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Using TAM to examine consumer acceptance of a mobile phone assisted smoking cessation program in Australia.

This paper study examines Australian smokers' perceptions of a potential SMS-assisted smoking cessation program. Using TAM we tested perceived ease of use, perceived usefulness and subjective norms on intentions to use this cessation program if it was available. Findings show that perceived usefulness and subjective norms were the significant predictors of intentions to use. Perceived ease of use did not directly influence this outcome instead it has an indirect influence through perceived usefulness. These preliminary findings can be built upon through introducing additional variables to help practitioners better understand consumer acceptance when marketing e-health programs such as this.

Key words: e-health marketing, smoking cessation, mobile phones, technology acceptance model

Track: Track 12 New technologies and e-marketing

1. Introduction

The Australian National Drug Household Surveys in 2004 identified that 62.7% of smokers consider themselves as occasional, light and/or social smokers, with heavy or 'chain' smokers comprising 37.3% (Australian Institute of Health and Welfare, 2005). Figures show that there has been a relatively steady decline in smoking over the years from 1980 with a significant decrease among male smokers in the years between 1983 and 1986. Yet this decline did not continue into the 1990s (Scollo and Winstanley, 2008). Currently, the smoking prevalence in Australia remains at a steady 20% (De Meyrick, 2009 *in press*), however, smoking continues to be a public health issue (Scollo and Winstanley, 2008).

A number of smoking cessation methods, drugs and programs are available to help Australians quit smoking, or at least significantly reduce their consumption of cigarettes (Scollo and Winstanley, 2008). With the extensive diffusion of the Internet, smoking cessation programs can now be offered through websites (e.g. Fritz *et al.*, 2008). In more recent times with the ubiquitousness of the mobile phone, the opportunity to combine mobiles with Internet cessation programs have been trialled and reported in the literature (e.g. Riley, Obermayer and Jersino, 2008; Obermayer, Riley and Jersino, 2004).

There are also studies that examine actual trials of the effectiveness of only using the mobile phone in smoking cessation programs (e.g. Rodgers *et al.*, 2005; Whittaker *et al.* 2008). While not an actual trial, Cacho-Elizondo and Tossan (2008) report on an exploratory, qualitative investigation of the potential of offering such a program which shows promising results. Such studies suggest that cessation program of this nature can be effective in reaching certain groups, such as youths and young adults, and their findings are relevant to the study reported in this paper. However, research in this area is still emerging and to-date no Australian studies have been found that examine the use of mobile phone technology in this way. For practitioners who are involved in e-health marketing, there is limited information as to what factors will influence consumers' acceptance of such programs and how to effectively market their benefits.

To address this gap in the literature, we discuss an exploratory study, based in Australia that examines factors that are likely to influence smokers' acceptance of a mobile phone assisted smoking cessation program, specifically one that is delivered by short messaging service (SMS). The paper proceeds as follows. The literature is reviewed to identify current work in this field. The methodology section is described followed by a discussion of the preliminary results. The paper concludes with the study's contributions to theory and practice.

2. Theoretical Background

In the area of health behaviour and health education, researchers suggest that interventions informed by theory may be more effective in changing behaviour compared to those that are not (Glanz, Rimer, and Viswanath, 2008). However, when selecting a suitable theory, it is important to ensure that it is relevant for the context of the study. The study reported in this paper involves evaluating Australian smokers' perceptions, beliefs and intentions towards a smoking intervention program delivered via SMS on their mobile phones. Thus, the study focuses on what factors are likely to predict consumers' intentions to use this type of mobile phone-based health (m-health) program if it was available. Owing to the combination of the technology, in this instance, the mobile phone, and consumer behaviour in a smoking cessation context, the Technology Acceptance Model (TAM) developed by Davis (Davis, Bagozzi, and Warshaw, 1989) was selected for the theoretical

framework. This model has a number of advantages in that it is a parsimonious but reliable model that can assist in examining user acceptance behaviour involving technology in a wide range of disciplines and contexts (Venkatesh, Davis and Morris, 2007). TAM has two central constructs that predict or explain intentions to accept using a technology, *perceived ease of use*, and *perceived usefulness*. However, its actual application in studies to assist in explaining or predicting consumer acceptance of using health interventions that are mediated by interactive communication technology has not been maximised to-date.

