhance the effects of their products (Hughes, 2011). Also, many beauty products are known to contain 'cancer-causing chemicals' and a global manufacturer has recently been compelled by law to either stop making, or stop selling products containing these chemicals (Yeomans, 2014). In South Africa, local hairstylists and consumer groups have called for the naming and shaming of certain popular hair treatment products that contain almost five times the legal limit of formaldehyde – a known carcinogen (cancer-causing agent). Of the seven brands tested, six contained higher than legal limits and, of these, five had actually claimed to be 'formaldehyde-free' (Comins, 2014).

Making claims that a particular product has been scientifically proven is common in the advertising industry, and is meant to imply to the audience that the claims made are beyond dispute (Chalmers, 1985: xv). This tendency is particularly common in the cosmetics industry who, according to Goldacre, (2009: 21-26) makes big money 'from nonsense' that it uses to fool people – especially women – with adverts depicting men in white lab-coats, and containing scientific-sounding jargon and incomprehensible diagrams. While conducting the analysis, adverts such as these were frequently observed in *Longevity*. In science circles the jargon attached to these adverts is known as 'cosmetic babble' and, although some feel that it is only the scientifically illiterate who are taken in by it, a number of top English scientists interviewed claimed they were unable to make sense of the terms used, while a Nobel laureate confessed that he understood 'nothing in these adverts' (Highfield, 2005). Furthermore, many of these products are endorsed by physicians who are already well qualified, but who claim the added qualification of being 'anti-aging specialists', a qualification that is not recognised by the American Board of Medical Specialities, nor by the Health Professionals Council of South Africa (Camcheck, 2010).

While certain powerful chemicals reported in the media have been shown to make the skin appear more youthful, they are only effective at such high

concentrations that using them would cause severe irritation , thus, they are only available on prescription or are 'massively watered down' in over-the-counter cosmetics (Goldacre, 2009: 22). Nevertheless, cosmetic companies continue to name these ingredients on their labels, 'wallowing in the glory of their efficacy at higher potencies', since only the chemical and not the concentration, is required on the label (Goldacre, 2009: 22).

In addition, these companies often use 'textbook' information about how cells in a petri dish might react to the ingredients, but fail to confess that this would not happen on the skin since it is fairly impermeable (Goldacre, 2009: 24), or that certain chemicals create an effect by stripping the top layer of skin cells – an effect that is lost when the cells regrow (Consumer Reports.org, 2012). Current research shows that buying expensive cosmetics is a waste of money (Smithers, 2009), and that no cream is capable of producing a true and lasting, anti-ageing effect (Hughes, 2012). Nevertheless, Lucintel (2012), a leading global market research firm, estimates that the global beauty market is estimated to reach $265-billion by 2017, and this by playing on the very insecurities the industry's own adverts are claimed to evoke.

As previously indicated in Figures 2 and 3, the average of pseudoscience adverts and advertorials was fairly high over the ten editions. Although various types of pseudoscience were covered by the adverts, the majority were for anti-ageing and/or beauty products and services. This was also the case for advertorials, although some pseudoscience advertorials were for travel destinations which hosted spas that promote CAM and other pseudoscience practices. While the content analysis did not include the supplements that were occasionally inserted inside the magazines, observation revealed that these merely contained more of the same anti-ageing information and adverts contained in the main magazine.

The literature review makes it clear that media stand accused by scientists of promoting pseudoscience. The data obtained for adverts and advertorials, and provided in the tables and figures, clearly support this. While the data obtained for pseudoscience articles are not as voluminous as they are for pseudoscience adverts and advertorials, and the number of pseudoscience articles dropped from Edition IV and remained fairly low, the publication, nonetheless, provides a regular platform for purveyors of pseudoscience. Although *Longevity* published a regular column by Patrick Holford during 2012, only Edition I in 2013 contained the column, while Edition V contained an article by him, and only the first four of ten editions published

in 2013 contained adverts for his products. However, all ten issues published in 2013 contained articles by both Oz and Demartini. From Edition IV to Edition X (2013), information on nutrition and other aspects of lifestyle (including those by Oz and Demartini) was presented in a 'dossier' called 'expert advice' that formed part of the magazine. As with Holford, both of these authors have been discredited by science yet, despite this, *Longevity* continues to describe their contributions as 'expert advice' and to provide a regular platform for their theories.

Field Research

For the field research, interviews were conducted on 38 respondents. As explained previously, respondents were obtained from an e-mail sent to friends and acquaintances of the researcher, requesting participation from anyone who had used any form of CAM. However, only 17 (45%) of the respondents interviewed are known to the researcher, the balance were obtained by the snowball sampling method explained previously. These respondents are unknown to the researcher and were obtained as referrals from the original respondents, and referrals from those referrals. Thus, the majority (55%) of respondents in this survey are people that the researcher would not normally have had access to. The survey questions aimed to confirm or deny the information presented in the literature review, to confirm or deny the role of the media in the rising popularity of CAM, to confirm or deny the hypodermic needle theory in CAM's popularity, and to determine why the respondents use CAM. The results of the survey are provided as bullet points below. Each bullet relates to a particular question in the survey, and is compared with associated information provided in the literature review. The survey questions are attached as Annexure 1.

