

TELEHEALTH IN SUBSTANCE ABUSE AND ADDICTION: REVIEW OF THE LITERATURE ON SMOKING, ALCOHOL, DRUG ABUSE AND GAMBLING

JUNE 2010



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TELEHEALTH IN SUBSTANCE ABUSE AND ADDICTION: REVIEW OF THE LITERATURE ON SMOKING, ALCOHOL, DRUG ABUSE AND GAMBLING

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ACKNOWLEDGEMENTS

This review was supported by a grant from the former Alberta Alcohol and Drug Abuse Commission (now Alberta Health Services). We would like to thank the following for their guidance and comments during the review process.

- Stephanie Phare, Alberta Health Services – Addiction and Mental Health
- George McBride, Alberta Health Services – Addiction and Mental Health

We would also like to thank Ms. Wendy McIndoo, Institute of Health Economics, for her editing, formatting and completion of the report for distribution.

EXECUTIVE SUMMARY

Background

Telemedicine and telehealth are defined as sending electronic health/health care information (e.g. data, audio, images) over distances between two or more individuals or sites. The scope of telehealth is somewhat wider than telemedicine since it includes areas such as self-help activities where people look for health related material that may impact their health or health behavior.

Many conventional interventions in addictions have been shown to be effective; however, the widespread use of those interventions have often been limited due to a limited number of personal services provided by professionals and the stigma associated with seeking and accessing available services. Telehealth can potentially overcome many of these challenges by offering services over distances and providing these services to large populations at the same time.

The aim of the study was to do a systematic review of telehealth studies in addiction/substance abuse and study the effectiveness and/or cost-effectiveness of the different telehealth applications in different addiction problems.

Methods

We looked for studies that analyzed for effectiveness of some kind of telehealth applications, comparing it to either no treatment or some existing non-telehealth treatment alternative in substance abuse. A comprehensive literature search was completed using a wide variety of terms from different types of addictive behaviors and telemedicine/telehealth applications. The search included the following data bases: Medline, Embase, PsycINFO, and Cochrane. The search was restricted from 1999 to May 2009. We selected articles that 1) included one or more of the following substance abuse/addiction areas - alcohol, smoking, illicit drugs, and gambling, 2) used some form of telemedicine/telehealth, 3) compared telehealth with another treatment or non-treatment alternative, 4) measured efficacy, effectiveness or cost-effectiveness of the intervention, or 5) reviewed efficacy, effectiveness or cost-effectiveness of telehealth in addiction.

Results

From the 1521 references identified in the search, 151 publications (9.9% of all abstracts) were ordered for closer review and 145 were received for detailed review.

Most of the articles came from the smoking cessation area (78) followed by alcohol (39), illicit drug use (10), and gambling (3). Of the studies, 15 were review articles, mainly from the smoking cessation (10). Through the telehealth activity, the studies were distributed to 64 applications via telephone, 39 via the Internet, 37 via computer/CD-rom and three via videoconferencing.

Internet applications were relatively common in alcohol- and smoking-related programs. Internet applications for students had relatively good outcomes, especially if the intervention is directed to those who used alcohol or smoked. The results of primary prevention studies of starting alcohol use or smoking are not promising. The general population applications seem to be more effective, especially for alcohol problems.

Getting more individualized programs based on the personal characteristics and increasing the length and frequency of the sessions improve outcomes. Adding the Internet application to other treatments, either simultaneously or after, can be beneficial. A large majority of the studies were large scale randomized controlled trials (RCTs), which indicates that these results are relatively reliable.

Similar to the Internet applications, many of the computer-based application programs were directed towards adolescents and college or university students. Most of these programs seem to be beneficial and the effectiveness was better in programs where students already used substances rather than in primary prevention type of programs. Some of the first programs did not use interactive and personalized information and, in general, they were not as effective compared to more theory-based intervention programs published at a later date. Overall, a majority of stand-alone computer applications had positive outcomes or were equivalent to face-to-face outcomes. The greatest uncertainty from the benefits can be seen in the smoking cessation studies where studies did not show clear positive outcome, especially student-based studies.

Out of 13 telephone-based applications in alcohol and smoking, 12 showed positive or outcomes that were equivalent to conventional methods. Half of these studies were based on reviews and meta-analysis in telephone applications in smoking cessation where we included only review studies. Most of the applications involved the conventional use of telephone for mediating advice and therapy by distance. The use of cellular phones for text messaging has increased during the last few years; however, there are only a few studies in this category.

Conclusion

The results of this review indicate that the Internet, computer, and telephone applications in alcohol and smoking addictions are at least as effective as conventional services, especially when we review more recently published applications that utilize personalized, interactive modular settings. There was some evidence from telehealth in the area of illicit drugs applications, but the number of studies was still relatively small (eight studies). There is a need for further studies which use telehealth for gambling addiction. Although telehealth applications are expected to be less expensive than individual face-to-face therapies, there is no good quality literature in the cost-effectiveness of telehealth applications in the studied addictions.

