

Cornish, M. (2009). The Nature and Accuracy of Alcohol Dependence Information on the Internet. *Counselling, Psychotherapy, and Health*, 5(1), The Use of Technology in Mental Health Special Issue, 249-299.



The Nature and Accuracy of Alcohol Dependence Information on the Internet

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Abstract

The internet has become a widely used and valued source of information over the last decade. This is despite the fact that current research warns that the information presented on the internet on health related issues tends to be suspect. To date no research has examined the nature and accuracy of Alcohol Dependence (AD) on the internet. The current research was designed to address the presentation of this important health issue on the internet. An examination of 210 AD websites show that AD information on the internet does not cover generally accepted scholarly biopsychosocial AD material. Additionally, information presented tends to be in a format not accessible to the general population in terms of reading level. Thus, AD internet information is suspect in its content and form. Recommendations are provided regarding AD internet information. Professionals and lay people alike are warned against relying on AD information on the internet as bibliotherapy resources.

Introduction

The internet has grown in its usage exponentially. According to the Australian Bureau of Statistics (ABS) it was estimated that 60% of Australian households had home internet access during the 2005-06 period (ABS, 2006). Eysenbach (1998) describes the internet as a compelling source of information due to its immediacy and interactive nature. Furthermore, the internet may lead to feelings of greater autonomy for the user in addition to providing access to information seldom otherwise available (Theodosiou & Green, 2003). As a source of information, the internet may now be the largest source of bibliotherapy, provider of health information, in the world.

Current research has indicated that a significant portion of internet consumers are occupied in obtaining information regarding health related issues (Borzekowski & Rickert, 2000; Gray, Klein, Noyce, Sesselberg & Cantrill, 2005; Martin, 2003; Morahan-Martin, 2004). Morahan-Martin (2004) estimated that approximately six million people in the United States of America (USA) search for health related information online each day. Moreover, there is an increasing tendency of people bringing articles taken from websites to medical appointments (Murphy, 2003; Theodosiou & Green, 2003). As stated by Newman (2004, p. 141), "All indicators suggest that technology may be an inherent part of psychotherapy delivery in the next decade".

Nevertheless, the quality of websites can vary substantially due to the absence of universal legislation to regulate internet information. To date there is a paucity of published studies examining the precision and reliability of health information on the internet. The few studies that have investigated the nature of health websites relate to specific concerns; for example, information relating to tobacco use (Pelling, 2006),

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cancer (Matthews, Camacho, Mills, & Dimsdale, 2003), melanoma (Bichakjian et al., 2002), depression (Lissman & Boehnein, 2001), and self-harm (Prasad & Owens, 2001).

Further research is necessary to investigate the accuracy of an entire range of health related topics evident on the internet (Benigeri & Pluye, 2003; Lissman & Boehnein, 2001). Consequently, the current study addresses the scant empirical research with regards to health information on the internet via an investigation into the nature and accuracy of Alcohol Dependence (AD) information on the internet.

Bibliotherapy Research

Although no one agreed upon definition of bibliotherapy exists (Richards, 2004), the essence behind what is meant by bibliotherapy is “the guided reading of written materials in gaining understanding or solving problems relevant to a person’s therapeutic needs” (Riordan & Wilson, 1989, p. 506). The use of bibliotherapy, or application of reading materials, in client education has been common for a number of years in psychological circles (Adler & Foster, 1997; Apodaca & Miller, 2003; Holman, 1996) and is seen as having many positive effects on client change (Adams & Pitre, 2000; Apodaca & Miller, 2003).

Bibliotherapy has a number of identified benefits including the fact that it can be highly accessible via email, retail book outlets, and the internet; is anonymous in nature in that others do not have to be involved; is cost-effective; may lead to professional treatment seeking; can encourage self-responsibility and empowerment as well as self and other awareness and empathy for various circumstances; and can facilitate an

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emotional adjustment lowering stress and anxiety and increasing coping skills (Adams & Pitre, 2000; Adler & Foster, 1997; Apodaca & Miller, 2003; Heather Whitton, & Robertson, 1986; Holman, 1996; Lenkowsky, 1987; Newman, Erickson, Przeworski, & Dzus, 2003; Pardeck & Pardeck, 1998; Richards, 2004; Riordan & Wilson, 1989).

Apodaca and Miller (2003) demonstrated the efficacy of bibliotherapy in effecting change with clients diagnosed with AD, with a relatively large effect size of 0.8, which is comparative with that of extended treatment. Maintenance of change gains have consistently shown very little reversal of the initial reductions in drinking associated with bibliotherapy for extended periods (i.e., up to 8 years) (Apodaca & Miller, 2003). Indeed, one study demonstrated bibliotherapy to show greater maintenance of gains in sobriety than extended therapy (Apodaca & Miller, 2003).

Conversely, bibliotherapy has drawbacks including the fact that the efficacy of such outside the context of health services, and apart from its use with some specific topic areas, is unknown (Adams & Pitre, 2000; Apodaca & Miller, 2003; McKendree-Smith, Floyd, & Scogin, 2003; Richards, 2004). Some also caution that many self-help books mistakenly claim to be treatment when they are actually educational and are designed to be used as an adjunct to therapy (Adams & Pitre, 2000; Riordan, Mullis, & Nuchow, 1996). At a user level, perceptions of self-help books may be unrealistically high given the power the published word has for many in our society. Also, clients may too become overwhelmed by some books given their volume and the reading level required for comprehension (Adams & Pitre, 2000; Riordan et al., 1996). Nevertheless, bibliotherapy continues to be in common use in psychological circles.

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The increase in popularity of the internet has added a level of complexity to the use of bibliotherapy in that lay individuals can now access psychological and health information for little or no cost on the internet independent of professional assistance or having the materials reviewed by journal editors or publishing companies (Cline & Haynes, 2001; Morahan-Martin, 2004; Rabasca, 2000; Theodosiou & Green, 2003). As a result, individuals may be gathering information that is too difficult, too detailed, or too simple and cursory to be of use or at such a reading level that the individual accessing the information is not able to comprehend the information or that the information is too simplistically presented. Additionally, the accuracy (Benigeri & Pluye, 2003; Bichakjian et al., 2002; Bower, 1996; Cline & Haynes, 2001; Craigie, Loader, Burrows, & Muncer, 2002; Croft & Peterson, 2002; Eysenbach, Powell, Kuss, & Sa, 2002; Fallis & Frické, 2002; Impicciatore, Pandolfini, Casella, & Bonati, 1997; Lissman & Boehnlein, 2001; Matthews et al., 2003; Morahan-Martin, 2004) as well as the intellectual accessibility as measured by reading level (Adkins, Elkins, & Singh, 2003; D'Alessandro, Kingsley, & Johnson-West, 2001; Freda, 2005; King, Winton, & Adkins, 2003; Singh, 2003) of internet information may be variable and thus questionable in its application with clients.