In the e-health and tobacco prevention literature, several studies report on trials of using SMS for delivering smoking cessation programs either in conjunction with a website (e.g. Riley, Obermayer and Jersino, 2008; Obermayer, Riley and Jersino, 2004) or just through the mobile phone (e.g. Rodgers *et al.*, 2005; Whittaker *et al.* (2008). In discussing how participants evaluated the programs, these studies provide evidence of how easy the programs were considered to be and what factors were found to be useful. These findings reflect *perceived usefulness* and *perceived ease of use* in the TAM model. We discuss these findings more closely within this framework.

Perceived usefulness: Whittaker *et al.* (2008), in a study of young adults, provide findings of participants perceptions of the pilot program that used both video messages and texts on mobile phones (n=13). Seven respondents liked the video messages, while five were unsure as to whether they were helpful, one respondent did not like them. In terms of the text messages these were considered useful. The ability to receive extra messages on demand was reported as useful by eight participants. Of the nine participants who quit smoking during the program the aspects that helped them the most [most useful] were: the mobile video clips; the encouraging messages; the text messages; being something new; quitting tips; provided motivation; acted as a reminder about what the participants were doing. Obermayer *et al.* (2004) in a study of college students, report differences in the ratings between those who had quit during the trial and those who had not in terms of the usefulness of the program. Thus, the usefulness of the text messages were rated higher as well as higher satisfaction rates with the program overall for those who quit. However, the authors report that all participants were consistently positive about the program's novelty and helpfulness. This study was replicated several years later (see Riley *et al.*, 2008) with a slightly older sample of college students. The authors measured participant acceptance of the program using mean ratings (3.5 or higher on 5 point Likert scales) with scores of 3.9 for overall satisfaction and 3.6 for perceived success of the program. Based on the foregoing evidence, perceived usefulness is an important factor that influences positive perceptions of the cessation programs.

Perceived ease of use: Whittaker *et al.* (2008) identify some of the technical challenges that occurred during the study, such as participants not having credit available to access the video links, mobile coverage not always available, and participants not knowing how to open the links. Where these obstacles impacted on participants' perceptions of the ease of using the program, they stopped participating until they received help. Obermayer *et al.* (2004) report moderately high scores for ease of use and comfort with using the different components of the program. The study combined text message support and website support, and participants reported that they found the SMS component easier to use and more acceptable than the Web component (which was under-utilised during the trial). The authors also found, however, that participants experienced technical difficulties, for example, different mobile service providers did not have easy to use reply functions, meaning that participants had to initiate completely new calls if they were seeking extra help. This discussion suggests that perceptions of how easy the cessation program is to use does influence positive perceptions of the cessation

program. Moreover, when technical difficulties are encountered, these can impact on participants' perceptions of the program's usefulness, and ultimately their intentions to use it.

Social influence: There is evidence in the literature of the effect of social influence in smoking cessation programs, particularly in terms of providing support for quitting (e.g. Cacho-Elizondo and Tossan, 2008; Ramsey and Hoffman, 2004; van den Putte, Yzer, and Brunsting, 2005). Obermayer et al. (2004) included the opportunity for participants to receive supportive messages from another person through the website, although the take up rates of this opportunity were low. Moreover, those who did, reported only moderate levels of satisfaction with this support during the trial. In the smoking cessation literature, the focus is more often on "explicit social influences" (van den Putte et al., 2005:187) such as influential others providing support (e.g. Ramsey and Hoffman). However, in their comparative study of six social influences on smoking cessation, van den Putte et al. (2005) found that the subjective norm had the most significant impact on people quitting smoking compared to the others social influences tested. Subjective norms relate to what a person believes that those people who are important to them might feel about the behaviour and thus may be a factor that influences the likelihood of someone using an SMS-assisted smoking cessation program.