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1. INTRODUCTION

Telemedicine and telehealth are defined as sending electronic health/health care information (e.g. data, audio, images) over a distance between two or more individuals or sites. The scope of telehealth is somewhat wider than telemedicine since it includes areas such as self-help activities where people look for health related material that may have impact on their health or health behavior. These activities are increasingly common due to the widespread use of the Internet and mobile technologies to search health-related information and manage chronic conditions, i.e. diabetes or hypertension. Based on the recent reviews, a large majority of young people and adults under 55 years of age in Canada have Internet connection, and the percentage of people over 65 years of age who have computer and the Internet is increasing rapidly. The overall Internet penetration rate in Canada in 2008 was 84.3% of the population. (Source: <http://www.internetworldstats.com/am/ca.htm>). In a 2006 survey in Ontario, 73% of drinkers and 81% of problem drinkers had Internet access.¹

Many conventional interventions in addictions have been shown to be effective; however the widespread use of those interventions have often been limited due to a limited number of personal services provided by professionals and the stigma associated with seeking and accessing available services. Since telehealth can potentially overcome many of these challenges by offering services over a distance and by providing them to large substance abuse and gambling problem populations or at risk populations at the same time or at the time when the customers are ready to get the service, telehealth has been seen as a very promising way to distribute substance abuse services to large and diverse populations.¹⁻⁴ Although a face-to-face skilled clinician provided care can be more effective than telehealth applications such as the Internet, validated telehealth applications made freely available for those in need could greatly increase the available services for problem substance abusers.¹

In this study, we looked at the key substance abuse problems: alcohol, illicit drugs, and smoking, together with gambling addictions. The following telehealth technologies were included in this study:

- **Telephone or mobile phone:** this may include customers calling to help lines and health care professional or peers calling to customers. The services may include assessing smoking behavior or providing services and support. For mobile phones, text messages were also included.
- **Internet:** these applications had the Internet serving an integral role in delivering the service. These include: Internet assessment tools, with or without feedback related to substance abuse, interactive computer programs where patients approach a server and the service is delivered based on individual characteristics of the customer, and e-mails that provide intervention material or feedback during the progress of the intervention.
- **Computer and CD-Rom:** these applications are not directly telehealth, since the data/information does not go outside the customer's computer. However, they were included as a parallel technology to Internet applications. Historically, some programs first started using individual computers and then the applications were extended to include the Internet. Also, many of these applications could easily be transferred to work through the Internet, since the methods of providing the service in computers and through Internet are the same.

- **Videoconferencing:** using this technology, live audio and video are transmitted between sites or to home using videoconferencing equipment, videophones or computers with cameras.

In these application areas, both addiction types and technologies could be mixed; for example, there were studies that aimed to treat addiction problems, including both alcohol and drug addiction. Also, the telehealth services could be either the only form of treatment or a part of a larger service package (e.g., telephone reminders, sessions that were provided remotely).

The aim of the study was to do a systematic review of telehealth studies in addiction/substance abuse and study the effectiveness and/or cost-effectiveness of the different telehealth applications in different addiction problems.

2. METHODS

2.1. Inclusion criteria

We searched for studies that analyzed for effectiveness of some kind of telehealth applications as defined above, comparing it to either no treatment or some existing non-telehealth treatment alternative in substance abuse. Studies that analyzed the feasibility or acceptability of the telehealth in the study area were excluded.

The target groups could be either people with substance abuse problems (one or several) or people who were at risk of developing a problem, such as substance abuse prevention programs for youth. All age and ethnic groups were included. Also, co-morbidity with other mental health disorders was included, if studies included those patients. Studies were excluded, however, if primary targets of the intervention were anything other than addictions, e.g., if the primary intervention was for heart disease intervention, but smoking was one of several targeted outcomes.

2.2. Search methods

A comprehensive literature search was completed using a wide variety of terms from different types of addictive behaviors and telemedicine/telehealth applications. Appendix A shows the search strategy used in PsycINFO database. The search included the following databases: Medline, Embase, PsycINFO, and Cochrane. Due to a relatively large number of articles found in the search and the rapid change of the telemedicine technologies, we restricted the search to include studies from 1999 to 2009 only. The searches were conducted in late May 2009 by an information specialist at the Institute of Health Economics.

In total, 1732 references were identified in the searches. After filtering duplicates and references from articles that were not from either search area, there were 1521 references in the final data base for review. Since we were not able to filter any more irrelevant abstracts from the database using exclusion criteria in our database manager, we decided to do a two-staged reviews of the abstracts. The first stage would exclude the abstracts that were not linked to either telemedicine or addiction, or only one of the areas. After this initial review, less than one-third of the studies were seen to include both telehealth and selected addiction specialties in their study area, or it was difficult to define.

The next stage of the review included a close review of the selected abstracts using the following criteria:

- The study includes one or more of the following substance abuse/addiction areas: alcohol, smoking, illicit drugs, and gambling.
- The study uses some form of telemedicine/telehealth application in the treatment or assessment process of the addiction/substance abuse.
- The telehealth application is compared with another treatment or non-treatment alternative. Telehealth could be a part of bigger study protocol, but the telehealth application should be measureable in the study (e.g., nicotine replacement therapy vs. nicotine replacement therapy + telephone counseling). Studies without any comparisons were excluded, since those studies could only provide information from areas like technical feasibility of the telehealth applications.
- The study measured efficacy, effectiveness, or cost-effectiveness of the intervention. Feasibility, acceptability, and patient satisfaction studies of telemedicine in addiction were excluded, since they don't show any clear patient or health care system outcomes/benefits.
- Studies that reviewed efficacy, effectiveness, or cost-effectiveness of telehealth in addiction were also included in the study.