Alcohol Dependence Information

Although the term “Alcoholism” was dropped with the introduction of the *DSM-III* (Saunders, 2006) in favour for two distinct categories labeled “Alcohol Abuse” and “Alcohol Dependence”, for the purposes of the current study the term “Alcoholism” will be used in conjunction with “Alcohol Dependence”, due to the familiarity of the term to

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lay people searching for information on the internet. AD and Alcoholism are important difficulties in our society with 4.1% of the population in Australia (Proudfoot, Baillie, Teesson, 2006) and 3.8% in the U.S. (Hasin, Bridget, & Grant, 2004) being diagnosed with such disorder. The *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR)* (American Psychiatric Association [APA], 2000) reports the prevalence of current AD to be approaching 5% of the general population. Indeed, current U.S. research sampling 18-29 year-old adults (N=8,666) found the prevalence of AD according to *DSM-IV-TR* criteria to be as high as 9.2% (Dawson, Grant, & Stinson, 2004). When one considers that health related items are significant matters of interest to search on the internet (Gray et al., 2005), it is clear that there are many individuals searching for AD information on the internet.

The present study examines the nature and accuracy of AD information on the internet. Such an assessment of the nature and accuracy of psychological related information on the internet is important as this information is accessed and used in various ways by a number of individuals. If the information is to be of use it must be both accessible and accurate. If the material is not accessible to the average Australian or American which is rated ninth (see Appendix A) and approximately eighth to ninth (Doak, Doak, & Root, 1996) grade level, respectively, or if the information is found to be comprehensively inaccessible or inaccurate then its usefulness is in question and, indeed, the information could be judged as useless or worse harmful if not both accessible and accurate.

As the current research is concerned with the nature and accuracy of AD information on the internet an outline of the main aspects of generally accepted

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knowledge relating to this diagnosis is appropriate and is provided as follows. For a full review of generally accepted knowledge relating to AD, the reader is referred to Cornish (2007). It is this summary information which was used in the current study to determine the level of accuracy of the websites subsequently examined. AD and Alcoholism information will be reviewed in a six part fashion: diagnosis, biological aspects, psychological aspects, social aspects, treatment approaches, and prognosis.

Diagnosis. Two foremost diagnostic tools are available to both the practitioner and researcher alike: The *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR)* (APA, 2000), and the *International Classification of Diseases (ICD-10)* (World Health Organisation [WHO], 1992). The APA (2000) recommends reference to the criteria for Substance Dependence when considering diagnoses of AD. The dependence syndrome is characterized by symptoms of physiological tolerance and/or withdrawal. Tolerance may be defined by either the need for a markedly increased quantity of the substance (i.e., alcohol) to achieve intoxication or the desired effect, or a markedly diminished effect with continued use of the same amount of alcohol (APA, 2000). Withdrawal is manifested by either a characteristic withdrawal syndrome, or alcohol is consumed to relieve or avoid withdrawal symptoms (APA, 2000). The APA (2000), in addition to physical indicators of dependence, recognize that the features of quantity of consumption, control or lack thereof, time spent in activities associated with alcohol consumption rather than appropriate activities, social difficulties and occupational and recreational decline, and the continuance of drinking despite knowledge of its harms, are all essential criteria in decisions relating to the diagnoses of AD. However, diagnosis is narrowed to include a maladaptive pattern of alcohol use, leading to clinically significant

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impairment, as manifested by three (or more) of the above characteristics within a twelve month period (APA, 2000).

To date the number of studies examining the validity of AD as a diagnostic construct has been greater within the framework of the *DSM-IV*, than that of research conducted with the *ICD-10* system of classification. The *ICD-10* contains six main criteria for the diagnosis of AD, as compared to the seven criteria advanced in the *DSM-IV*. Nevertheless, in a comparative study of the two classification systems for Substance Dependence, Saunders (2006) concluded that both represent psychometrically robust measures, and that the differences are slight enough to not warrant major distinctions. The lone difference is the *ICD-10* includes a cognitive item of craving as a category whereas the *DSM-IV* does not (Saunders, 2006). For the intent of the present study, therefore, *DSM-IV* diagnostic criteria was used as a point of reference in determining accuracy measures of internet information concerning AD (See Appendix B).

Risk Factors. A review of the entire catalogue of information pertaining to the risk factors associated with the development of alcoholism is outside the scope of the current study. Interested readers are referred to Cornish (2007) for a biopsychosocial review of the literature. Nevertheless, a thorough review of the available literature has revealed a consistent range of bio-psycho-social aspects relevant to the topic. Polcin, (1997) suggests the substantial quantity of evidence in support of varying approaches to etiology has led to a general consensus that alcohol problems are multi-determined. Thus, it should be noted that the presence of one or more of the variables presiding within an individual does not necessarily lead to the development of AD. As with the determination

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of any behaviour, a multitude of variables must combine fittingly for said behaviours to occur. For example, the supported hypothesis of a genetic link to alcoholism is not sufficient in itself to predict future alcohol problems as there are many environmental and interpersonal factors to consider. As Tooby and Cosmides (2005, p. 34) state, “every single component of an organism is codetermined by the interaction of genes with environments.” Thus the etiology of AD can be considered multidimensional and highly complex.

