Predictors of succes at the smoking cessation outpatient clinic at Medisch Spectrum Twente

Voorspellende factoren voor succes in de Rookstoppolikliniek in Medisch Spectrum Twente

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Contents

Abstract

INTRODUCTION: Smoking is a habit that causes many health hazards, such as pulmonary diseases. Smoking cessation interventions are very common nowadays. Medisch Spectrum Twente has instated a smoking cessation outpatient clinic. Patients are counseled and assisted in their efforts to quit smoking. The present study aims to describe the population at the outpatient clinic and test several possible predictors of success. METHOD: At baseline, two questionnaires were administered. The Smoking Related Questionnaire was used to measure demographic data and smoking related behaviors, and Beck's Depression Inventory measured depression scores. Smoking cessation outcomes were extracted from patient files. No follow-up measure was conducted. Predictors were independently tested using independent samples t-tests. A binary logistic regression analysis was conducted to test significant results simultaneously. RESULTS: Significant results found independently were: the first quartile of age (t(124)=2.248, p=.026), self-efficacy (t(131)=3,455, p=0,001), and depression (t(123)=-3,649, p<0,000). Binary logistic regression analysis using these three predictors proposed an acceptable model (Chi square (3) = 18.05, p<0.001) using these predictors. An R-square of .196 was found. Only depression remained statistically significant in this analysis (OR=1.10, p=.01). DISCUSSION: Depression scores can be used to predict smoking cessation outcomes in this sample, however, the proportion of variance explained is not high, and differences between groups on depression scores were not clinically significant. Lack of follow-up measurements and unstandardized interventions limit the generalizability of this study.

Introduction

Smoking is one of the largest health issues today. It's been related to a number of serious illnesses, such as pulmonary and cardiac diseases. Research has shown smoking to be the number one cause of preventable disease and morbidity (Boyle, 1997; Mokdad et al., 2004). Specifically for the Netherlands, van den Berkmortel et al (2000) stated that smoking is held responsible for 86 en 36% of annual mortality from lung cancer and cardiovascular disease, respectively. A study by Marek et al. (2009) illustrates the economic impact of smoking. They found that smoking related costs in Germany were 38.9 billion Euro. At the same time, smoking taxes only generated 13.8 billion Euro, which shows a large economical deficit.

It is often assumed that smoking cessation promotes health, and indeed this has been shown in scientific literature. Forsch et al. (2009) found that people who quit smoking grew older, and the earlier they quit, the longer they lived. According to Fagerström (2002), most adverse health effects of smoking are reversible. He states that the largest benefits of cessation occur when quitting smoking when young, but still many benefits remain for quitters at older ages.

Smoking is a difficult habit to break. For example, Law et al (1995) found that with a simple advice from tha GP or specialist no more than 2% of smokers stopped smoking. When the advice was followed up with further visits to the clinic, consultations by telephone and support letters, the percentage of quitters increased only to an average of 5%. These results indicate a need for more elaborate interventions.

For this reason, a large number of smoking cessation programs has been developed. These programs may use different strategies, such as individual or group counseling, use of medication or self-help booklets. Many of these programs have been used in studies designed to find determinants of smoking cessation or to evaluate (cost-) effectiveness of such endeavors.

One of the most widely used theoretical models in relation to smoking cessation is the Transtheoretical Model of Change (TMC), developed by Prochaska and DiClemente. This theory states that cessation is a process in which people move through different stages, where each stage is linked to different processes of change that will allow an individual to progress to the next stage.

The model involves different stages of change. The first is precontemplation. People in this stage have no serious intention of quitting anywhere in the future. Next is contemplation. Contemplators do have plans to quit, but have not yet taken preparatory action. When a contemplator starts preparing for quitting he had reached the preparation stage. These individuals are preparing their quitting attempt, but have not stopped yet. When an individual is in the process of quitting he is in the action stage. Once an individual has quit for some time, he must maintain this change. This is the maintenance stage. For most addictive behaviors, people are assumed never to quit this stage, as they will always need to maintain their change in order to prevent relapse (Prochaska et al., 1992). In smoking cessation, often relapse is referred to as a pseudo-stage, showing that people may fall back to earlier stages in the model. According to Prochaska et al. (1992), individuals usually relapse one or more times before definitively quitting. Eberman et al (1998) found, in a random survey of Dutch

smokers, that the average ex-smoker made five or more attempts before succesfully quitting smoking.