One senior researcher read all of the abstracts and studies if they fulfilled the inclusion criteria as well as those that did not include enough information to make the inclusion decision. These articles were all ordered for closer review.

Articles were categorized by the telehealth application used and the type of addiction. In a case where multiple addictions were treated, the study was included into the all addiction categories (e.g., alcohol and drug addiction categories). This means that one study can be represented in several categories. The review studies were categorized as their own category in each addiction.

Once the full articles had been categorized, they were read and assessed to see if they fulfilled the inclusion criteria of the final review. This was done by one senior researcher. All of the included articles were then reviewed and the summaries of the articles were included in the attached appendices. However, if the same study or program was reported in several journal articles or other publications, the results of these articles were combined to one review summary of the study. That is, one review summary can include one or several separate articles (all references included).

After the article summaries had been completed, they were summarized by type of technology and addiction problem. This means that within each telehealth application, the study will show for which addictions the telehealth applications are effective. It is also possible to compare which telehealth applications are best for each addiction type. However, this comparison may be somewhat restricted, since very few studies compare more than one telehealth application to a non-telehealth application.

In this study, we report all of the study areas identified in the review, except for telephone applications in smoking cessation. This area of research is relatively well established and we found 45 studies from this specialty area. It means that in this topic area, we could do a separate review and still have a large number of studies included. Since we found several systematic reviews from this topic area, we decided to review only the systematic reviews, so that we could reduce the burden of reporting all identified studies in the review.

Telehealth applications in addiction research have in many cases been developed in universities and many of them have been first tested using students. Since these applications are somewhat different from the applications directed to general population or sub-populations of adults, we have divided each telehealth application and specialty subgroup to student/youth and adult applications. The student applications are mainly directed to college and undergraduate students; that is, they include; very few students over 20 years of age.

In this review, the quality of the studies was not assessed using a quality index used in many systematic reviews. Instead, we report if the article was a randomized controlled trial (RCT) or if some other trial method was used. In addition, the RCTs were divided into large (each arm had at least 50 patients) and small (less than 50 patients per arm) RCTs. This cut-off point has been also used in other telehealth reviews.^{5,6}

3. RESULTS

3.1. Abstract and article retrieval

From the 1521 references identified in the search, the first reviewer selected those abstracts that included an application that used telehealth and included some substance abuse problem related topics. We identified 429 abstracts (28.2%) for closer review. From these abstracts, 151 publications (9.9% of all abstracts or 35.2% of final included abstracts) were ordered for closer review and potential inclusion. Table 1 shows the distribution of the 145 articles that were obtained for closer evaluation in the review by telehealth application and type of addiction.

Table 1: Articles obtained for closer assessment by telehealth application and specialty

Telehealth method	Smoking ^{&}	Alcohol	Drug abuse	Gambling	Total specialty*
Number of articles	78 (+10 reviews)	39 (+4 reviews)	10 (0 reviews)	3 (+1 review)	130 (15 reviews)
Telephone	43 (+2 smokeless tobacco)	10	4	2	59
Mobile/text message	5	0	0	0	5
Internet	21 (1 smokeless tobacco)	17	0	1	39
Computer/CD-Rom	19	12	6	0	37
Videoconferencing	0	1	1	1	3
Meta-analysis	3	1	0	0	4
RCTs	65 (3 smokeless tobacco RCT)	32	9	3	109

*Note: some studies may have been used for more than one telehealth application

[&]Smokeless tobacco studies shown in parenthesis

Since some of the articles in Table 1 are included in two or more substance abuse categories, the actual number of separate articles is approximately 130. Over half of the clinical studies dealt with smoking cessation which also accounted for two-thirds of the review articles included in the study. Over half of the smoking studies were telephone applications but computer (n=18) and

Internet (n=21) applications were also common. Over 80% of studies had some kind of randomization. All three smokeless tobacco studies were RCTs. From 39 alcohol studies, 15 (38%) were internet applications followed by 13 computer/CD-Rom applications. Only 10 illicit drug abuse studies were found; four were telephone- and six were computer-based studies. From the three gambling studies, two were telephone- and one was an Internet-based videoconferencing application.

3.2. Internet-based applications

Appendix B, Table B.1 includes all the abstracted Internet-based articles selected after the final review, including articles that were identified during the review process from other articles. The Internet application articles (n=36) included 16 articles (12 studies) in alcohol addiction, one in gambling problems, and 20 articles (18 studies) in smoking cessation. There was one Internet-based videoconferencing application from the illicit drug area.

Internet applications differ significantly based on the nature of the interaction in the program. The simplest applications would direct a person to addiction-related information on a webpage that could consist of one session of alcohol or other addiction education. These sites can be described as *static sites*.⁷ The next step would be to allow interaction between the Internet site and the individual or give personalized feedback to them based on the assessment done once entering the Internet-based program. This feedback can be structured; for example, to follow short Motivational Intervention/Interview type of therapy. The most advanced programs would provide cognitive behavioral therapy or another type of therapy through the Internet using learning modules and possible self-assessments during the program. In this review, we categorize the material for each addiction based on these types of programs.