Biological Factors. The literature consistently identifies four biological components to AD: genetic factors, biochemical research, sex, and age. Specifically, research indicates through twin and adoption studies that heritable factors play a 50-60% role in the development of AD (e.g., Cadoret, Yates, Troughton, Woodworth, & Stewart, 1995; Heath, 1995; Oroszi & Goldman, 2004; Quickfall & el-Guebaly, 2006). Biological vulnerability to AD has also been demonstrated via biochemical research revealing brain responses to alcohol involves changes in neurotransmission that play a role in maintaining drinking behaviour (Schuckit & Smith, 2000; Schuckit, Smith, & Kalmijn, 2004). The prevalence rates of AD between genders are higher for males than females, with a male-to-female ratio as high as 5:1 (APA, 2000). Research suggests that earlier the age of experimentation with alcohol, the greater the likelihood of developing later alcohol problems (Bonomo, Bowes, Coffey, Carlin, & Patton, 2004; Marsh & Dale, 2005). Conversely, research also finds age-related physiological changes in elderly people can result in increased susceptibility to the intoxicating effects of alcohol, and subsequent problems (APA, 2000).

Psychological Factors. Research into the psychological factors pertaining to AD have consistently revealed there to be four main components: cognitive, emotional, comorbidity and personality elements. Cognitive processes are critically implicated in the development of AD. Indeed, people's attitudes and beliefs are important (e.g., believing alcohol has many positive effects) in determining whether one will go on to develop AD (e.g., Dodes, 2002; Kirisci et al., 2004; Smith, Goldman, Greenbaum, & Christiansen, 1995). Drinking to cope (e.g., emotionally) may predispose one to a future diagnosis of AD. Excessive consumption of alcohol may be used as a method to relieve seemingly uncontrollable, unpleasant feelings of depression, anxiety and stress (e.g., Bates, 1993; Buckstein, 1995; Dodes, 2002; Kaminer, 1994). AD has also been associated with numerous other diagnoses including depression, anxiety, schizophrenia, and antisocial personality disorders (APA, 2000; Kushner, Abrams, & Borchardt, 2000; Lynskey, 1998; Marsh & Dale, 2005; Petrakis et al., 2002; Sher, Walitzer, Wood, & Brent, 1991). Finally, the majority of investigations have failed to identify a hypothetical 'alcoholic personality'. Thus, there is widespread agreement refuting the existence of an 'alcoholic personality' (Bates, 1993; Polcin, 1997).

Sociological Factors. Sociological factors of AD evident in the scientific literature continually point to five main components. These sociological factors include cultural factors, family and developmental factors, peer factors, gender and socioeconomic status. The APA (2000, p. 219) states, "The cultural traditions surrounding the use of alcohol in family, religious, and social settings, especially during

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childhood, can affect both alcohol use patterns and the likelihood that alcohol problems will develop.” Cultural factors include availability of alcohol and social acceptance of the use of alcohol. Insecure attachment styles, severe family disturbance and dysfunction are implicated in the development of AD (e.g., Bellis, 2002; Caspers, Cadoret, Langbehn, Yucuis, & Troutman, 2004; Goodwin, Fergusson, & Horwood, 2004; Molnar, Buka, & Kessler, 2001). Peer associations also play an important role in the development of future AD, as peer networks provide influential sources of support and reward (e.g., Beman, 1995; Goodwin et al., 2004). Finally, it has been suggested that higher levels of AD are associated with lower socioeconomic status, unemployment, and lower educational levels (Helzer, 1987).

Additional AD related items of interest. Whether treatment was mentioned or not was recorded in a dichotomous manner in the present research, as was whether prognosis was mentioned. A complete review of these items, however, is beyond the scope of the present study.

Health information on the internet

Information dissemination regarding health related issues traditionally has been the domain of practicing health professionals. However, health information has now become readily available to anyone with access to the internet. Concomitantly, the internet has become an important medium among adolescents, and young adults (Borzekowski & Rickert, 2000; Gray et al., 2005). Gray et al. (2005) suggest that in

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excess of 90% of teens to young adults (15-24 year-olds) have accessed the internet for information in general, and that 75% of this robust sample had used it to find health information.

Health topics listed as gaining the most interest included sexual health and drug/alcohol related issues (Gray et al., 2005). Adolescents being renowned for having difficulties in accessing established health services, particularly mental health services, for various reasons may fail to benefit from traditional health information sources (Gray et al., 2005; Jacobson, Richardson, Parry-Langdon, & Donovan, 2001). However, health information gained from the internet, offering privacy and confidentiality, has alleviated such difficulties (Borzekowski, & Rickert, 2001; Gray et al., 2005). Considering these points, and that adolescents and young adults are the most active groups of internet users (Borzekowski & Rickert, 2000; Gray et al., 2005), it seems likely that internet information pertaining to health topics will be actively sought by adolescents. Furthermore, since information gained from online sources has the potential to influence the decisions, and subsequent behaviours, consumers make regarding their own health care (Boyer, Shannon, & Hibberd, 2005; Falck, Carlson, Wang, & Siegal, 2004; Pelling, 2006), and the reality that internet use is so widespread in general (Cline & Haynes, 2001; Fallis & Fricke, 2002; Morahan-Martin, 2004), it is essential information be accurate.

Knowledge regarding the nature and accuracy of AD information accessible on the internet has hitherto been nonexistent. The bulk of studies investigating the accuracy of health information have focused largely on broad health issues (e.g., Benigeri & Pluye, 2003; Cline & Haynes, 2001; Eachus, 1999; Morahan-Martin, 2004), or entail searching

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specific health topics (e.g., Bichakjian et al., 2002; Lissman & Boehnlein, 2001; Matthews et al., 2003; Pelling, 2006; Prasad & Owens, 2001). These previous efforts examining health related information on the internet have failed to demonstrate significant positive outcomes. That is, the comprehensive agreement among researchers is that the overall standard of health information available online is low. Lissman and Boehnlein (2001) suggest that 'For-profit' web sites appeared more frequently in the top sites, and also contained inferior information than the 'Not-for-profit' sites produced by web search engines. Many websites with health information can contain wrong, misleading and even dangerous information (Crocco, Villasis-Keever, & Jadad, 2002).

According to Eysenbach et al. (2002, p. 2695), "Accuracy can be defined as the degree of concordance of the information provided with the best evidence or with generally accepted medical practice." Hence, the various studies addressing accuracy of health information on the internet all begin by defining the relevant terms associated with the specific concern under investigation. For instance, Lissman and Boehnlein (2001) testing information about depression used *DSM-IV* criteria in determining measures of accuracy.