For most behaviors, relapse is assumed to be common. This makes the TMC a spiral model, so that people may both make progress and regression in stages. According to Prochaska et al. (1992) a relapse most frequently involves a move back to the contemplation or precontemplation stage. A model like this can be visualized as a spiral:

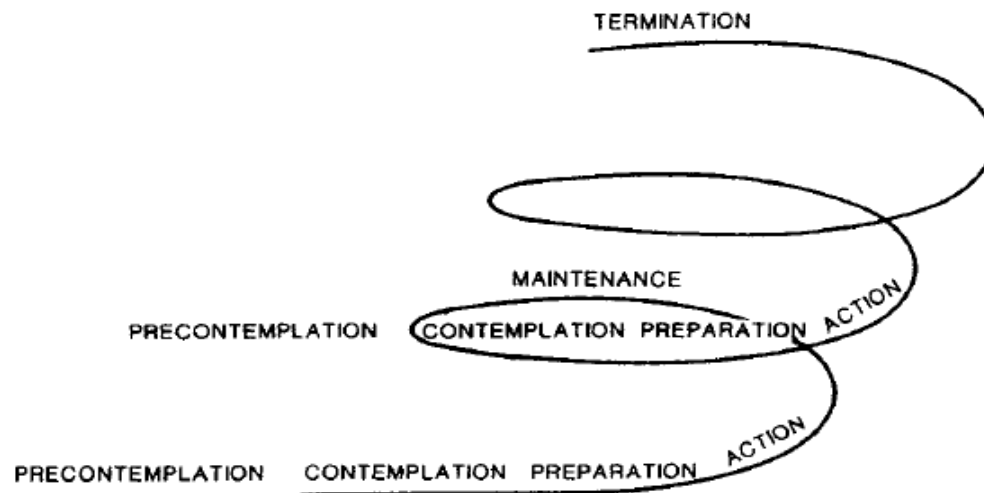*Figure 1: A Spiral Model of the Stages of Change*

Figure 1: A Spiral Model of the Stages of Change

Each stage of change is related to different processes of change which promote progression through the model. These processes have received less attention in the literature, therefore I will refer you to the studies of Prochaska et al. (1988, 1992) and DiClemente et al. (1991) for more information on the processes of change identified in the TMC.

The most frequently used outcome measures for smoking cessation programs are abstinence and changes in the aforementioned stages of change. Examples of studies that also investigated differences in stages of change next to actual abstinence include Bransetter et al. (2009) and Barbeau et al. (2006) among others. Bransetter et al. (2009) found more commonalities between quitters and reducers than between reducers and non-changers. This provides further evidence for using more extensive outcome measures than only abstinence and continuance.

There are many inconsistencies in the literature on smoking cessation. Many factors are found to influence smoking cessation outcomes, but relatively few are found with high consistency. Within-person factors shown to influence outcomes include attitude towards smoking cessation and self-efficacy in relation to smoking cessation (Christenhusz, 2006). Recent research has also focused on personality traits as predictors of success. Cosci et al. (2009) found that high scores on Psychotisism and Neuroticism predicted lower success rates in smoking cessation. Caution is advised however, as these factors have also been shown to influence other possible predictors of smoking cessation (Arai et al., 1997). This research suggests influence of Psychotisism and Neuroticism might influence smoking cessation only through influencing other relevant aspects of behavior. The influence of

gender on smoking cessation outcomes is unclear. Some research finds no differences in outcomes between genders (Gritz et al., 1998), but others do find such differences (Bransetter et al., 2009). Age is sometimes found to influence outcome, for example McWhorter et al. (1990) found that older age predicted success. However, Bransetter et al .(2009) found that among teens individuals who increased smoking behavior during the intervention were significantly older than quitters or reducers. Finally, nicotine-dependence is often related to outcomes, with greater dependence leading to greater chance of failure (McWhorter et al., 1990; Cosci et al., 2009; Bransetter et al., 2009, Breslau et al., 2000).

There are also more external factors influencing smoking cessation outcomes. Hospitalization is often related to positive outcomes (France et al., 2001; McWhorter et al., 1990). Freund et al. (1992) found that such an effect holds true for people diagnosed with heart disease, but not for people diagnosed with pulmonary illnesses. McWhorter et al. (1990) also found an effect of household income, where higher incomes predicted higher success rates.