3.2.1. Internet-based alcohol applications

Of the 12 separate studies in alcohol applications, eight were based on different student populations.⁸⁻²³ Although students are significant populations in terms of risk behavior, some of the results from these studies may not be fully generalizable to other populations, especially to adult problem drinking populations with possible other addiction problems and mental health issues. Eight of the alcohol application studies were from the USA and one from each of Canada, the UK, the Netherlands, and Australia.

All of the 12 studies included an alternative that was either feedback/interactive or a short course or more extensive therapy from which some were stand-alone applications and some combined with printed material or personal communication with a therapist or counselor. About half of the student-based studies had a positive impact on drinking, at least in the short term, but the effects were not uniform for both sexes and the level of alcohol consumption at baseline. Student studies based on motivational intervention^{15,16,19} and personalized feedback^{10,11,13} seemed to have the best impact on those who already drank, while the preventive impact for non-drinkers was not found.⁸ Six of the student studies were from the USA and one each from UK and Australia. Except for two small RCT studies,^{10,11,21} all were considered large RCTs (more than 50 subjects per study arm) indicating that their findings were based on relatively good quality studies. However, most of the student studies had some limitations concerning their generalizability to all students, based on self-reported data and missing follow up data.

One of the non-student population studies applied the same methods used in a student study on young working adults.¹² The study showed that the web-based personalized normative feedback

was as effective as including 15 minutes of motivational interviewing by a counselor to the web-based feedback and they both were significantly more effective than the non-treatment control group. The WebCT-based moduled (eight reference modules + 15 decision making modules) program for rural middle-aged women showed the same results as mailing a 48-page booklet that included the same material.¹⁴ The main limitation of the study was that the 3 months drop out rate was 34%. The study of Riper et al.¹⁸ assessed whether an effective self-help program could be transferred to an Internet-based program. They showed that the 6-week cognitive behavioral therapy (CBT) and self-control-based program without a therapist was effective in reducing problem drinking among the adult general population.⁽²⁴⁾ The Internet-based assessment and brief personalized feedback program that took about 10 minutes to complete had positive short-term (3 and 6 months) outcomes²² however the 12-month outcomes did not differ significantly from the control group.²³ Statistically significant short-term (i.e., 3 month) outcomes were also seen in the Finnish version of the same program.²⁵

Almost all Internet-based applications utilized online screening tools. In addition to the above articles, we identified a few studies from the properties of these online tools (Appendix C). Hester and Squires²⁶ show that the population norms for Internet-based populations may differ from the norms derived from face-to-face tools (such as the MATCH study²⁷). In another study, the psychometric properties in test-retest measurement in eight hazardous alcohol drinking measures were found to be good when administered online²⁸.

In summary, there are promising studies in Internet applications for alcohol addiction when more developed interactive/moduled programs are used in motivated high risk/problem drinking populations. Also, the meta-analysis of Riper et al.²⁹ concludes that among personalized-feedback programs, the Internet offers ample opportunities on a broad scale and it is also well utilized by individuals in need of services. A systematic review by Bewick et al.⁽²⁾, together with a study of Chiauzzi et al.⁴, also concluded that interactive personalized web-sites were more effective than sites that were not developed to include these properties, i.e. feedback. The articles chosen for this review were primarily from the last 3 years, indicating that the evidence in this area has emerged relatively recently.

3.2.2. Internet-based smoking cessation applications

The review included 20 articles (18 studies) about smoking cessation related to Internet applications (Appendix B, Table B.1). From those studies, four were directed to student populations, one study used an adolescent population, while the remainder of the studies were directed to adult populations. Two studies were related to worksites, while a majority of the studies were public web-sites that offered services for people from wide geographic areas and from several countries. The student studies³⁰⁻³³ varied in methods of delivering the programs. Among students, the Internet applications seem to be effective in reducing smoking, at least in the short-term. However, in the only Internet-based study that looked for long-term outcomes in a student population, the positive outcomes observed at 3 months did not last for the 6 months and 1 year follow ups, compared to the no intervention group³³.

The studies for the general populations had mainly positive results, compared to non-intervention control groups. When used in addition to nicotine replacement therapy, the results were better than without Internet connection³⁴⁻³⁶. The programs that included a higher level of individualized therapy were better than generic applications^{7,34-42}. That was true also in the only smokeless tobacco study in this category⁴³. Reminders (e.g., by emails) were found to be

beneficial^{31,39,41,44,45} as well as resulted in more frequent use of service^{32,41,44,46}. Only two studies did not show significant results^{47,48}. In the general population, 1-year positive outcomes were found in two studies^{37,40}.

In addition to the primary studies, one meta-analysis was found on the Internet-based smoking cessation interventions and two reviews on the quality of the information in web-sites. In a recent meta-analysis⁴⁹, nine web-based smoking cessation interventions were shown to be more effective than control groups (relative risk (RR), 1.40; 95% CI 1.13-1.72). A review that looked at the quality of the information in web-assisted tobacco interventions (WATIs) found that most sites (74%) met the exclusion criteria that included product sales without web-based intervention, unguided library of literature, and web-sites linking to other web-sites³. Of the remaining 23 web-site studies, 26% provided only minimal coverage of key components of tobacco treatment and most sites (69%) did not include any inaccurate information. Compared to the author's earlier review, the quality of the web-sites had improved significantly in several information areas^{3,50}.