To the extent that methodological issues are concerned, each of the reported studies (e.g., Bichakjian et al., 2002; Lissman & Boehnlein, 2001; Matthews et al., 2003; Pelling, 2006; Prasad & Owens, 2001) have employed somewhat robust designs capable of generating sufficient power to detect variances (Cohen, 1992). The majority examined at least the first twenty web sites according to the search terms used. The findings of previous research indicates that those searching the internet tend to not venture far from the initial and original site provided and the first few websites accessed by the various

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search engines (Morahan-Martin, 2004) would suggest that the number of websites examined were ample. Indeed, Hansen, Derry, Resnick, and Richardson (2003) discovered that when accessing health information, people find the sheer volume of possible web sites retrieved by most search engines to be overwhelming and caused difficulty, leading people to search only the first few results. Additionally, this caused difficulties in finding relevant information, with another study concluding that information for a specific enquiry produced unsatisfactory information (Zeng et al., 2004).

An apparent shortcoming in the bulk of past research on health information on the internet is the absence of any investigation into the accessibility, or readability, of health information online. Research examining the readability of health information has continually demonstrated it to be beyond the reach of those whom use, and indeed need, it the most (e.g., Adkins et al., 2003; D'Alessandro et al., 2001; Freda, 2005; King et al., 2003). For example, D'Alessandro et al. (2001) found the reading level required for pediatric information available online to far surpass that of the national average reading level for persons in the USA (Doak et al., 1996). These findings have been corroborated by recent research (Freda, 2005; King et al., 2003) suggesting that health information available to the general public may not only be inaccurate, but may also be inaccessible.

A further limitation regarding past research assessing health information on the internet is the lack of exploration into the actual design of the websites, or their visually appealing nature. Given that individuals with AD often react to alcohol related cues presented via images, underscores the importance of this design investigation (e.g., Coffey et al., 2002; Coffey et al., 1999; Glautier & Drummond, 1994; Rosenow et al.,

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1994; Smith-Hoerter, Stasiewicz & Bradizza, 2004). Given the visual nature of the internet, it was surprising that few articles reviewing websites actually assessed the visually engaging nature of the websites examined. Indeed, according to Eysenbach et al, (2002) of those using some measure of design quality very few actually reported said results. Pelling (2006) reported a simple design measure based on pictures versus text and found that websites relating to tobacco were more likely to contain pictures if they were commercial versus non-profit or government originating sites. Similarly, Lissman and Boehnlein (2001) also found that commercial sites were more likely than non-profit sites to contain banners (such as pictorial product advertisements). In addition to finding the websites to be more visually engaging tend to be commercial in nature, these two studies (i.e., Lissman & Boehnlein, 2001; Pelling, 2006) found the commercial websites to be less accurate with the scientific literature regarding the specific concern. However, a previous study by Fallis & Frické (2002) indicates that the source, defined by the credentials of the author of the internet material, did not relate to the accuracy of information provided. Similarly, Kunst et al. (2002) indicated only a slight relationship between the source and the accuracy of information provided as well.

Hypotheses

Given the findings of previous research, the current study proposes three main hypotheses. First, it was hypothesised that the current study would find little congruence between active internet material and the scientific literature regarding AD. Second, it was expected the current study would find reading levels too high regarding the accessed

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internet resources on AD, compared to average reading levels of the USA and Australia.

Thirdly, it was expected the current study would find commercial sites to be less accurate and contain more images than non-commercial sites.

In addition, due to the lack of research examining a number of internet related aspects (search engine utilized, hyperlink activity and recency of page-updates) and the number of references cited on websites, as they relate to accuracy and accessibility, were also examined.

Method

Overview

The current study examined a set of websites in order to determine the nature and accuracy of AD information on the internet. This examination occurred in two stages. First, a set of websites was obtained which was then, second, examined for accuracy, accessibility and design. The specific procedures used to select and collect websites, as well as analyses are as follows.

Search Engine Selection & Website Collection

Search Engine Selection. In order to determine the most representative search engines to use for the gathering of specific websites in the present study an examination of search engine popularity relating to internet research was conducted in a twofold

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fashion. First, a review of past research investigating websites was conducted in order to determine which search engines have been used in research. Second, research investigating the popularity of various search engines was examined.

The review of past research identified five main publications investigating websites. Specifically, assessing individual health topics on the internet. The search engines used in these research projects included, presented in alphabetical order, Altavista, Excite, Google, Infoseek, Lycos, Microsoft Network (MSN), Netscape, and Yahoo (Bichakjian et al., 2002; Lissman & Boehnlein, 2001; Matthews et al., 2003; Pelling, 2006; Prasad & Owens, 2001).

The popularity of various search engines has been assessed by few. However, there are two notable exceptions. First, the Nielsen NetRatings reported by Nielsen web reference (Bausch, 2007), and second, the rankings available from comScore Media Metrix (Burns, 2007; Lipsman, 2007). According to both of these sources the most popular search engine is Google followed by Yahoo and MSN. It is noted that the three most popular search engines as indicated by Bausch (2007) and Lipsman (2007) were also used in past published research on the nature of internet health information. As a result, the current study will also utilize the three most popular search engines: Google, Yahoo, and MSN.

Website Collection. A standard power analysis formula was used to determine the minimum number of web cases required to enable satisfactory statistical analyses to be performed (Cohen, 1992). A total of 14 variables, as follows, were assessed for each website obtained. Thus, the first 70 websites were obtained from each search engine for a

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generous total of websites, 210. The original web address produced by the searches performed were the only sites examined due to the fact that previous research indicates that those searching the internet tend to not venture far from the original site provided and the first few websites accessed by the various search engines (Morahan-Martin, 2004).

Data collection occurred during a one week period. Specifically, between June 1 and June 4, 2007, a number of relevant terms were used to search the internet using the designated search engines. This allowed for two days of web searching, saving, and the printing of websites for each search engine utilized.

The search terms used in the current study included those that would be used by a lay person searching the topic area of interest. In particular, AD and Alcoholism. Thus, using Boolean logic (Barker, 2002) the following search terms were used: “Alcohol Dependence” or “Alcoholism” in order to simulate the two likely searches of the internet made by those interested in the disorder.

Website Assessment

A total of 14 variables were evaluated in the current study. These included the search engine used to gather the sites examined (Google, Yahoo, and MSN); the readability of the websites collected, the design aspects of the sites, the source of the websites, recency of the sites, presence of hyperlinks and activity, accuracy of the information contained on the sites, and the bibliographic references presented on said

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sites. Each of these variables is described in more detail as follows save the search engines used which has been previously presented.