- As quoted in the literature review, surveys of CAM users worldwide reveal that users tend to be middle-aged, middle-class and educated, and that women are more frequent users than are men (Cant, 2002: 19; Ernst, 1993: 44; Shapiro 2009: 218). Results of this survey confirmed this, and are illustrated in Figures 4, 5, 6, & 7, respectively:
    - respondents were between 33 and 74 years of age, with an average age of 58 years (Figure 4). Using the developmental psychologist Erik Erikson's psychosocial development stages, this is considered middle-aged since

middle adulthood is considered to be between the ages of 40 and 65 (McLeod, 2008);

- by far the majority, 32, or 84%, of respondents were middle class* with an annual income of between R155 000 and R870 000 per annum, 6 or 16% had an income above R870 000 per annum, while no respondents had an income below R155 000 (Figure 5);
- the majority, 19 or 50%, of respondents had a university education, 15 or 39% had some college education, while only 4 or 11% had no tertiary qualifications (Figure 6);
- the majority, 26 or 68%, of respondents were female (Figure 7).

*In South Africa, there appears to be little consensus regarding the income levels for the income groups: low, middle and high. This is, apparently, owing to the enormous disparity in earnings and education within the population (Visagie, 2013). According to Paul Egan, Managing Consultant at the University of Cape Town's Unilever Institute of Strategic Marketing (personal communication, 19 May, 2014), 70% of households in South Africa currently live on R5 000 per month, while the top 5% of earners account for almost 40% of all taxable income.

The generally accepted definition of the middle class is a group of educated, high-income, skilled individuals who associate with one another and who have significant spending power (Burger & McAravey, 2014). The term is reserved for those who are 'relatively affluent, and who are not considered wealthy or upper class' (Visagie, 2013). However, in South Africa, those in the actual middle of the income distribution tend to have low skills, low income and few assets (Burger & McAravey, 2014), and their standard of living is well below what is generally considered a 'middle-class lifestyle' (Visagie, 2013), as previously defined. This fact was confirmed by Egan's (2014) estimate for the middle income group in South Africa as being between R5 000 and R15 000 total household income per month.

Considering the definition provided for the middle class, the figures obtained from the Bureau of Market Research (BMR) of the University of South Africa (Unisa), seemed to provide parameters that are a more accurate reflection of that definition, especially in terms of education and buying power

(Bureau of Market Research, 2011). Thus, although the figures are much higher than those provided by Egan (2014), BMR's figures were used. For ease of interviewing, all four middle groups (low, emerging, realised and upper) were grouped as middle, and the income of each group (low, middle, affluent) was rounded off to provide some margin for inflation since these figures were released in November 2012.

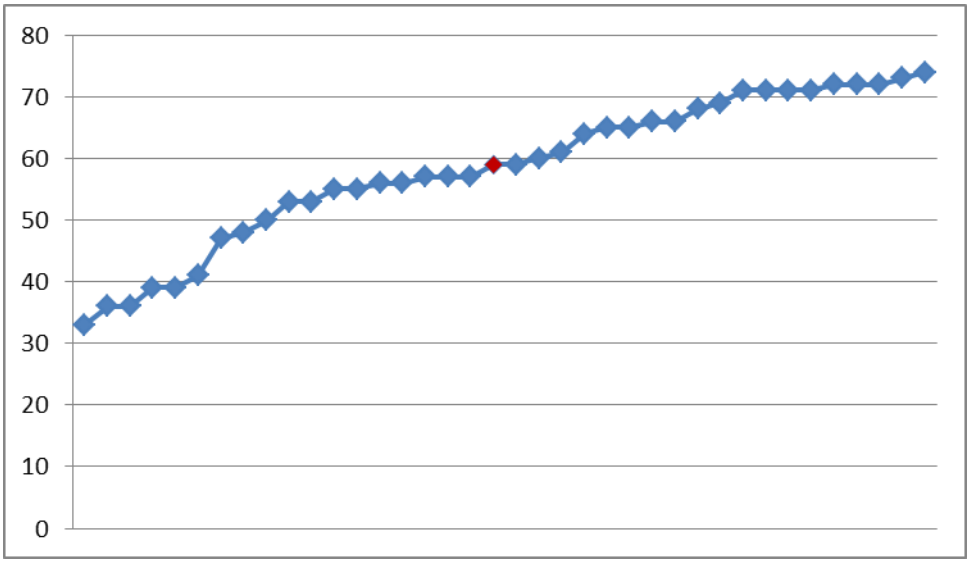


Figure 4: Age range of respondents, with average age indicated in red.