3.2.3. Internet-based gambling and drug addiction applications

Both areas of gambling and drug addiction included one study. In a small RCT of 66 problem gamblers in Sweden⁵¹, an 8-week/8-module CBT through the Internet was effective up to 36 months follow up (effect size 0.83) compared to a wait-list. The study excluded severely depressed gamblers and was based on telephone interview diagnosis. The only Internet-based application in illicit drug addiction used Internet-based videoconferencing to connect methadone maintenance clinic patients to one individual and two group sessions per week⁵². They found that Internet-based group counseling seems to be as effective as in-person counseling in helping to expand the continuum of care in the area of aftercare.

3.2.4. Summary

Internet applications in substance abuse are relatively common in alcohol- and smoking-related programs (Table 2). However, they are not common among programs that treat illicit drug and gambling problems. A large proportion of the studies, especially from the alcohol-related programs, were directed to college and university students who have good computer and Internet skills. Students also have relatively good outcomes, especially if the intervention is directed to those who use alcohol or smoke and if alcohol consumption is high. The results of primary prevention studies of starting alcohol use or smoking are not promising. The general population applications seem to be more effective, especially for alcohol problems (Table 2). However, this can be an artifact of the timing of the programs since students were used as a target population in the beginning of the development of the Internet-based programs.

Getting more individualized programs based on the personal characteristics and increasing the length and frequency of the sessions improve outcomes. Adding the Internet application to other treatment, either simultaneously or after it, can be beneficial. Although several of the studies had problems, particularly regarding the response rates in the follow ups, a large majority of the studies were large scale RCTs, which indicates that these results are relatively reliable.

Table 2. Summary of the review outcomes by substance abuse, technology and by target group of adolescent and students, and adults*

Substance abuse/Addiction	Alcohol		Smoking		Illicit Drugs		Gambling		Total	
	Yes	No [#]	Yes	No [#]	Yes	No [#]	Yes	No [#]	Yes	No [#]
Effectiveness										
Internet applications										
Students/adolescent	4	4	5	0, (1)					9	4, (1)
General population	4	0, (1)	11	2	1		1		17	2, (1)
Computer applications										
Students/adolescent	3	1	2	3	1				6	5
General population	3		3	1	4				10	1
Telephone										
Students/adolescent										
General population	5	1	6 ^{&}		1				12	1
Videoconferencing					1				1	0
Total	19	6, (1)	27	6, (1)	8	0	1	0	55	13, (2)

* Results are shown by separate studies that may include one or more articles as shown in Appendix B

[#] Includes studies with no impact or no clear positive outcome compared to no therapy, or worse outcome than in conventional treatment alternative

() No long term impact in a study that has a positive short term results

[&] Based on review and meta-analysis studies

3.3. Computer-based applications

In the computer application studies, we found a total of 26 articles, or 21 different studies (Appendix B, Table B.1-3). In alcohol addiction, there were 10 articles and seven different studies; in smoking there were 11 articles and nine different studies; and in drug addiction there were five studies. Five of the studies were small RCTs while the rest of the studies were either large RCTs or some type of group RCT. This indicates that the study quality was relatively good in terms of possible bias between the compared study arms. However, many of these studies suffer somewhat, for example, self-reported data, co-morbidities between addictions and other mental health conditions, especially depression, which are sometimes included or excluded from the studies. In the computer applications, the follow-up rates are generally higher than in the Internet applications.

3.3.1. Computer-based alcohol applications

Of the seven alcohol studies, two were undertaken with student populations and two with early adolescents (i.e., community and mother-daughter setting). Within the student/adolescent studies, Barnett et al.⁵³ showed that brief motivational interviewing, either in person or by CD-Rom, had some promise to decrease drinking volume among at-risk college students, but these results are uncertain since the study did not have a non-intervention control group. The second student study⁵⁴⁻⁵⁶ compared the computer delivered personalized normative feedback group to an assessment only group and found that the computer application may constitute a promising prevention strategy among students who drink once coming to college.

The first early adolescent study^{57,58} used CD-Rom technology and included ten 45-minute sessions. This study showed that the alcohol use was lower in the CD-Rom-plus-parent group compared to the CD-Rom group alone group and the control groups. The second adolescent study of Schinke et al.⁵⁹ also used a CD-Rom but it also had an online connection that was used to send email reminders and update the program schedule. The study showed that the mother-daughter pairings that did 14 interactive module sessions together had improved outcomes in underage drinking behavior areas compared to the control arm.

Neumann and his group⁶⁰ used computer generated personalized printed material to emergency department injury clients and found that the computer group had significantly decreased alcohol consumption and at-risk drinking compared to control groups at 1-year follow-up. A computer-based interactive brief motivational intervention was shown to be effective in reducing drinking and drinking-related problems for up to 1 year follow up⁶¹. The study by Kay-Lambkin et al.⁶² included people who have alcohol problems and who could also have other addiction problems and co-morbid depression. They found that therapist-given brief intervention alone was good for alcohol problem alone patients, while other groups benefited from motivational interviewing and cognitive behavioral therapy after brief intervention with no significant difference between computer and face-to-face therapies.