Intervention factors are also relevant to outcomes. Meta-analysis of literature on the subject by France et al. (2001) found that intensive interventions were in general more effective than less intensive ones. Though this seems to be a strong effect, there are also a number of studies that found no such effect (Murphy et al., 2005; Voorhees et al. 1996). France et al. (2001) also mentioned in their study that low intensity interventions tend to be less well designed, and the lack of significant effects for these interventions might be due to the low power of these studies rather than the effectiveness actually being lower. It could also be noted that intensity of an intervention may be operationalized in different ways, which may account for inconsistencies in the literature on this subject. According to France et al. (2001) relapse prevention is a significant factor in increasing effectiveness of interventions, but only when the prevention is continued for a longer period. They found no effect for relapse prevention programs providing support for shorter than 3 weeks. France et al. also found Nicotine Replacement Therapy (NRT) to increase effectiveness, but only when combined with adequate relapse prevention modules. Freund et al. (2009) conducted a similar study, with different predictors. They found a significant intervention effect for provision of assistence and counseling to quit, but no effects for assessment of smoking status, advice to quit or provision or discussion of NRT.

An obvious question raised by the previous section is which specific types of intervention appear to be effective. A systematic review by van den Berkmortel et al. (2000) found significant effects on the long term for supportive schedules, nicotine replacement and buproprion chloride interventions. Another sytematic review by Lemmens et al. (2008) found evidence of effectiveness for group behavioral therapy, bupropion, intensive physician advice, nicotine replacement therapy, individual counseling, telephone counseling, nursing interventions and tailored self-help interventions.

Study Motivation

The hospital Medisch Spectrum Twente (MST) has instated an outpatient clinic to assist people in quitting smoking. This was done following research by Christenhusz (2006) among Chronic Obstructive Pulmonary Disease (COPD) patients in the same hospital. This has been done in close cooperation with doctors from the lung department at the MST. The clinic has been operational for as couple of years now, and valuable information has been gathered about participants of this smoking cessation program.

The goal of this study is to analyze the information gathered and provide a general image of the population at the smoking cessation outpatient clinic. The analysis will focus on finding predictors of success among this population. We hope this study can confirm some constructs influencing smoking cessation, as well as possibly identifying some new factors. Specifically for the MST this study might provide information that will help the outpatient clinic adapting their intervention to the specific patients attending.

Methods

Subjects

The participants for the outpatient clinic have to meet a few requirements. First, participants must be able to speak, read and write in the Dutch language. Participants must be willing to quit smoking on a preset date. It should be noted that before the treatment is started, participants must see a lung physician. Practice has shown that for some people this is unacceptable, so there might be some attrition due to this requirement.

Patients are allowed to come to the smoking cessation outpatient clinic without a physician's referral. However, especially during the first months of the clinic, most patients would be referred to the clinic by lung physicians. Therefore, people with lung diseases might be overrepresented in this study. General demographic data on the population can be found in the results section.

Interventions

The outpatient clinic for smoking cessation at the MST theoretically uses one of two interventions: Either the SmokeStopTherapy (SST), developed by Christenhusz (2006) or the LMIS, a standard, less intensive intervention commonly used in Dutch hospitals. This intervention has been developed by Stivoro, a Dutch association for smoking prevention and cessation. The LMIS consists of a certain number of individual counseling sessions, if desired coupled with NRT. SST consists of both individual and group counseling sessions and is used in combination with NRT.

After speaking with some of the employees at the smoking cessation outpatient clinic it was noticed that counselors often tailor these interventions to the needs of specific patients. There may be differences in number of counseling sessions, degree of medication prescription and strategies used by counselors. Differences turned out to be very large, with intervention durations ranging from a few months to a few years. This factor needs to be taken into account while interpreting the results of the study.

Data Collection

Participants in the clinic will be asked to fill in a number of questionnaires. The first questionnaire is filled in prior to the first intervention appointment. Two other questionnaires will be completed after the first appointment. Finally, a last questionnaire is completed after the actual quit date. The questionnaires used in this study are the ones completed after the first appointment. Scores on these questionnaires were encoded in Microsoft Access and converted to SPSS files for analysis.