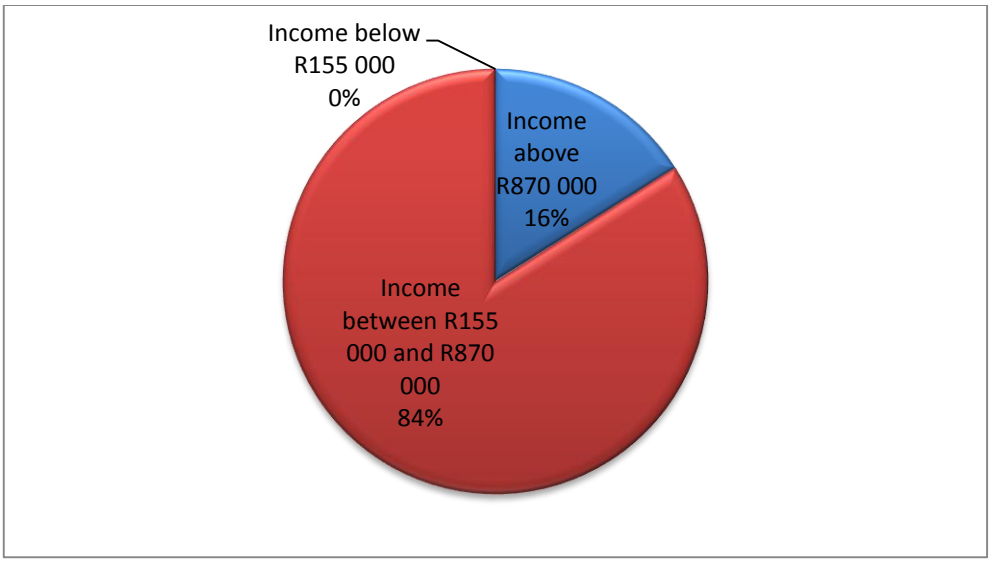


Figure 5: Income groups of respondents – red representing middle, blue representing high.