The website characteristics and accuracy of the obtained websites was measured by two assessors educated in the basic diagnostic, biological, psychological and social aspects of AD, with access to a registered psychologist with clinical and counselling training to answer any relevant questions. The two educated assessors examined each website in order to allow inter-rater reliability to be calculated. Data obtained from correlations of variables concerning accuracy produced excellent inter-rater reliabilities of 0.935, 0.889, 0.814, and 0.871 for diagnosis, biological, psychological, and sociological aspects respectively.

Accessibility. A number of formulas can be used to assess reading level, or accessibility. In an examination of two popular methods for assessing reading level, accessibility, Freda (2005) indicated that the Flesch-Kincaid method used by Microsoft Word produced the more accurate assessment of readability. As a result of this examination and the ease of access to the Flesch-Kincaid formula via Microsoft Word it was decided that the reading level presented on the websites assessed would be examined using the Flesch-Kincaid formula. Higher required reading levels equates to lower accessibility.

Design: Pictures/Text Ratio. The internet is a multimedia enhanced environment in which text is paired with graphics and other multimedia aids (Barak, 1999). The current study used a simple ratio measure for design. Specifically, the number of pictures

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against the number of pages located on particular websites. Pictures being defined as all images on a website including cartoons, images, pictorial advertisements and logos. Such an inclusive definition of pictures and a simple ratio definition of design were chosen for simplicity of interpretation and analysis.

Source: government, non-profit, university, company, individual. There are a number of possible website sources. Many of these relate to specific domain names. For instance, there are dot com, dot net, dot org, dot asn, dot id, dot biz, dot info and dot co domains available on the Internet and it is likely that additional domain suffixes will be created in the near future (AUSWEB, 2007; Melbourne IT, 2007; Webcity, 2007). Each suffix represents the origin of the website, for instance dot org means a traditionally non-profit organization and dot edu refers to an educational institution. A listing of the main website suffixes can be found in Table 1. Additionally, websites can originate from various countries as well. Websites examined in this study had the source of sites but not the country origin recorded for analysis.

Table 1.

Common website suffixes and their meanings.

| Suffix | Meaning |
|--------|-------------------------|
| .com | Commercial company |
| .edu | Educational institution |
| .gov | Government |
| .net | Network |

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| | |
|------|--------------|
| .org | Non-profit |
| .mil | USA military |

Recency. Information on the internet is continually being updated. Nevertheless, older web information can still be accessed. Some websites display a last updated badge indicating when the site was last modified. This last modification date can be used as a basic measure of the recency of the information provided. Morahan-Martin (2004) and Barak (1999) note that few studies have reported the recency of websites examined in studies despite the importance of such a measure for the validity, currency, of information provided. This lack of attention to the recency of information may be due to the fact that some have indicated such recency data do not correlate or only slightly correlate with accuracy (Fallis & Frické, 2002; Kunst et al., 2002). The recency of the websites accessed was recorded in the present study, when available as health related information is generally considered outdated in 3 to 5 years (Health Compass, n.d.; John Hopkins Bayview Medical Centre, 2006).

Hyperlink/Activity. The presence of hyperlinks and their activity was recorded as this may offer an extra dimension for exploration unique to the internet environment.

Accuracy. As stated previously, accuracy was to be rated via its concordance with the best scholarly evidence available. For the purposes of the current study accuracy has been limited to include diagnostic criteria, and a summary of the best available evidence

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regarding the biological, psychological and social aspects of AD. Definitional criteria were included in the first instance as this is a common measure of accuracy in previous studies conducted by Fallis and Frické (2002), Bichakjian et al. (2002) and Lissman and Boehnlein (2001). Additional information on the biological, psychological, and social aspects of AD has been collected from a number of pertinent and recent sources via a comprehensive literature review, aspects of which have been previously outlined. Accuracy did not include, in the present study, information regarding treatment and prognosis. However, whether such information was provided in a categorical manner was recorded.

The accuracy of each website obtained was assessed by use of a standard form recording each of the 14 variables explored (See Appendix B). The variables assessed were of a categorical (source of website, search engine used, inclusion of treatment and prognosis information), ordinal (readability) and continuous nature (design, recency, and bibliographic references). The majority of the accuracy variables were rated on ratio scales reflecting the number of common generally accepted information categories relating to AD. For instance, the generally accepted diagnostic criteria for AD contain ten components. Thus, the accuracy of the diagnostic criteria for AD was rated out of 10+1, with higher numbers indicating a greater degree of accuracy thus indicating that a certain number of diagnostic components were included on the website examined, with zero indicating no topical information found. Similarly, the common elements the difficulty examined relating to biological, psychological, and social aspects were rated on 4 (Genetic Disposition; Biochemical Factors; Gender; Age), 4 (Emotional Factors; Cognitive Factors; Comorbidity; Personality), and 5 (Cultural Factors;

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Family/Developmental factors; Peer Factors; Gender; SES) numbered ratio scales respectively, with higher numbers reflecting greater numerical inclusion of the generally accepted biological, psychological, and social aspects of the difficulty on the website examined, with zero indicating none of the literature identified factors being mentioned. These biological, psychological, and social aspects have been previously reviewed in the introductory section of the present study. A copy of the form used to record the 12 variables explored can be found at the end of the study (Appendix B).

References provided – bibliographic format. When examining the quality and accuracy of a journal article one examines the references upon which the research has been based. This allows a certain measure of credibility to be established. Consequently, the veracity of the internet information found using the search terms chosen was assessed not only by educated assessors but also the number of references provided in a bibliographic format listed on each website assessed.

Results

Descriptive Data

Website Assessment. When using the search terms “Alcohol Dependence” and “Alcoholism” with each of the search engines (Google, Yahoo and MSN), a total of 674,000; 484,000 and 67,338 hits were produced, respectively. As with all internet search

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strategies, invariably there are some inactive sites. Out of the 210 websites examined, 5 were inactive, 172 unique with 38 duplicates. Inactive sites constitute missing data.

A total of 14 variables were evaluated in the current study. These included the search engine used to gather the sites examined (Google, Yahoo, and MSN); the readability of the websites collected; the design aspects of the sites; the source of the websites; recency of the sites; accuracy of the information contained on the sites; hyperlinks present and activity, and the bibliographic references presented on said sites. Additionally, two composite variables were created. These were Total Accuracy, as defined by diagnosis and biopsychosocial factors, and Source Derivative, as delineated by profit versus non-profit websites. Commercial, or profit, websites included dot com websites, whereas non-profit websites included dot edu, dot gov, dot net and dot org. Table 2 presents the descriptive results of each of the assessed variables.