Smoking Related Questionnaire

The first questionnaire used in the study is the Smoking Related Questionnaire (Mudde et al. 2000). This questionnaire was used to inventorise demographic data, social variables, cognitive variables and smoking related behaviors.

Several forms of demographic data were available from the SRQ. These include age, working status and education. Often, only a birth date was entered in the questionnaire, a date of filling in the quetionnaire was often missing. Therefore, it was impossible to calculate the age at the start of the

intervention. The age variable included was age at the time of the study. Due to the nature of the questionnare, it was not possible to determine subjects' sex. Social variables include measures of social support and modeling. A range of cognitive variables was also available from the SRQ. These include attitude towards smoking cessation, self-efficacy and the position in the stage of change algorithm.

Finally, the SRQ collects information on smoking related behaviours. These include form of tobacco use, amount of cigarettes smoked, previous quitting attempts, smoking cessation methods or aids used, a Fageström subtest and the ageat which a subject smoked his or her first cigarette.

Beck's Depression Inventory Questionnaire
The second questionnaire used in this study is Beck's Depression Inventory Questionnaire (BDI). This questionnaire inventorises depression. The scale consists of 22 items where the subjects check the box most appropriate to their present situation. Items ask about different depressive symptoms, such as suicidal thought, problems sleeping and feelings of sadness. Some statements are quite bold (I don't enjoy sex as much as I used to, I would commit suicide as soon as I get the chance). Therapists noted that some people refuse to fill in the questionnaire seriously.

Scores on the items range from 0 to 3 points. For the full questionnaire, a sum score is obtained that indicates the degree of depressive symptoms in an individual. The sumscore ranges from 0 to 63 points. Beck et al. (1996) identified four categories of depression. For this questionnaire, they claimed 0-13 points indicate minimal depressive symptoms, 14-19 points indicate mild depressive symptoms, 20-28 points indicate moderate depressive symptoms and 29-63 points indicate severe depressive symptoms.

Outcome measures
Smoking cessation outcomes were extracted from the patient files. When patient files did not provide conclusive information or were not available, subjects were assumed to be smoking.

Statistical Analysis
Data available will be analyzed using SPSS for Windows. First, T-tests will be used to check for significant differences between quitters and non-quitters. For the significant results from the T-tests, a binary logistic regression analysis will be conducted. General descriptive statistics will also be calculated to provide a general image of the intervention population.

Subscales
The SRQ has a number of subscales that were used to calculate sumscores on several measured constructs.The subscales used in this study were the same as in the Christenhusz (2006) study. Those subscales are: attitude towards smoking cessation, social support, modeling, self-efficacy, stage of change and Fageström (a measure of nicotine-dependence).

In general, these subscales consisted of several items. Answering options were recoded and given a quantitative value in relation to the measured construct. Adding the different values for one construct then yields a sumscore, which was used in the analysis.

For attitude towards smoking cessation, higher scores indicated highly positive attitudes towards smoking cessation. For social support, high scores indicated large amounts of social support from the

social environment. High scores on modeling indicate large amounts of smokers in the social environment, who could function as rolemodels. When a subject scored high on the self-efficacy subscale, he would have high levels of self-efficacy. Stage of change is simply an item that places a subject in a certain stage of change. High scores on the Fageström subscale indicate high levels of nicotine-dependency.

Linearity

Not all variables can be assumed to have a linear distribution. In particular for this study, education and age may be problematic. For these variables, a standard linear analysis was conducted, but secondly, using dummy variables, each level of the variable was tested seperately.

Age was recoded in four categories, containing the first, second, third and fourth quartiles in the population. This choice was made to assure that the groups were equal in size. Q1 ranged from 18 to 41, Q2 from 42 to 51, Q3 from 52 to 58 and Q3 from 59 to 72. Seperate tests were conducted to test for predictive value of each quartile seperately.

Education was first recoded into three categories, containing low, intermediate and high level education. Low education contained the first two response categories, intermediate contained the middle three categories and high contained the final two categories. A standard independent samples t-test was conducted using this division. Also, t-tests were conducted with the dummy variables, whether or not a subject had enjoyed low, intermediate or high level education.

Results

Population at the clinic

To provide a general image of the population at the smoking cessation outpatient clinic, some general descriptive statistics were acquired for some of the SRQ items and BDI sumscores. As mentioned, all questionnaires were administered at the beginning of the intervention. Reported statistics were therefore all baseline measurements.