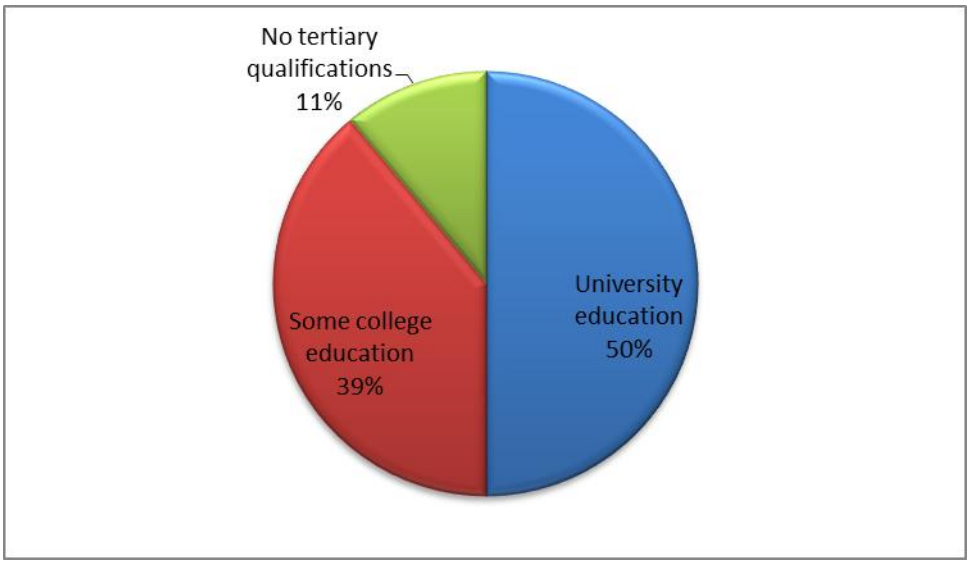


Figure 6: Education levels of respondents

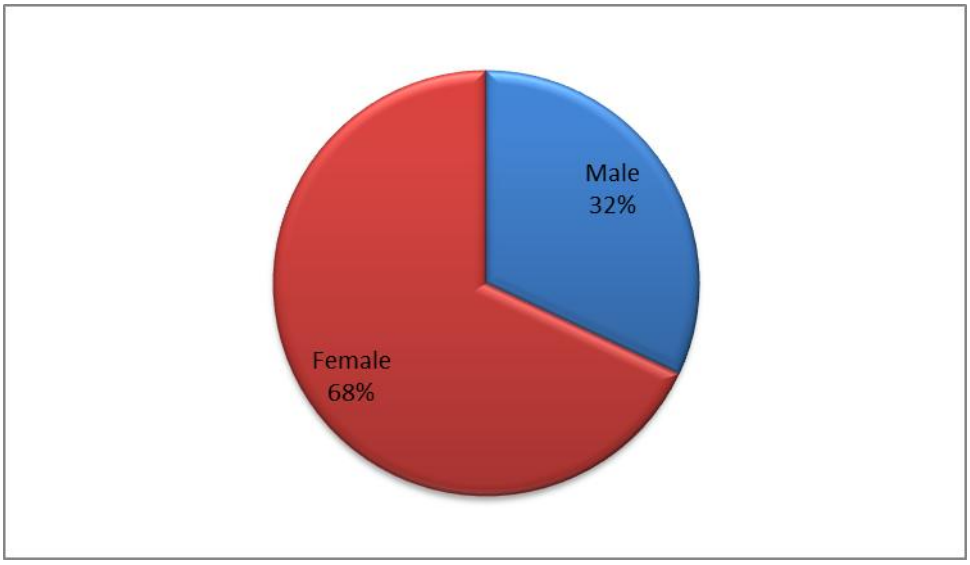


Figure 7: Female/male ratio of respondents

- Both scientists and media scholars blame scientific illiteracy for the increasing popularity of pseudoscience (Abbas Raza, 2014; Claassen, 2011: 364; Daempfle, 2013: 13). As with similar surveys quoted in the literature review (Ernst, 1993: 44), field work for this study does not support this view, but supports the view (Hood, 2009: 78; Sagan, 1996b; Shermer, 2002: 64) that belief in pseudoscience has nothing to do with education or intelligence. As reflected in Figure 6 above, the majority of respondents had some form of tertiary education and, of those respondents personally known to the researcher, two are science graduates (8, 26), two are pharmacists (7, 18), while four hold post-graduate science degrees (9, 13, 22, 23). Of these eight respondents, two were totally opposed to orthodox medicine. Respondent (8), was vehemently opposed to it: 'I don't believe in orthodox medicine' and 'I would never consult a medical doctor'. This respondent said she would only use a conventional medical doctor 'during a trauma when I am unconscious and someone takes me to hospital. As soon as I am able to, I will immediately go to a homeopath'. In similar vein, respondent (26), said, 'my first choice would always be a homeopath', and said she would only use an orthodox doctor 'in case of trauma when no homeopath was available'. The latter confirms scientists' (Hood, 2009: 78; Shermer, 2002: 64) argument that neither intelligence, nor education in science, grants immunity to a belief in pseudoscience, and Sagan's (1996b) contention that pseudoscience attracts many 'accomplished people', and is not a doctrine for 'nitwits'.
- As described above, of 38 respondents, only two (5%) claimed they never choose to use orthodox medicine. The remaining respondents (95 %) admitted to using both CAM and orthodox medicine. Surveys conducted in other countries have revealed that a common reason people turn to CAM is their disappointment with orthodox medicine (Goldacre, 2007a). This survey proved no different but, while many respondents expressed reservations regarding orthodox medicine and the way it is practised, the majority of respondents was not opposed to using orthodox medicine, as described above, and most used it in conjunction with their alternative therapies of choice. This majority included four females (25, 27, 28, 29) who are practising CAM therapists. Despite their reservations about orthodox medicine and the fact that

they use CAM, respondents indicated that they still rely on orthodox medicine to diagnose, and also for curing serious disease. For example, male respondent (6) said he uses orthodox medical doctors 'because they have the relevant equipment to monitor your heart rate, etc., but if they found anything wrong, I would go to a homeopath for their treatment'. While female respondent (11) admitted she uses an orthodox medical doctor for her 'annual checkup for blood pressure, mammogram, and pap smear'. Only four (11%) respondents said that a homeopath is their first port of call when ill, nevertheless, all of these admitted they would use orthodox medical doctors in certain circumstances. For example, female respondent (1), said her homeopath 'fixes anything that's wrong, no matter what', but then admitted she would use an orthodox doctor 'for something drastic, like cancer'. A blind male respondent (15), who did not have a high opinion of conventional medicine and who is quoted elsewhere in this study, said he only uses orthodox medical doctors for 'surgery, and specialists like ophthalmologists when I need them'. Only two (8, 26) respondents (5%), both female, were specifically opposed to orthodox medicine, and would only use it if they had no choice. Both of these held science degrees and their feelings regarding orthodox medicine were dealt with above.

- As reported in the literature review, many scientists' (Becker, 1976: 47; Hood, 2009: 260; Sabbagh, 1991: 247; Sagan, 1996a: 19) argue that belief in the likes of CAM is the result of humans' natural tendency to believe in supernatural phenomena. Results of the survey confirm this. The majority, 33 or 87%, of respondents held some form of religious and/or spiritual belief. Although this may be a contentious issue, and is not within the scope of this study, many scientists see all forms of religion and other theories regarding the supernatural as pseudoscience since there is no proof for any of it. Furthermore, the New Age Movement, described earlier, is strongly associated with virtually all forms of pseudoscience (Dole, Langone, Dubrow-Eichel: 1990) and a belief in miracle cures (Diamond, 2001: 32; Shapiro, 2009: 162). As recorded by Offit (2013: 239), the majority of CAM therapies are also closely aligned with this Movement, and their therapies are referred to as New Age medicine. The results of the survey confirmed a correlation between the use of CAM and belief in New Age theories: 20 or 53% of respondents

indicated that their religious/spiritual beliefs were aligned with New Age theories. In addition, all four CAM therapists interviewed (25, 27, 28, 29) admitted to being strongly aligned with the New Age Movement.

- A common theme in the survey confirmed certain scientists' (Fitzpatrick, 2002: 59; Offit, 2013: 2) view that patients turn to CAM when they experience medical doctors as insensitive and unsympathetic, that they don't take time to listen to or reassure their patients (Cousins, 1979: 137). Female respondent (20) said she uses alternative practitioners because 'they have a more caring approach than scientific medicine does', while another female respondent (26) said, 'homeopaths are more holistic – they spend time with you, ask you about your personal life, and are always willing to listen', and yet another female respondent (22), who has a post-graduate degree in science, said: 'I do believe in the science of medicine, but I'm disillusioned with doctors because they don't listen, and don't spend time with you anymore'. A male respondent (15), who uses an 'integrated' practitioner (medical/homeopath) was especially scathing of orthodox medical doctors, describing them as 'anal, arrogant, opinionated, unapproachable, humourless, rigid, and they don't listen'. A less scathing, but somewhat similar view, has been expressed by one of orthodox medicine's own Dr Bernard Lown (2012), Emeritus Professor of Cardiology at Harvard School of Public Health and winner of a Nobel Peace Prize: 'There is magic to attentive listening'. Lown believes that the 'most glaring lacuna' in orthodox medicine is the lack of communication skills and that, instead of cultivating the 'innate humanity of their students', medical schools 'deplete their commitment to caring'. This, he says, is especially true in hospitals where doctors never learn to know their patients, and end up referring to them by their diseased organ, such as the 'kidney' patient. Lown (2012).
- With regard to the time spent in consultations and as mentioned in the literature review, Dawkins (2007) provides a comparison between the British National Health, where patients can expect only eight minutes from orthodox medical practitioners, and CAM practitioners who spend an hour with each patient. South Africa is not much different, with the mean duration of a consultation at non-academic hospitals in Gauteng being nine minutes (Steyn, & Levitt, 2006: 228). The results of this survey confirm Dawkins' claim, with