In the review by Elliott et al.⁶³, they found 17 RCT (August 2007) studies from computer-based interventions for college drinking, including computer feedback (paper of electronic), CD-Rom/computer, and internet applications. Overall, the studies provided some support for electronic interventions, especially compared to an assessment only control group. They also

identified possible moderators (baseline drinking patterns) and mediators for change in drinking behavior (corrected drinking norms) in the reviewed literature.

3.3.2. Computer-based smoking cessation applications

From the nine different studies in smoking related computer applications, five were done with student populations starting from 13-14 years of age.⁶⁴⁻⁷⁰ With the exception of the Aveyard et al.⁶⁴⁻⁶⁶ studies from the UK, all other studies took place in the USA. Two of the student studies included non-smokers. One by Aveyard et al.^{64,65} did not observe a preventive effect in using an expert computer system over the English national curriculum control group. Prochorov et al.,⁶⁹ however, demonstrated that a CD-Rom-based multimedia program significantly prevented non-smokers from starting smoking. Among student smokers, the studies by Aveyard et al.⁶⁴⁻⁶⁶ did not find short- or long-term reductions in smoking rates. The two studies from Prochorov et al.^{69,70} found a decreasing trend in smoking rates (non-significant), and Fritz et al.⁶⁷ showed that four, completed 30-minute sessions had a positive effect on smoking rates 1 month later. O'Neill et al.⁶⁸ showed that undergraduate smokers progressed significantly in the stage of readiness to quit smoking in a computer-assisted program but it did not have significant effect on cessation rates. Although two out of five student/adolescent-based studies showed positive outcomes in smoking cessation and two other studies have some positive trends, the short term and long-term effects are still largely unknown.

Of the non-student studies, one came from the UK⁷¹ and analyzed smoking cessation during pregnancy. The three US-based studies analyzed the impact of adding stimulus control computer or counselor calls to an individualized expert system⁷², a computerized gradual smoking reduction program⁷³, and a computerized smoking cessation program organized through primary care physician practices^{73,74}. The interactive computer programs did not help expectant mothers and their spouses to quit compared to standard care,⁷¹ and the same result was found by Prokhaska et al.⁷² Riley et al.⁷³ showed a significant reduction in smoking that was maintained over 1 year, which was somewhat better than the outcome in the self-help manual group. In the Smith et al. study⁽⁷⁴⁾ the computer tailored intervention in a primary care setting was 1.77 times more likely to make a patient smoke free ($p=0.078$) than standard care. This study was the only economic evaluation study from among the Internet- and computer-related smoking studies and it showed that the incremental cost of the program was \$5570 per primary care practice and \$41 per smoker. The decision analytic model showed an incremental cost-effectiveness of \$1174 per life year and \$869 per QALY (Quality Adjusted Life Year), which could be considered very cost-effective outcomes.

The review of Walters et al.⁷⁵ included articles until August 2004 and analyzed the evidence of the computer and Internet applications in smoking cessation. They concluded that the evidence was still emerging and the most consistent evidence was still from the “first generation” of computerized and mailed feedback reports. Myung et al.⁴⁹ in their recent random-effect meta-analysis found that web- and computer-based smoking cessation programs were effective (relative risk (RR), 1.44; 95% CI 1.27-1.64), and the effectiveness was similar in nine web-based interventions (RR, 1.40; 95% CI 1.13-1.72) and 13 computer-based studies (RR, 1.48; 95% CI 1.25-1.76). The review also found that 1-year outcomes were better in the intervention group compared to controls, but the effectiveness of adolescent interventions were not significant (RR,

1.08; 95% CI, 0.59-1.98).⁴⁹ The relatively high uncertainty in adolescent studies was similar compared to our study findings.

3.3.3. Computer-based drug addiction applications

Of five studies, only one⁷⁶ was directed to prevent drug abuse among 12-13 year old school children. This interactive audio and video program in CD-Rom included 10 sessions and was intended for home and after school use. There were significant positive impacts in many knowledge, attitude, and other outcome areas compared to the delayed intervention group.

The remaining four studies were published in 2008 and 2009 and were directed to the general population.^{62,77-80} All of these studies based their treatment on some well defined therapy-like motivational interviewing or cognitive behavioral therapy and they used patients with different severity levels. All of these studies showed a positive impact of computer-related applications in drug addiction care. Bickel et al.⁷⁷ and Key-Lambkin et al.⁶² found that computer applications had similar outcomes compared to the face-to-face alternatives.

3.3.4. Computer-based gambling addiction applications

In the final review, there were no studies that focused on gambling addiction-related computer applications.

3.3.5. Summary

Similar to the Internet applications, many of the computer-based application programs were directed towards adolescents and college or university students. Most of these programs seem to be beneficial and the effectiveness was better in programs where students already used substances than in primary prevention type of programs. Some of the first programs targeting smoking and alcohol substance abuse did not use interactive and personalized information and, in general, they were not as effective compared to more theory-based intervention programs published during the last five years. Overall, a majority (16 out of 22 studies) of stand-alone computer applications (i.e., no Internet connection) had positive outcomes or was equivalent to face-to-face outcomes (Table 2). The greatest uncertainty from the benefits can be seen in the smoking cessation studies where especially student-based studies did not show clear positive outcome.