General demographic data

The mean age of patients in the clinic was 49.48 years (*SD* 12.26). In the present sample, 59.1% was still active in a job, 38% was no longer active. The sample was relatively evenly distributed among education levels. From all valid responses, 39.8% had enjoyed low level education, 35.2% had enjoyed intermediate level education and 25% had enjoyed high level education.

Social environment

Of all patients participating in this study, 33.6% had a smoking partner. A non smoking partner was reported by 42.3%, the remaining subjects either did not respond or did not have a partner.

The first measure conerning social environment was social support. Most subjects (52.2%) report strong stimulation from their partners to quit smoking. The majority of participants reported moderate or strong (33.6% and 32.8%, respectively) support from their families. 47.7% reported strong support from their children. Most subjects report moderate to strong support from their friends (32.6% and 28.1%, respectively). A majority of subjects (49.8%) report no support from their co-workers. The average score on the social support subscale was 8.32 (*SD* 3.385), where a maximum of 15 was possible.

The second measure concerning the social environment was the modeling subscale. Most patients reported having no children living at home (74.5%), of those who did have children living at home, most (15.3%) reported there were almost no smokers among them. The most common answer on the question about family was almost no smokers, with 35%. When asked about friends, most participants (24.8%) reported about equal amounts of smokers and non-smokers. For colleagues, 47.4% reported not having any, while most people who did have colleagues reported less than half of them were smokers smokers (18.2%). The average score on the modeling subscale was 4.18 (*SD* 3.35), out of a maximum of 16 points.

Cognitive variables

Most people (49.6%) thought quitting smoking would improve their health a little. Nearly equal amounts of subjects think they would and would not miss smoking (35.8% and 36.5%, respectively). Most people (47.4%) perceived their chances to get lung cancer to become much smaller after quitting smoking. 58.4% thought that when they quit smoking, they would not have more problems relaxing. The vast majority (82.5%) thought they would be very content with themselves if they succeeded in quitting smoking. 32.9% thought they would suffer from withdrawal symptoms when quitting. Most subjects think they would either improve the health of those around them or improve their health a lot (44.5% and 40.9%, respectively). 57.7% thought they would not be bored more

often when they quit smoking. The average score on attitude towards smoking cessation was 5.34 (*SD* 3.23), where the maximum score was 12.

For self- efficacy, most people (34.3%) thought they were probably capable of not smoking when they are tense or stressed. When angry, most people had neutral to moderately positive thoughts about being able not to smoke (25.5% and 27%, respectively). When going out, most people (29.9%) thought they would probably be able to keep their smoking in check. When feeling down, 27% reported probably not being able to resist the temptation to smoke, while 26.3% reported neutral and another 26.3% reported probably being able to resist temptation. When offered a cigarette of their own brand, 35% thought they would probably be able to decline. 37.2% reported probably being able to not smoke when seeing someone else enjoy smoking. The average score on the self-efficacy subscale was 1.96 points (*SD* 5.55) where the maximum score was 12.

One SRQ item asked about the current postition in the stage of change algorithm. The majority of participants (64.2%) indicated that they wanted to quit smoking within one month. Further details can be found in table 1. The first two categories in the table can be identified as being contemplators, while the remaining categories can be said to be in the pre-contemplation phase.

Planning to quit	Percentage
Quit within one month	64.2%
Quit within six months, but not this month	20.4%
Quit within one year, but not in the next six months	6.6%
Quit within five years	0%
Quit, but not within five years	0%
Not planning to quit	.7%
No response	8%

Table 1: Stage of Change

Smoking behaviour

The SRQ used the Fagerström subscale as a measure of nicotine dependence. The majority of participants (41.2%) reported smoking their first cigarette within 5 minutes after waking up, while another 35.9% reported smoking their first cigarette between 6 and 30 minutes after waking up. Not smoking in areas where smoking is prohibited provided no problems for 81.8% of participants. For 69% of participants, their first cigarette in the morning would be the hardest to give up. 43.6% of participants reported smoking more in the first hours after waking up. Most participants (65.6%) reported that they don't smoke when they are sick in bed. The average score on the Fagerström scale at baseline was 3.7 (*SD* 1.67) points, where 7 points was the maximum score.