18 or 47% of the respondents saying that their CAM therapists spent up to an hour and even more in a consultation, while the remaining responses were anything between 20 minutes and an hour. A female respondent (9) said, 'they take their time, and don't just rush you in and out' - this in contrast to another female (20) who complained that orthodox medical doctors, 'don't spend enough time with you, then write out a script and send you away'. Lown (2012), sympathises with patients' concerns surrounding time: 'Time does not have to be everlasting for a doctor to be responsive to a patient. It can be stretched through a host of measures – for example, by facing the patient at eye level; by banning intrusions by secretaries, technicians, or colleagues; and by not interrupting a patient's narrative'.

- While Dawkins (2007) contends that CAM practitioners spend an hour with each patient 'in return for a healthy fee', only one respondent, a female (24), complained about the fees attached to CAM: 'homeopaths are too expensive'. However, several respondents felt that orthodox medicine has become a money spinner. A male respondent (2) said 'they charge like bloody hell', while female respondent (22) said, 'it seems they are only chasing money', while another said, 'I think it's become very much a money-making racket' (31). This respondent (31), who had been involved in a serious motor car accident and eventually obtained relief from a chiropractor, felt that medical doctors are too quick to want to operate. Lown (2012) offers a similar sentiment stating that, currently, orthodox medicine does not reward doctors for talking to their patients – instead, it pays them handsomely for surgery and the use of other medical technology. He believes that healthcare, generally, has become focused on profit, rather than on patients' well-being, and that it has become the ultimate market commodity – unlike an ordinary consumer, a patient can never be 'sated' since his/her life may ultimately depend on medicine (Lown, 2012).
- Research results quoted by Cant (2002, 19) revealed that CAM users tend to be more health conscious and more likely to be chronically ill. This survey confirmed that CAM users are health conscious, with 32 or 84% of respondents admitting to being so. One of these, respondent 38, a female vegan believes that '90% of all illness is food-borne. I don't believe we are

victims of disease. I think people like to believe that they are victims of disease and have no part in becoming ill.' This belief stands in stark contrast to a female, practising CAM therapist (29) who claims not to be health conscious at all: 'I eat anything and I smoke – what comes out of your mouth causes disease, not what you put into your mouth'.

- Although chronic conditions did not form part of the survey questions, several respondents mentioned using CAM for these because they do not like the drugs prescribed by orthodox medicine, and/or because they have had little success with orthodox medicine for these conditions. Female respondent (1) said: 'I have polymyalgia which the GP said I would have to use cortisone for the rest of my life. I decided to hell with this lot, and decided to see a homeopath' who, the respondent believes, has cured her. A 72-year old male (2) coyly admitted to using a naturopathic 'equivalent of Viagra that works as well as prescribed Viagra'. Other respondents used CAM for a variety of chronic conditions: chiropractors for recurrent sports and other skeletal injuries, homeopaths for chronic sinusitis, hay fever and allergies, but nobody reported using CAM for any serious, chronic conditions, such as cancer or heart disease.
- Surveys conducted elsewhere have shown that CAM users express concern regarding the side-effects of drugs and the fact that they are manufactured from 'chemicals' (Cant, 2002: 24), whereas they believe that CAM is harmless and natural (Campbell, 2002: 3; Cant, 2002: 24; Loxton, 2007). Concern regarding the side-effects of orthodox medicine, as well as a preference for 'natural' methods were common themes in this survey. A 56-year old female respondent (11), who regularly uses a homeopath, chiropractor, acupuncture, reflexology and a sangoma, said, 'I prefer to use natural methods if I can'. Respondent (27), also female, said of CAM, 'the medication is less invasive, it works better, is better for your body, it harmonises with the body, and has minimal side effects'. Female respondent (24) uses chiropractors and acupuncture, because 'I'm trying to be more natural'. A 53-year old female respondent (29) who believes that 'healing starts at the emotional level', said, 'the chemicals in drugs only address the physical, not the source. When you use chemicals, you land up having to take more and more drugs to address the

side-effects of the others'. Especially interesting were the responses of two pharmacists: male respondent (7) said: 'naturopathic treatment is more effective, and I don't like the side-effects associated with orthodox medicine', while female respondent (18), also a pharmacist and whose opinion of orthodox medicine is 'very high', said she uses CAM 'mainly as an alternative to painkillers and anti-inflammatories'. As Lown (2012) points out, 'every drug is a potential poison'. This is in line with the Paracelsus Paradox, named after the Swiss physician Paracelsus (1493-1541) whereby the dosage of a drug determines whether it's a remedy or a poison, and today, hundreds of years later, it remains a gold standard in medicine (Claassen, 2014: 52). Thus, while doctors may know the side-effects of one drug, side-effects become more and more unpredictable with multiple drug prescription – something that is almost the norm in the chronically ill and the elderly (Lown, 2012).