Table 2.

Descriptive results for the study variables.

| Variable | <i>N</i> | <i>M</i> | <i>SD</i> | <i>Min</i> | <i>Max</i> | <i>Median</i> | <i>Mode</i> |
|-------------|----------|----------|-----------|------------|------------|---------------|-------------|
| Readability | 199 | 11.43 | 1.16 | 5.30 | 12.00 | 12.00 | 12 |
| # Pages | 205 | 4.62 | 5.22 | 1.00 | 48.00 | 3.00 | 3 |
| # Images | 205 | 5.12 | 5.36 | 5.12 | 33.00 | 3.00 | 2 |
| Source | 210 | - | - | - | - | - | 1 |
| Recency | 81 | 2005.12 | 2.38 | 1999 | 2007 | 2006 | 2007 |
| Diagnosis | 205 | 3.06 | 2.84 | 0.00 | 10.00 | 4.00 | 0 |

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| | | | | | | | |
|----------------|-----|------|-------|------|-------|------|---|
| Biological | 205 | 1.11 | 1.12 | 0.00 | 4.00 | 1.00 | 0 |
| Psychological | 205 | 0.65 | 0.88 | 0.00 | 3.00 | 0.00 | 0 |
| Sociological | 205 | 1.25 | 1.28 | 0.00 | 4.00 | 1.00 | 0 |
| Total Accuracy | 205 | 6.07 | 5.06 | 0.00 | 20.00 | 6.00 | 0 |
| Treatment | 205 | - | - | - | - | - | 1 |
| Prognosis | 205 | - | - | - | - | - | 0 |
| References | 205 | 4.06 | 11.76 | 0.00 | 96.00 | 0.00 | 0 |

The 205 websites examined ranged from one page to forty eight pages with an average of four and a half pages of information ($M = 4.62$, $SD = 5.22$). As can be seen from Table 2, the descriptive results for the variables of interest revealed some noticeable qualities. Beginning with Total Accuracy, the mean result ($M = 6.07$, $SD = 5.06$), out of a possible 23, coupled with a zero result for 21.4% of cases indicates AD internet information lacks diagnostic and biopsychosocial information. This is further highlighted with the variables Diagnosis, Biological, Psychological and Sociological, which show frequencies of zero scores being 35.7%, 39.5%, 56.2%, and 39%, respectively. Indicating that at least a third of the sites obtained scoring zero for, including diagnostic and biopsychosocial, information on AD.

The mean score for Readability ($M = 11.43$, $SD = 1.16$) suggests that internet information concerning AD may be inaccessible by the average Australian reader. The most common result across the websites for Readability was the highest possible score

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(*Mode* = 12), with a frequency of 60%, and 85% of scores above the average reading level for Australia.

The majority of websites did not include recency figures (59%) or references (67.6%). Among the websites collected the representation of commercial (51.4%) and non-commercial (48.6%) sites were found. There was a high frequency of websites that made reference to treatment (73.3%), and a high portion had hyperlinks (94.8%) that were active (94.3%).

Data Preparation and Screening

Prior to analysis, all data were examined using SPSS for accuracy of entry, missing values, and where appropriate, univariate outliers, normality and linearity. There were five cases with missing values (the inactive websites), whereby these were excluded casewise for the analyses. Appropriate variables were examined to ensure that assumptions of multivariate analyses were satisfied (Tabachnick & Fidell, 2001). The distributions of these appropriate variables were examined visually using frequency histograms and empirically using skewness and kurtosis ratios. This examination revealed that the distribution for the majority of variables to be non-normal. Examination of the distribution for each of the accuracy variables (Diagnosis, Biological, Psychological, Sociological and Total Accuracy) revealed moderate positive skew and kurtosis. However, the skewness and kurtosis statistics for the variable of interest, Total Accuracy, fell within acceptable parameters (2.23 and -2.62 respectively), as did Diagnosis. For the remaining variables that did not demonstrate normality (i.e.,

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Readability, Number of Pages, Number of Images, Recency, References, and Biological, Psychological and Sociological variables), transformations designed to increase the normality of distribution were investigated. As a result, square root, logarithmic and inverse transformations were attempted on the data. However, no transformations generated a more normal distribution. Consequently, variable scores remained untransformed for data analysis (Appendix C). This lack of normality for some variables likely lowered the power of analyses to find significant variable impact.

Inferential Analysis

An independent samples t-test was conducted to test the hypothesis that commercial websites would contain less accurate information than non-commercial websites. It was found that no significant differences were evident between commercial ($M = 6.40$, $SD = 5.33$) and non-commercial ($M = 5.71$, $SD = 4.76$) websites, $t(203) = -0.987$, $p = .325$ (2-tailed).

An independent samples t-test was conducted to test the hypothesis that commercial websites would contain more images than non-commercial websites. It was found that no significant differences were evident between commercial ($M = 5.51$, $SD = 5.69$) and non-commercial ($M = 4.71$, $SD = 4.99$) websites, $t(203) = -1.07$, $p = .286$ (2-tailed).

Bivariate correlations were conducted using non-parametric (Spearman Rank Order) correlations for all categorical and non-normal continuous variables (see Table 3). The accuracy variables Biological, Psychological and Sociological had significant

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positive bivariate correlations with Number of Pages, and, intuitively, whether or not treatment and prognosis was mentioned. Number of Pages also showed a significant positive correlation with References. Readability was positively correlated with References, but of note was that Readability was negatively correlated with Biological and Psychological variables. Also of interest is that Biological had a significant negative correlation with Hyperlink and Activity.

In addition to the descriptive and comparative analyses reported above, the current study also examined variables in an exploratory manner. A forward multiple regression analysis was conducted to determine the best subset of predictors of Total Accuracy. Based on the statistical criteria computed from the particular variables drawn (Tabachnick & Fidell, 2001), two variables were entered. The variables entered were: Number of Pages and Readability. Number of Pages was entered on the first step of the analysis, $R^2 = .103$, $F(1,78) = 8.968$, $p = .004$, and accounted for 10.3% of the variance. On step 2, Readability was entered, R^2 change = .057, adding a further 5.7% to the variance explained. Number of pages and Readability collectively explained 16% of the variance in Total Accuracy, $R^2 = .160$, $F(2,77) = 7.347$, $p = .001$.