Most participants in the study smoked either regular cigarettes or shag (56.2% smoked cigarettes, 58.2% smoked shag). The average number of cigarettes smokes a day was 20.6, *SD* 10.9. Pipetobacco was smoked by 1.4% of participants, with .7% smoking more and .7% smoking less than 25 grams a day. Cigars were smoked by 7.3% of participants, those participants smoked an average of .86 (*SD* 6.2) cigars a day. 45.3% of participants reported trying their first cigarette after the age of 15, while 21.6% reported their first cigarette at an age of 14.

Most participants (90.5%) in this study, had already tried to quit smoking before. Table 2 contains information on which aids they used while trying to quit. The table clearly shows most people who try to quit by themselves use no aids at all, nicotine gum or other aids or methods. It is worth noting that nicotine patches are not included in the response options. People who used this aid should be found in the other aids or methods category.

Aid	% of participants that used it
No aids	30.7%
Group counseling	3.6%
Individual counseling	1.5%
Nicotine gum	29.2%
Nicotine spray	.7%
Anti-smoking pill (such as Zyban)	8.8%
Other aids or methods	40.9%

Table 2: Smoking cessation aids used by participants prior to study

Depression

The average score obtained on the BDI was 9.45 (*SD* 9.12). According to Beck (1996) such scores indicate minimal depressive symptoms, the least severe category identified.

Baseline predictors of smoking cessation

Table 3 provides a general overview of this section. Note that for age Q1 scores closer to 1 indicate more subjects that are in that category, while scores closer to 2 indicate more people not belonging to that category. For education, higher scores indicate higher education. For stage of change, high scores indicate intentions to quit nearer in the future. For first cigarette smoked, higher scores indicate an older age at which the first cigarette was smoked.

Predictor	Mean smokers	Mean quitters	P
Age	47.9	52.4	.051
Age Q1 (cat.)	1.68	1.86	.026*
Working status (cat.)	1.35	1.44	.277
Education	1.79	2.00	.140
Social support	8.20	8.60	.537
Modeling	4.51	3.6	.142
Attitude towards smoking cessation	5.27	5.47	.741
Self- efficacy	.90	4.29	.001*
Stage of change (cat.)	2.41	2.42	.939
Fagerström	3.78	3.72	.860
Amount of cigarettes smoked	22.31	21.67	.742
First cigarette smoked (cat.)	7.76	7.51	.410
Depression	10.76	4.85	.000*

Table 3: A summary of results

Age

Another independent samples T-test was conducted for age. When age was simply entered as a linear variable, results were not statistically significant (t(124)=1.969, p=.051). As mentioned before, age was categorised into quartiles. When subjects under age 42 (Q1) were compared to older subjects, a significant result was found (t(124)=2.248, p=.026). Q2, Q3 and Q4 all did not reach

statistical significance (t(124)=-.075, p=.940, t(124)=-.827, p=.410, t(124)-1.315, p=.191, respectively).

Working status

An independent samples t-test was conducted to check for predictive value of working status. For this analysis, the people who did not answer to this item were assumed to still have a job. Results were not significant (t(135)=1.091, p=.277).

Level of education

Another possible predictor of success could be level of education. The SRQ has a question that inventarises this. As mentioned before this variable was recoded in the same way as the Christenhusz (2006) study. Participants that did not respond were assumed to have enjoyed average education. After this recoding, an independent samples T-test was performed to check if it was of predictive value for smoking cessation outcomes. The results did not turn out to be significant (t(110)=1.201, p=.232).

It is not necessarily plausible to assume that the population is linearly divided over the education levels. Therefore the item was recoded to test seperately whether low education or not, intermediate education or not, or high education or not had a relation to smoking cessation outcomes. For low education levels a t(110) score of .427 was obtained, which was not statistically significant (p=.670). Intermediate level education and high level education turned out statistically insignificant as well (t(110)=1.053, p=.295 and t(110)=-1.675, p=.097, respectively). Overall, we can conclude that there is no relation between education levels and smoking cessation outcomes.

Social support

A general social support score was calculated. This consisted of 5 items, asking information about support by partners, children, family, friends and co-workers. This score was used in an independent samples t-test to assess whether social support differed significantly between succesful and unsuccesful quitters. The test yielded no significant results (t(124)=.619, p=.537).