- Another common theme among respondents was that orthodox medical doctors are too quick to prescribe drugs in the first place. A male respondent (7), a pharmacist with a 'very high' opinion of orthodox medicine felt 'they over prescribe. Like using h-bombs for simple ailments. Especially the use of cortisone for treating mundane things like colds'. Another respondent (16), also male, finds many medical doctors to be 'quacks and pillpushers'. Some respondents echoed the sentiments of those in the CAM industry who claim that orthodox medicine is in the pockets of the pharmaceutical industry (Novella, 2012a). A female CAM therapist (26) said, 'it's become too commercialised and run by the drug companies'; female respondent (17) said, 'they sell drugs, and are constantly pushing things like statins and other meds that are not healthy, and there is controversy about whether they work'. While female respondent (38) said, 'I am also not convinced that doctors want you 100% healthy. Their business and livelihood revolves around sick people and selling drugs'. A male respondent (2) said, 'prescription medicine does not always work, and it's much more expensive than alternative medicine'. In some ways, Lown (2012) echoes these concerns with the belief that doctors are ill-informed about the high cost of medicines, seldom prescribe generics, and don't consider that money spent on costly medications may affect patients' ability to feed and educate their families.

- Survey results also confirmed Campbell's (2002: 9) assertion that patients use CAM in the belief that orthodox medicine suppresses the symptoms, whereas CAM addresses the underlying cause. Male respondent (21), who didn't have 'much faith in orthodox medicine' said, 'they do little more than dispense pills, and treat the symptoms not the cause', while male respondent (6) said, 'they rely too much on MIMS to prescribe medicines and do not apply their minds to treating the cause and not just the symptoms'. (MIMS is a medical database of prescription drugs, clinical guidelines and patient advice.) Female respondent (1) said, 'the homeopath has told me that orthodox medicine can only mask the symptoms, but cannot address the cause. I believe the homeopath uncovers the cause and cures it'. Another female, (25) said of orthodox medicine, 'it doesn't cure, it only treats the symptoms so keeps you coming back'. Many of these sentiments tie in with Lown's (2012) feeling that orthodox doctors are too quick to resort to technology instead of spending time obtaining a clinical history and doing a physical examination. As he says, 'why waste time questioning fallible, loquacious patients when one can image the very source of their pathology?'
- The majority of respondents (28 or 74%) use more than one type of therapy, with homeopathy being the most commonly used (33 or 87%), confirming Singh and Ernst's (2009: 117) statement that this is the most commonly used form of CAM. The second most frequently used was chiropractic, with 22 or 58% of respondents using it, while the third most frequently used is acupuncture with 11 or 29% of respondents using it. Other CAM therapies used by respondents - not in order of popularity and not necessarily covered in this study - include reiki, reflexology, sangoma, aromatherapy, Bach flower remedies, energy balance, kinesiology, iridology, body alignment, naturopath, osteopath, spiritual alignment therapy, ethnomedicine, massage, body stress release, magnet therapy, neurolinguistic programming.
- As mentioned previously, scientists are united in their view that media are to blame for the popularity of pseudoscience (Goldacre, 2009: 251; Kruglyakov, 2002; Offit, 2013: 6; Park, 2001: 26; Pigliucci, 2010: 85; Sagan, 1996a: 17; Singh & Ernst: 2009: 310). But what constitutes 'media'? Media is the plural of the word medium, and comprise the various processes involved in

communicating any message between the sender and the receiver (Croteau *et al.*, 2010: 8) As such, media include all forms of the press (newspapers, magazines, books), as well as advertising, films, video, television, recorded music and the Internet (Croteau *et al.*,2010: 3; Fourie, 2010: xxi). Results of this survey revealed that the majority of respondents (55%) obtained information on CAM from the Internet, 53% obtained it from personal referrals, while information on CAM is only opportunistically obtained from newspapers, magazines and television programmes. Only seven respondents (18%) mentioned specific magazines, notably *Natural Health* (5, 16, 31) and *Odyssey*, (25, 28, 29, 31) while only one (5) mentioned *Longevity*. One of these (16), a male believed 'they are all in it to make money', while female respondent (12) said she did not obtain information from the media because 'they don't know anything'. However, this same respondent (12) admitted to using the homeopathic manual and the Internet – both different forms of media, as described above. Considering scientists' contention that media are responsible for driving the popularity of CAM (and other pseudoscience), the evidence in favour of this statement is hardly overwhelming, as the figures quoted above show.

- In contrast to the WHO review discussed earlier (Shapiro, 2009), which found that more than half of users use CAM when they are not ill, only one respondent confirmed this. Female respondent (31), who has a chronic health condition as a result of a motor car accident said, 'I use various types of CAM as a preventative health measure. I've had some serious health issues, so I use CAM therapies to prevent any kind of recurrence'.
- The majority of users admitted they would use CAM therapists again. Only one (37) male respondent said he would not; while two expressed ambivalence – a male pharmacist (7), said, 'I would consider it'; and a female vegan (38), who believes that all disease is caused by the food we eat, said, 'I do not really see the need for any practitioner'.
- Martin's (1998: 260) contention that many CAM therapists claim that disease, especially cancer, is the result of wrong thinking, and not loving oneself was confirmed by one of the CAM therapists interviewed (29), 'Healing starts at the emotional level'.