2.1 Conceptual model

At this present time, no studies have been found that investigate the use of mobile phones to deliver smoking cessations programs in Australia. Our exploratory study provides preliminary evidence about whether Australians would be likely to use an SMS assisted smoking cessation program if it was available, based on their perceptions of its potential to be useful, easy to use and whether they think that people who are important to them would want them to do use this cessation method to quit smoking. Figure 1 shows the conceptual model to test the following hypotheses.

Hypothesis 1: *Perceived Ease of Use* will be positively related to *Perceived Usefulness*

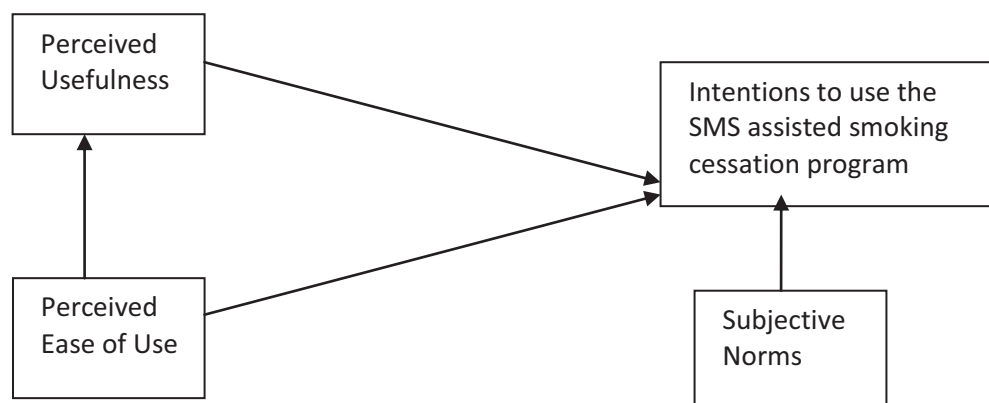
Hypothesis 2: *Perceived Ease of Use* will be positively related to *Intention to Use*

Hypothesis 3: *Perceived Usefulness* will be positively related to *Intention to Use*

Hypothesis 4: *Subjective Norms* will be positively related to *Intention to Use*.

Hypothesis 5: *Perceived Ease of Use* will be indirectly related to *Intentions to Use* through *Perceived Usefulness*.

Figure 1: Conceptual model



3. Methodology.

The survey was conducted online and the resulting data was downloaded as an Excel file and imported into SPSS. Using the online method means that there are no data entry errors and provides an effective and efficient data collection method. The sample was recruited through an Australian market research company using their consumer panels consisting of people located in every State and Territory in Australia. This approach was justified on the need to locate a large, national sample of people who currently smoke. This approach has been used in other smoking cessation research (e.g. van den Putte et al., 2005). The survey ran for one week and 453 respondents were recruited comprising 49% females, 51% males; 25% were aged from 18 – 30, 25% aged from 31 – 40 year, 23% aged between 41 and 50 years, 28% were aged between 51 and 65 years. In terms of education, 46% had 12 years of schooling or less, 33% had vocational or diploma level education, 15% had tertiary education and 5% had professional or other educational qualifications. Regarding occupations, 21% were involved in home duties or retired, 12% had casual or part time work and 67% were employed in a range of occupations. Eighty three percent of the sample identified themselves as being addicted to nicotine. In terms of mobile phone use, 71% were medium to high users for voice calls and 89% use SMS.

Three-item scales for each of the three independent variables were adapted from the work of Davis et al. (1989) measured with a five point Likert scale with end points ranging from (1) strongly disagree to (5) strongly agree. Three items were used to measure *intentions to use*. A principal components factor analysis was performed on the items and Cronbach alphas calculated. Only one item did not load on its identified construct. Thus *perceived ease of use* contained 2 items with a correlation of .65. The six items measuring *perceived usefulness* and *subjective norms* loaded on their relevant constructs ($\alpha = .92$ and $.94$ respectively) which are above the .70 level recommended by Nunnally and Bernstein (1994).