Modeling

The modeling subscale was used in an independent samples t-test to see whether modeling influenced chances of succes in this study. Results of this test did not reach statistical significance (t(131)=-1,478, p=0,142). Therefore, modeling did not appear to have predictive value in this study.

Attitude toward smoking cessation

The average baseline score for the population on the attitude subscale was 5,34 (*SD* 3.23), indicating predominantly positive attitudes towards smoking cessation. The t-test comparison between the groups yielded no significant results (t(135)=.331, p=.741). Thus, smoking cessation attitude does not seem to be a predictor of smoking cessation.

Self efficacy

Self-efficacy was also tested for predictive value in the present study. This test yielded statistically significant results (t(131)=3,455, p=0,001). The 95% confidence interval of the difference between the groups ranged from 1,45 to 5,33 points, with succesfull quitters scoring higher on self efficacy. It seems that higher self efficacy is related to more favorable outcomes in this study.

Stage of change

One item asked about the particpants' plans to quit smoking. An independent samples t-test was conducted to check if this variable was associated with smoking cessation outcomes. Results were not statistically significant (t(131)=0,076, p=0,939).

Fagerström

The Fagerström sumscore was used in an analysis to test for influence of this subscale. For this analysis, subjects who reported 0 cigarettes a day were excluded from analysis. This was done because these people will score very low on the Fageström due to their not smoking. This will disrupt the analysis for predictive value, since the scale aims to measure nicotine-dependence prior to quitting. Results were not statistically significant (t(103)=-.177, p=0,860).

Amount of cigarettes smoked

For this analysis, patients reported smoking 0 cigarettes a day or did not respond were ignored. Again, we are interested in data prior to quitting, people who have already stopped smoking will disrupt the results of the predictor analysis. The analysis was carried out for the remaining group. This test did not yield significant results (t(96)=-.331, p=.742). Amount of cigarettes smoked could not predict smoking cessation outcomes in this study.

First cigarette

The SRQ includes a question on the age at which a person first smoked a cigarette. The scale ranged from younger than eight with one year increments to older than 15. An independent samples T-test was used to see if this variable could predict smoking cessation outcomes. Results did not reach statistical significance (t(135)=-.827, p=.410).

Depression scores

The sumscores on the BDI were used to test for influence of depression. This analysis yielded significant results (t(123)=-3,649, p<0,000). The 95% confidence interval for the difference ranged from -9.11 to -2.7, with succesful quitters scoring lower. It seems that lower depression scores predict positive smoking cessation outcomes.

Multivariate tests

For the significant results (depression scores, self-efficacy scores and whether or not a subject was in the first age quartile), a binary logistic regression analysis was performed. All variables combined were shown to have a significant effect (Chi square (3) = 18.05, p<0.001). The proportion of explained variance (using Nagelkerke's R Square) was .196. This shows the present model is acceptable and we can continue further analysis.

For depression scores, an Odds Ratio of 1.10 (p=.01) was acquired, with a 95% condfidence interval ranging from 1.02 to 1.18. For self-efficacy, an OR of .93 (p=.108) was found, with a 95% confidence interval ranging from .86 to 1.02. For the first quartile of age, an OR of 1.56 (p=.419) was found, with a confidence interval from .53 to 4.62. The results show that for this model, the only remaining statistically significant predictor is Depression score. Higher depression scores still seem to predict failure at smoking cessation.

Table 4 provides an overview of the results from this analysis.

predictor	Smokers	Quitters	Odds ratio	95% CI OR	p
Depression	10.70	4.85	1.097	1.020 – 1.179	.012
Self-efficacy	.87	4.12	.934	.859 – 1.015	.108
Age (Q1)	1.85	1.78	1.564	.529 – 4.623	.419
Nagelkerke R2					19,6%
Chi2 (df)					18.051 (3)
p					.000*

Table 4: Binary logistic regression output

Discussion

This study provides a short description of the population at the smoking cessation outpatient clinic and tested some predictors. Binary logistic regression conducted on significant results from the t-tests proposed a three predictor model.

This model predicts smoking cessation on the basis of scores on the depression scale, self-efficacy and age Q1. The Chi square and p-values indicated this model was acceptable in predicting outcomes. The R square value was only .196 however, indicating that only about 20% of variation could be explained through this model. This provides little certainty. It would likely be inefficient to screen subjects on the basis of these predictors and find ways to tailor the intervention to groups scoring differently on these predictors.