- This therapist also confirmed one of orthodox medicine's worst fears – the rejection of potentially life-saving therapies in favour of CAM: 'If you can't cure something in 2 – 3 months, then you're just causing harm. I've told someone who used chemotherapy for three months to stop, and she did. She has been clear of the cancer for two years.' This respondent believed she played an important role in the latter's 'cure'. When asked where she obtained information on alternative health, the respondent further confirmed an alliance between CAM, belief in the supernatural, and the New Age Movement: 'Prayers lead me on my path. I also use tarot cards for messages'. According to Messer and Griggs (cited in Bensley, 2002: 197) tarot cards are used for communicating with the dead. They are also used for fortune-telling, and are commonly used by those who practise witchcraft (Yau, 2002: 279). Modern tarot cards have been traced back to the 15th century, and are yet another form of pseudoscience, popular with occultists and the New Age Movement (Carroll, 2013).

Summary of field research

This is the first survey conducted on CAM users in South Africa. And the results confirm the findings of surveys conducted in other countries (and covered in the literature review) - that the majority of CAM users are middle-aged, middle class, educated and mostly female. It also confirmed that the majority of CAM users have a tertiary education, and that a substantial number are educated in the sciences.

This survey also confirmed a general dissatisfaction with orthodox medicine as reported in the literature, with regard to the following: the amount of time spent in consultations, listening to patients, prescription drugs and their side-effects, lack of success with chronic health problems such as allergies, but also with the high costs involved in medical treatment. Respondents also expressed mistrust in orthodox medicine's association with the pharmaceutical industry, with many feeling that orthodox doctors merely sell drugs. However, despite these misgivings, the majority of respondents in this survey used CAM in conjunction with orthodox medicine, and still rely on orthodox medicine for serious illness and diagnoses that require medical technology.

Field work also confirmed the majority of respondents hold religious and/or spiritual beliefs, confirming scientists' contention that humans have a natural

tendency to believe in the supernatural. Field work also confirmed the correlation, reported in the literature review, between CAM and the New Age Movement, since the majority of respondents admitted to being aligned with theories associated with this Movement, while all four CAM therapists interviewed admitted to being strongly aligned to it. Results further confirmed the tendency, described in the literature, of CAM therapists to dissuade patients from using potentially life-saving medical treatment, as well as their theory that disease stems from wrong-thinking.

Comments from respondents confirmed the belief that CAM users believe it to be more 'natural' than orthodox medicine and, therefore, less harmful. However, considering the descriptions provided for the various forms of CAM, one wonders how sticking needles into the flesh, or manipulating the spine can be construed as 'natural'.

While this survey confirms much of what has been revealed by surveys conducted elsewhere, and which were covered in the literature review, it did not confirm that the majority of CAM users use the associated therapies even when they are not well, merely to maintain their health, or 'balance'.

Finally, while the Internet was cited as the main source of information on CAM, personal referrals were a very close second. Thus, the results of this survey do not overwhelmingly support scientists' contention that media are responsible for CAM's rising popularity, nor do they support the hypodermic needle theory of a passive audience being 'injected' with CAM by the media.

Conclusion

As mentioned at the outset, this study comprises two components. The first is a content analysis of *Longevity,* used to demonstrate the presence of pseudoscience generally, in a South African women's health and lifestyle magazine. The second component is field research to confirm or deny the information provided in the literature review, to confirm or deny the media's role in CAM's rising popularity and, finally, to determine the reasons that South Africans use CAM despite its public denunciation. Both of these components are analysed using the hypodermic needle theory of a passive audience and an influential media.

Overall, the data obtained from the content analysis of *Longevity,* as well as the documented negative effects of 'beauty ideals' on women's self-esteem, and the estimated annual worth of the cosmetics industry seem to confirm the hypodermic

needle theory of a passive audience being injected with pseudoscience - most especially the pseudoscience associated with women's beauty and ageing. The sheer volume of adverts and advertorials, and the fact that the magazine is still in existence, shows that pseudoscience – especially of the cosmetic variety pays the media – in terms of advertising and magazine sales. This latter fact is reinforced by the estimated global value of the cosmetics industry, provided earlier. Despite the fact that the number of articles on pseudoscience was not as high as the number of adverts and advertorials, the publication continues to provide a regular platform for recognised purveyors of pseudoscience, such as Oz and Demartini. Thus, the content analysis clearly demonstrates media's proclivity for both reporting and advertising pseudoscience albeit, in this particular magazine, chiefly pseudoscience as practised by the cosmetics industry.

It must be borne in mind that this is an exploratory study using volunteers. Despite the fact that the majority of the volunteers were obtained through the snowball method described earlier, it is not necessarily a representative study of all South Africans who use CAM. In addition, the snowball method may have inadvertently recruited people of similar thinking – e.g. vegans may refer predominantly friends who are vegans. Nevertheless, based on the results of the field research, users of CAM in South Africa are predominantly middle-aged, middle class, educated, and female. Moreover, a substantial number of the respondents are science graduates, confirming the fact that education in science is no guarantee against a belief in pseudoscience. And, while the majority of CAM users express similar concerns regarding orthodox medicine as those expressed in other countries and covered in the literature review, they, nevertheless, use it in conjunction with CAM. In addition, the majority of CAM users interviewed displayed sufficient trust in medical technology to turn to orthodox medicine when medical technology is required for a diagnosis, and also for acute or serious conditions.