It should be noted that some of these computer-based programs could be transferred to Internet and vice versa. In the 2009 review⁴⁹ the effectiveness of the comparable computer and internet smoking studies were also found to be similar.

3.4. Telephone applications

3.4.1. Telephone applications for substance use and gambling

Telephone applications in alcohol, illicit drugs, and gambling included 10 separate articles and seven independent studies (Appendix B, Table B.3). Telephone applications in illicit drug addiction included one study that consisted of three articles.⁸¹⁻⁸³ The same three articles (one study) were also included in the alcohol category together with five other studies.⁸⁴⁻⁸⁸ One study was found from the area of gambling addiction.⁸⁹ From these seven studies, five were large RCTs, which indicate that the studies were of relatively good quality.

The only telephone application in drug addiction was the study of McKay et al.⁸¹⁻⁸³ that compared telephone-based continuing care with two more intensive face-to-face continuing care alternatives for both alcohol and cocaine addiction. The study showed that telephone care is an effective form of delivering step-down treatment for most patients with both alcohol and cocaine dependence after completing their initial stabilization treatment.

The other five studies in alcohol abuse included one study in an Emergency Department environment including patients with alcohol-related injuries,⁸⁸ three studies in a primary care setting that screened their participants from all of their patients,⁸⁴⁻⁸⁶ and a study that was undertaken in China^{86,87} that used psychiatric centre patients. The emergency care study had only a slight impact on impaired driving in the highest scoring alcohol user group but, otherwise, the results did not differ significantly from the controls. The results in the primary care setting studies indicated that telephone alone or combined with other material, such as mail-outs, can have some impact on drinking outcomes. Similar to McKay, studies such as the one completed by Horng and Chueh⁸⁷ showed that telephone follow-ups was an effective form of aftercare after inpatient care for alcohol dependence.

3.4.2. Telephone in smoking cessation

A large portion of the telephone application articles were from the smoking cessation projects and trials. In total, 43 articles fulfilled the inclusion criteria and an additional six articles included review results from that area. Since this area could be a topic of its own systematic review, we include only a summary of the identified systematic review studies. A descriptive review of North American tobacco cessation quitlines⁹⁰ showed that in 2007, there were 52 US and 10 Canadian quitlines, which had adopted multisession proactive counseling and also conducted regular outcome evaluations. They also found that about half of the quitlines also used the Internet to provide cessation information.

In a recent review, Krishna et al.⁹¹ studied health care delivery via cellular phones. Of the 25 studies that were included, three studies were from smoking cessation^{37,92,93} and were all identified in our review. Three of the studies utilized text messaging, while one program sent eight weekly smoking cessation sessions to cell phones that were tailored to HIV/AIDS patients.⁹³ All of the studies showed statistically significant improvements in smoking cessation.

Stead et al.⁹⁴ conducted a Cochrane collaboration review of “telephone counseling for smoking cessation”. They evaluated the effect of proactive and reactive telephone support via helplines and in other settings to help smokers to quit. Sixty-five trials met their inclusion criteria. Among helpline customers, quit rates were highest for groups randomized to receive several proactive sessions of counseling (nine studies, RR 1.37, 95% CI 1.26 – 1.50). However, the review could not conclude how many beyond two sessions were most effective. Of three hotline studies, two detected a significant benefit and one did not find a benefit. The review also found that telephone counseling not initiated by calls to the helpline also increased quitting (44 studies, RR 1.29, 95% CI 1.20 – 1.38). The authors concluded that proactive telephone counseling helps smokers who are interested in quitting. There is also some evidence that a dose effect, with three or more calls, increased the likelihood of quitting compared to minimal interventions like self-help booklets, brief advice, and pharmacotherapy alone. A meta-analysis by Pan⁹⁵ also concluded that proactive telephone counseling was an effective adjunct to other minimal interventions and it was more effective for young, male, and light-smoking participants.

A recent meta-analysis of RCTs reviewed behavioral interventions for smoking cessation using only biochemically validated studies measuring 6 or 12 month outcomes.⁹⁶ The study found that as a behavioral method, telephone counseling was effective (i.e., quit rates) compared to control groups (mainly usual care or no care) (odds ratio (OR), 1.58, 95% CI 1.15-2.29).⁽⁹⁶⁾ This OR was comparable to those in individual counseling studies (OR, 1.49; 95% CI 1.08-2.07), and group counseling (OR, 1.76; 95% CI 1.11-2.93), while a minimal clinical intervention was not statistically significantly better than controls (OR, 1.50, 95% CI 0.84-2.78). Another recent Cochrane review⁹⁷ analyzed psychosocial interventions for smoking cessation in patients with coronary heart disease. The methods reviewed included behavioral therapeutic intervention, telephone support, and self-help intervention. They found 16 studies in total using these three types of interventions and the ORs were very similar in these interventions. For telephone interventions, the OR for quitting was 1.58 (95% CI 1.28 – 1.97). More intensive interventions showed better outcomes.⁹⁷

In a systematic review, Hailey et al.⁵ found that all six studies that were telephone-based were of high scientific quality. Five of these showed that telephone intervention was effective and one indicated that it was not effective compared to non-telemedicine alternative. Also, five studies indicated that no further studies are needed in the field.