4. Results

To test the hypotheses, simple and multiple regression analyses were run to examine the relationships among *perceived ease of use*, *perceived usefulness*, *subjective norm* and *intention to use* an SMS assisted smoking cessation program. Table 1 shows the results.

Table 1: Results of regression analysis of factors affecting intention to use

(a) Effect of perceived ease of use on perceived usefulness			
Adj R Square = .276	F= 173.682		.000
Variable	β	t	Sig
Perceived ease of use (H1)	.527	13.179	.000
(b) Effect of perceived ease of use, perceived usefulness and subjective norm on intention to use an SMS assisted smoking cessation program.			
Adj R Square = .706	F= 358.999		.000
Variable	β	t	Sig.
Perceived ease of use (H2)	.061	.1.986	.048
Perceived usefulness (H3)	.608	7.345	.000
Subjective norm (H4)	.205	2.429	.016

A simple regression was used to examine the relationship between *perceived ease of use* and *perceived usefulness* (H1). The findings show that 28% of *Perceived Usefulness* is explained by *Perceived Ease of Use* ($\beta = .527$, $p = .00$). Thus Hypothesis 1 is supported. In the next step, multiple regression analysis was undertaken to test the influence of *perceived ease of use*, *perceived usefulness* and *subjective norm* on *intention to use* (H2, H3 and H4). The results show that 70% of variance is explained. *Perceived usefulness* ($\beta = .608$, $p = .00$), *Perceived Ease of Use* ($\beta = .061$, $p = <.05$) and *subjective norms* ($\beta = .223$, $p = <.05$) are statistically significant, thus supporting H2, H3 and H4. A Sobel test confirmed that mediation is occurring between *perceived ease of use* and *intention to use through perceived usefulness* thereby supporting H5.

5. Discussion and conclusions

The studies discussed in the literature review identify aspects of mobile phone-based smoking cessation programs that were considered useful by participants and the extent to which the delivery of the program via the technology was easy to use or found to be problematic. Whether or not these findings have a statistically significant impact on people's use of the programs, however, are not examined. Using the parsimonious TAM framework, our study shows that *perceived usefulness* is best predictor of people intentions to use this type of smoking cessation program. *Perceived ease of use* also is an important factor that needs to be addressed, but it does not have a direct relationship with *intentions to use* the program. Its effect is indirect in that it is moderated by *perceived usefulness*, that is, when difficulties are experienced, participants are more likely to believe that the program is not useful, rather than impacting on their intentions. This makes sense as if a program is not easy to use, it might be perceived as having limited usefulness by those who intended to use it.

Our study also shows that in addition to perceiving that the SMS-assisted smoking cessation program would be useful to help them quit, they believe that those whose opinion are important to them would also encourage them to use such a service. The literature suggests that other people are willing to support an individual to cease smoking (e.g. Ramsey and Hoffman, 2004). However, van den Putte et al. (2005)'s findings suggest that this type of social influence has a small impact on the person planning to quit, a finding also suggested in Obermayer et al. (2004). Smokers are more likely to consider quitting if they think that people whose opinions they value think that they should (van den Putte et al., 2005), a finding that is supported in our study.

Health behaviour or health education programs that are informed by theory may also be more effective for changing behaviour (Glanz et al., 2008). We argue that the use of theory can also assist practitioners to market e-health programs more effectively when they have a good understanding of what factors best predict or explain consumer acceptance of such programs. Our findings, based on the TAM model are promising for this purpose. Further research, however, should include constructs, that moderate or mediate these relationships to enrich the predictive or explanatory nature of this model for SMS-assisted smoking cessation programs. The subjective norm influence also provides opportunities for further research to investigate what other social influences are significant. While Glanz et al. (2008) warn against being variable driven, integrating variables into a sound theoretical framework can develop a bridge from one study to another in order to generalise findings more appropriately and improve marketing effectiveness in e-health programs.

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