As with other countries, this exploratory study revealed that the majority of respondents' first choice of CAM is homeopathy, followed by chiropractic, then acupuncture. Despite this, however, only 11% of respondents use homeopathy as a first port of call when ill. Results also confirm that CAM therapists spend a substantial amount of time with their patients, with the majority of respondents' saying they spent up to an hour or more with them. Furthermore, the majority of respondents' said this was an important factor in their decision to use CAM. Similar to other surveys

described in the literature review, this survey confirms that users of CAM are health conscious, but it did not confirm the finding that most CAM users use CAM to maintain their health even when they are not ill.

This survey also supports scientists' view that humans have a natural tendency to believe in the supernatural: the majority of respondents hold religious and/or spiritual beliefs. Moreover, as described in the literature review, the majority of CAM therapists and CAM users in South Africa have beliefs that are congruent with the New Age Movement.

This study reveals that media, particularly the Internet, clearly play a role in distributing information on CAM, but only slightly more than personal referrals, while magazines, newspapers and television play an almost insignificant role. Thus, in contrast to scientists' view that media are to blame for CAM's rising popularity, and in contrast to the hypodermic needle theory of a passive audience being injected with information on CAM, this survey revealed it is not media so much as it is the way orthodox medicine is practised, that is responsible for CAM's popularity.

Finally, the question that drove this research in the first place - why do South Africans believe in CAM when it has been discredited by science? For the same reasons that users in other countries do: it works for them. It works for them because they have experienced relief from whatever ailed them – whether by placebo, by confirmation bias, or by cognitive dissonance as described in the literature review; it works for them because they perceive it, rightly or wrongly, as being more natural than orthodox medicine – especially with regard to the dangers inherent in prescription drugs; it works for them because the therapists listen, spend time with them and show a caring attitude; it works for them because they do not experience side-effects from it and, finally, it works for them because they are generally disillusioned with the practice of orthodox medicine and CAM is the only 'alternative' they have.

The results of this survey clearly show that South Africans have experienced a loss of confidence in orthodox medicine and the way it is practised in terms of time to listen; attention to detail; results achieved; costs involved; prescribed drugs and their side-effects, and a perceived sinister relationship between orthodox medicine and the pharmaceutical industry. But, as the literature review showed, South Africans are not alone in this - some authors (Fitzpatrick, 2002: 76) feel that, if all CAM achieves is to return empathy to orthodox medicine, it will have served a purpose. Lown (2012)

feels more strongly, arguing that it will take a Renaissance to restore the doctor-patient relationship that he believes orthodox medicine itself destroyed over a century ago. One wonders whether it is a coincidence that it was at about that time, that 'Lily the Pink' created an empire on the sale of a herbal concoction, and that the various forms of CAM began gaining popularity?

What comes across loud and clear from the respondents in this study, is a general dissatisfaction with the way orthodox medicine is being practised, and some mistrust for the profession itself. The fact that the majority of respondents use orthodox medicine in conjunction with CAM, and use orthodox medicine for the diagnosis and treatment of serious and/or acute health conditions, shows that it is not the science and technology they distrust, but the way orthodox medicine is practised. As Harrison (2014) points out, alternative medicine's strength is the fact that it is people-centric. 'It excels at seeing a flesh-and-blood person in need and then catering to her or his wishes and emotional needs'.

Perhaps this is the message underlying CAM's rising popularity: orthodox medicine, as a profession, needs to do some self-examination and share some responsibility for what it has termed a throwback to the Dark Ages, instead of making accusations against the media. Lown (2011), who has written extensively on repairing the trust between physicians and patients, asks of his own profession: how bad does it have to become 'before an informed citizenry consigns it to the junkyard of history?' And, while faith in CAM certainly cannot be perceived as being 'informed', it is clear from this study that people turn to CAM primarily as a result of their disillusionment with the practice of orthodox medicine, and only secondarily – if at all – as a result of what they learn in the media, as scientists contend.

> 'There is mystery in the universe, beguiling mystery, but it isn't capricious, whimsical, frivolous in its changeability…..There is mystery but not magic, strangeness beyond the wildest imagining, but no spells or witchery, no arbitrary miracles.'
>
> Science, delusion and the appetite for wonder, Richard Dawkins, 1997.

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Annexure 1

- Name, age, gender:

- What is your highest qualification?
  High School
  Some college qualification
  University degree

- Is your total household annual income:
  Below R155 000
  Between R155 000 and R870 000
  Above R870 000

- What kind of alternative health practitioners have you consulted?

- What are your reasons for using alternative practitioners?

- Would you use an alternative practitioner again?

- On average, how much time does your therapist spend with you?

- In what circumstances would you use a conventional medical doctor?

- What is your opinion of conventional medicine?

- Do you consider yourself health-conscious?

- How would you describe your spiritual/religious beliefs?

- Would you say that your spiritual beliefs are aligned with the New Age Movement?

- From which sources do you obtain information on alternative health?