For further exploratory purpose, oneway ANOVAs were conducted to determine whether any differences existed between the search engines used and the variables Readability, Page Design, Recency, References, and Total Accuracy. No significant differences were found between search engine used and all the above variables (see Table 4). Data missing is due to Levene's test for homogeneity of variances not being satisfied,

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and post hoc analyses could not be exercised due to the nature of the data (Tabachnick & Fidell, 2001).

Table 4.

ANOVA results for Search Engine and variables of interest.

| Variable | <i>F</i> | Significance ($p < .05$) |
|----------------|----------|----------------------------|
| Readability | .890 | .950 |
| # Pages | 2.091 | .126 |
| # Images | - | - |
| Recency | .198 | .821 |
| References | - | - |
| Total Accuracy | 1.09 | .338 |

Discussion

Accuracy of Alcohol Dependence Information on the Internet

Accurate information concerning AD on the internet from a diagnostic and biopsychosocial perspective is low. As predicted, the results of this study showed that the mean level of Total Accuracy for the websites analysed to be low. This is further highlighted by the fact that zero scores for each of the accuracy variables was a common feature of the data, indicating that many websites failed to mention any of the principal features of AD according to the scientific literature. These results add support to existing scholarship on the accuracy of health information presented on the internet. In particular,

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these results are consistent with previous research findings (e.g., Benigeri & Pluye, 2003; Bichakjian et al., 2002; Bower, 1996; Cline & Haynes, 2001; Craigie et al., 2002; Croft & Peterson, 2002; Eysenbach et al., 2002; Fallis & Frické, 2002; Impicciatore et al., 1997; Lissman & Boehnlein, 2001; Matthews et al., 2003; Morahan-Martin, 2004) showing the accuracy of health information on the internet to be lacking.

Accessibility of Alcohol Dependence Information on the Internet

The results have revealed, as hypothesised, that the reading level required to access AD information on the internet is excessive, when compared is made with the average reading levels of both the USA and Australia. These results are consistent with previous research findings (e.g., Adkins et al., 2003; D'Alessandro et al., 2001; Freda, 2005; King et al., 2003) showing health information in general tends to be inaccessible to those who would use it.

Commercial versus Non-commercial Websites

No significant differences in Total Accuracy were found between commercial and non-commercial websites. Additionally, no significant differences were found between commercial and non-commercial websites with regards to design, or the number of images present on the websites. These results fail to corroborate previous findings (e.g., Lissman & Boehnlein, 2001; Pelling, 2006) that commercial websites contain inferior information to non-commercial sites, yet display greater design aspects.

Limitations

Although the results of the current study indicate the quality of AD information on the internet to be lacking, in addition to demonstrating low accessibility, caution must be taken when drawing conclusions. The following limitations of the present study must be considered. First, generating any definitive conclusions is difficult due to the nature of data analysed. That is, it is possible that the variables in reality are not normally distributed and generally that the non-normality of the data lowered the statistical power of the analyses used.

Second, the average reading levels with which the data was compared may not be the same as those who access the internet. Explicitly, individuals who access the internet may possess higher reading levels than the national averages of the USA and Australia.

Third, although excellent inter-rater agreement was found for website assessment, the analysis was conducted in such a way that the key criteria for each of the accuracy dimensions were recorded as either present or not. This obviously does not address the actual content contained in the websites. A content analysis of AD information would address this problem.

Fourth, the results are only representative of websites collected during the specified period. That is, the research is a point-in-time study. As websites may continually appear and disappear from the internet as rapidly as technology advances, it is highly probable that repetition of this study, with these particular websites, is not possible. Additionally, some of the websites are not designed to provide information but rather exist as personal accounts, thereby reducing the accuracy outcomes of the present study, given the way accuracy was defined.

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Implications

Despite the limitations of this research, the study has further demonstrated that health information posted on the internet is lacking in accuracy. The paucity of accurate websites represented in this search may stem from a number of factors. To be listed and highly ranked by a search engine, the owner of the website must continually meet complex demands to maintain the position on the search engine. These demands may not facilitate a scholarly review of AD. This may result in many individuals receiving incorrect or even harmful material from the internet.

Of major concern is the number of websites displaying images of alcoholic beverages and their consumption, which has the capacity to ‘trigger’ craving reactions (e.g., Coffey et al., 2002; Coffey et al., 1999; Glautier & Drummond, 1994; Rosenow et al., 1994; Smith-Hoerter, Stasiewicz & Bradizza, 2004) in those who may be searching for AD information on the internet. Future research should investigate the nature of AD images on the web.

With the internet becoming increasingly employed in the delivery of psychological applications (e.g., Barak, 1999), and accessed by individuals searching for health related information (e.g., Borzekowski & Rickert, 2000; Gray et al., 2005), an urgent call is made to health and addiction practitioners who have developed websites for educational purposes to examine their ranking on major search engines. As it is impracticable to suggest strict regulations on information posted on the internet, the possibility of mistaken and harmful information is a reality. Hence, with the outcomes of

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the current research, the author appeals to the Australian Psychological Society, American Psychological Association, and governments to become increasingly involved in the dissemination and maintenance of recent and accurate health related bibliotherapy. In addition, it is suggested that governments and psychological agencies advertise specific websites relating to AD information via other media sources, as has been witnessed with beyondblue.com.au for depression. This may potentially encourage those dealing with alcohol related issues to seek out such sites for information rather than trawling through the seemingly random contents of search engines.

As research in the area of psychological applications on the internet has only just begun future research possibilities are abundant. The need to determine the accuracy and quality of an entire range of psychological themes on the internet is evident. With regards to AD information on the internet, future research might investigate the actual content of websites through qualitative analysis procedures, including treatment, and to examine thoroughly the nature of design and some other unique features of the internet.

Conclusion

In conclusion, the findings of the current study indicate that AD information presented on the internet is lacking in accuracy and is inaccessible to the general population. Although no differences were established between source and design of the information, this may be partially attributed to the nature of the data. These findings have further confirmed the existing body of literature examining internet information. Hence,

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consumers and health practitioners alike are warned against using internet information resources as bibliotherapy.