To our knowledge, the literature has not yet linked depression scores to smoking cessation outcomes. However, Brummett et al. (2003) found depression to be related to smoking. According to Tashkin et al. (2009), psychiatrists also report antidepressant effects of smoking. Knowing this, a connection can be made between higher depression scores and more difficulties in quitting smoking. People with higher depression scores might revert to smoking in order to relieve their depressive symptoms.

Quitters scored an average of 4.85 on the BDI, while smokers scored an average of 10.7. According to the categories Beck et al. (1996) identified, both smokers and quitters fall in the minimal depressive symptoms category. This shows that these differences are, at least according to Beck et al., not clinically significant, as they don't fall in different clinical categories. This is in line with the small Odds Ratio found in this study. This indicates that an increase in depression scores predicts only a very small change in smoking cessation outcomes. These results will not have many practical implications for the outpatient clinic.

Independently, self-efficacy and the first quartile of age were found as significant predictors for smoking cessation outcomes.Higher self-efficacy was beneficial for smoking cessation outcomes, and being in the first quartile group of age was associated with not quitting. When entered in the binary logistic regression analysis, however, these two predictors were no longer statistically significant.

Apparently, these two predictors interact with each other or with depression scores. Literature can give some insight in some of these interactions. For example, Boehmer (2007) found that higher subjective age was related to lower self-efficacy levels. In relation to depression, Nolen and Koerselman (2000) found that depression is related to feelings of self-blaming and guilt and difficulty in making decisions. These constructs can be intuitively linked to self-efficacy, as someone who blames himself for everything is unlikely to feel he can do those things effectively. Furthermore, a relation between age and depression has been proved in the HUNT study by Stordal et al. (2001). They found that both dimensional depression scores and prevalence rates increased with age. Examining the exact nature of the interactions between these predictors was beyond the scope of this study.

The present study could not indentify many predictors of smoking cessation. A first logical explanation would be a difference between the population used in this study and the populations used i n the literature. Some studies used specific worker groups (Barbeau et al., 2006), some used COPD patients (Christenhusz, 2006), and others used hospitalized patients (France et al., 2001). None of these populations exactly match the population used in this study, which might explain why some of the results found in those studies were not replicated in the present study.

Another possible explanation is the absence of follow-up measurement. A follow-up measurement would identify relapses and will most likely end up with a slightly different group of succesful quitters. Possibly there are other predictors that predict smoking cessation when measured six months after treatment.

A final explanation lies in the fact that the interventions used were not standardized. This can have different effects on different variables. Interventions might turn out to be different for different values of predictor variables. The mechanisms through which intervention characteristics interact with predictors are not known, but they might alter results.

Limitations

The most notable limitations of this study are lack of follow-up measurements and unstandardized interventions. The first makes success rates unreliable, as the literature has shown high relapse rates (Prochaska et al., 1992; Eberman et al., 1998). The fact that questionnaires were only administered at baseline also makes it impossible to make statements about when and how often changes occur in predictors. Specifically the stage of change algorithm could provide usefull insights when measured at different times. Other predictors would also be interesting to measure more frequently. Investigating for example when self-efficacy scores tend to rise throughout the course of therapy might provide useful insights.

The fact that interventions were not standardized makes it impossible to make general statements about predictive value due to possible intervention-predictor interactions. The results found in this study should hold true for this population when the therapists remain the same and keep working like they did during the study. It can not be assumed, however, that other interventions and therapists will respond the same when encountered with different values of predictor variables.

Recommendations

In this study, a lack of standardization in patient files was found. Due to this problem, it would be very time consuming to find out for every patient for example how many treatments they had, how many they missed, what their CO-scores were etc. Due to this problem a lot of information that was theoretically available could not be used in this study. For further studies using the same population to be more comprehensive, it would help if there was a more standardized way that information was stored.

I recommend using a cover sheet that would cover most of this information. It could have check lists where every appointment could be checked of, a section where CO-scores can be filled in and a field that contains the smoking status at the end of treatment. One page like this would make the files much easier to use in studies so more information can end up being used.

Following studies should make sure there is a standardized intervention to be analysed so that statements made can be more generalizable. Also, follow-up measures should be conducted to identify relapses and provide a more reliable measure of abstinence.

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