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Appendices

Cornish, M. (2009). The Nature and Accuracy of Alcohol Dependence Information on the Internet. *Counselling, Psychotherapy, and Health*, 5(1), The Use of Technology in Mental Health Special Issue, 249-299.

Appendix A

Cornish, M. (2009). The Nature and Accuracy of Alcohol Dependence Information on the Internet. *Counselling, Psychotherapy, and Health*, 5(1), The Use of Technology in Mental Health Special Issue, 249-299.

Appendix A

Formula used for developing the Australian national average reading level

As there was no available data, at the time the study was conducted, expressing the average reading grade level for Australia in terms of the Flesch-Kincaid Formula, an estimate was developed. An analysis was conducted whereby, initially it was established which Australian newspapers have the greatest reading audience (based on a number of sources: e.g., <http://www.thepaperboy.com/australia/>, http://www.newspapers.com.au/most_popular.html, and <http://www.4imn.com.au/>). Next, these newspapers were assessed using the Flesch-Kincaid readability scale. Finally, once all the readabilities had been ascertained an average was taken, thereby enabling the current researcher to produce an average reading grade level, according to the Flesch-Kincaid Formula, for the Australian populace.

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Appendix B

Cornish, M. (2009). The Nature and Accuracy of Alcohol Dependence Information on the Internet. *Counselling, Psychotherapy, and Health*, 5(1), The Use of Technology in Mental Health Special Issue, 249-299.

Appendix B

The Nature and Accuracy of Alcohol Dependence/Alcoholism Information on the Internet

Standard forms used for recording variable data and diagnostic criteria.

| Case | Search Engine | | | Readability | Design | | Source | Recency | References/ Biblio | Hyperlink | |
|------|---------------|----------|----------|---------------------------|--------------|---------------|--------|---------|--|-----------------|------------------|
| | G (1) | Y (2) | M (3) | Grade level (0-12) | # Pgs | # Imgs | # Pgs | # Imgs | .com .edu .org etcetera | Pres ent | Acti vity |
| 1 | | | | | | | | | | | |
| 2 | | | | | | | | | | | |
| 3 | | | | | | | | | | | |
| | | | | | | | | | | | |
| 210 | | | | | | | | | | | |

| Accuracy | | | | | | |
|----------|--|---|---|--|--|--|
| Case | Diagnosis: (Alcohol Dependence = 10 diagnostic criteria/Like rt scale = 11) | Biological Aspects 4 (Genetic Disposition; Biochemical factors; Gender; Age) | Psychological Aspects 4 (Emotional Factors; Cognitive Factors; Comorbidity; Personality) | Sociological Aspects 5 (Cultural Factors; Family/Develop mental factors; Peer Factors; Gender; SES) | Treatment Mentioned (1=Yes/0=No) | Prognosis Mentioned (1=Yes/0=No) |
| 1 | | | | | | |

| | | | | | | |
|-----|--|--|--|--|--|--|
| | | | | | | |
| 210 | | | | | | |

Diagnosis Criteria (Adapted from the *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR)*, APA, 2000)

1. Tolerance – need for markedly increased amounts of alcohol to achieve intoxication or the desired effect.
2. Tolerance – markedly diminished effect with same amount of alcohol.
3. Withdrawal – characteristic withdrawal syndrome of maladaptive behavioural changes, with physiological and cognitive concomitants, that occurs when blood or tissue concentration of substance decline post prolonged heavy use of substance.
4. Withdrawal – characteristic withdrawal syndrome typically using alcohol throughout the day beginning soon after waking.
5. Withdrawal – alcohol taken to relieve or avoid withdrawal symptoms.
6. Alcohol taken in larger amounts or over a longer period than was intended.
7. Persistent desire or unsuccessful efforts to cut down or control alcohol use.
8. A great deal of time is spent in activities necessary to obtain alcohol, or recover from its effects.
9. Important social, occupational, or recreational activities are given up or reduced because of alcohol use.
10. Alcohol is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by alcohol use (e.g., alcohol-induced depression or continued drinking despite recognition that an ulcer was made worse by alcohol consumption).

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Appendix C

Appendix C

Table 1.

Tests for normality and transformation outcomes of the study variables.

| Variable | Skew | Std. error of skew | Kurtosis | Std. error of kurtosis | Normal Y/N | Trans1 Y/N | Trans2 Y/N | Trans3 Y/N |
|----------------|--------|--------------------|----------|------------------------|------------|------------|------------|------------|
| Readability | -2.764 | 0.172 | 8.468 | 0.343 | N | N | N | N |
| # Pages | 4.961 | 0.170 | 32.739 | 0.338 | N | N | N | N |
| # Images | 2.367 | 0.170 | 7.339 | 0.338 | N | N | N | N |
| References | 4.618 | 0.170 | 26.160 | 0.338 | N | N | N | N |
| Diagnosis | 0.344 | 0.170 | -1.053 | 0.338 | Y | - | - | - |
| Biological | 0.570 | 0.170 | -0.913 | 0.338 | N | N | N | N |
| Psychological | 1.147 | 0.170 | 0.292 | 0.338 | N | N | N | N |
| Sociological | 0.609 | 0.170 | -0.872 | 0.338 | N | N | N | N |
| Total Accuracy | 0.380 | 0.170 | -0.887 | 0.338 | Y | - | - | - |

Table 2.

Transformations conducted on the study variables.

| Variable | Transformation 1 | Transformation 2 | Transformation 3 |
|----------------|------------------|------------------|------------------|
| Readability | SQRT (K-X) | LG10 (K-X) | 1/(K-X) |
| # Pages | SQRT (X) | LG10 (X) | 1/(X+C) |
| # Images | SQRT (X) | LG10 (X) | 1/(X+C) |
| References | SQRT (X) | LG10 (X) | 1/(X+C) |
| Diagnosis | - | - | - |
| Biological | SQRT (X) | LG10 (X) | 1/(X+C) |
| Psychological | SQRT (X) | LG10 (X) | 1/(X+C) |
| Sociological | SQRT (X) | LG10 (X) | 1/(X+C) |
| Total Accuracy | - | - | - |

X = variable name

C = a constant that is added to each score so that the smallest score is 1 (rather than zero or negative scores)

K = constant from which each score is subtracted so that the smallest score is 1 (i.e., the largest score +1)