3.4.3. Summary of telephone applications

Unlike other types of telehealth applications, there were no adolescent and student targeted programs (Table 2). Out of 13 applications, 12 showed positive or outcomes that were equivalent to conventional methods, indicating that telephone applications are effective in alcohol and smoking applications. Half of these studies were based on reviews and meta-analysis in telephone applications in smoking cessation where we included only review studies. Most of the applications involved the conventional use of telephone for mediating advice and therapy by distance. The use of cellular phones for text messaging has increased during the last few years, but there are few studies in that category.

4. DISCUSSION

There is emerging evidence regarding the effectiveness of telehealth interventions in different areas of substance abuse and addiction. In total, 55 (81%) programs were found to be effective, while 13 programs did not differ from the non-treatment alternative or were less effective than conventional methods. In addition, in two applications that had positive short-term outcomes, the long-term outcomes were found to be non-significant. The most effective telehealth application was telephone with 92% of studies (including reviews in smoking) showing effectiveness, followed by the Internet and computer having 81% and 72% of effective program applications. Videoconferencing has only one study which is not enough evidence to establish effectiveness.

In general, the telehealth applications can be divided to four broad categories: information sites (e.g., telephone helplines [single generic call], information websites, information in the form of personalized feedback that is based on assessment instruments, and therapy based on modules that follow on established type of therapy (e.g., cognitive behavioral therapy, motivational intervention) including interactive personalized interface. Effectiveness was found to be lowest in the static information sites, which is independent of the technology used or type of substance abuse or addiction. Interaction seems to increase the effectiveness of the interventions and the

most promising results come from interventions that are mimicking effective face-to-face therapies. Also, simple reminders using text messages and email have lately been shown to be a low cost strategy to increase the effectiveness of a program.

Lack of access to the different telecommunication technologies, especially the Internet, has been seen as one problem for telehealth in substance abuse. However, the studies that were published during the last few years do not consider that the lack of access to telecommunication is a problem for many clients. Although the use of land-line based telephones is decreasing rapidly, the user rate of mobile phones is now very high in every population sub-group, which allows for the use of text and voice messaging, and also increases the ability to browse the Internet.⁹¹ Almost all Canadians currently have access to a computer and the Internet.⁹⁸ Based on the large number of Internet-based applications made available during the last few years and some of the utilization numbers that the studies showed, the Internet seems to be a promising way to reach large populations and provide them with personalized and continuing therapy and support.^{22,23,25} Internet applications may also follow an inpatient care period, where the continuity of the care is difficult to organize due to long distances. For subgroups that may not have access to computer (e.g, homeless, those with illicit drug addictions, residents in remote communities), specific rooms in public places or in health facilities with computers access could be an option.

Of the population sub-groups, students and adolescents are the ones that were studied most frequently. This is partly because they were easy to reach by researchers and they also were the first to use new information and communication technologies. The outcomes are mixed in student populations. Generic information programs for all students were not very effective, at least not in the long-term. Programs that were directed to users (i.e., smokers and drinkers) were shown to be more effective compared with primary prevention studies. Providing information from the average consumption/behavior of peers and comparing it to own utilization has been effective in some studies. Most of the other programs were targeted to the general population, although some racially or culturally targeted programs exist in the US. Also, the review included a program for rural women and a program for teenage daughters and their mothers, but these types of programs were rare. Moreover we did not identify any telehealth study that was targeted to elderly/senior populations.

One technology that seemed to be missing from the literature was videoconferencing. There was very little published literature in this area to support any decisions for addiction-related programs. As an addiction type, the gambling related studies were also very rare; we found only three original studies and one review article from which only one fulfilled the inclusion criteria. Good economic evaluations were also lacking, since only one study provided any cost-utility type of outcomes and even that study was not of high quality. Although several studies indicated that these technologies were low-cost technologies, they did not include any detailed economic analysis to support those conclusions. More research is needed especially in the economics of telehealth in substance abuse and addictions.

In general, the study quality was relatively good, since a majority of the studies were RCTs and most of them had large sample sizes with at least 50 participants in each study arm. However, the use of RCTs as an indicator of study quality is somewhat restrictive, but considering that the relatively large number of the reviewed studies were based on RCTs it is feasible to state that the overall study quality was good.

The two main limitations of this review were that the included studies usually were based on self-reported data and in many studies the number of subjects lost in the follow up was high. The problem of keeping patients in a telehealth addiction program and then following up on the results, however, is not a problem that is confined to the telehealth applications, it is a general problem in the whole substance abuse specialty.²² The threshold for trying telehealth applications is seen to be lower than attending conventional interventions due to easy access to these applications and the lack of stigma of face-to-face interactions. Once more, people with relatively low levels of need and motivation try these applications, more people discontinue after the first contact and later during the program. After a certain time period, this motivation may be increased via automated messages (e.g., email or text messages).

5. CONCLUSIONS

Internet applications in substance abuse are relatively common in alcohol- and smoking-related programs. Student populations have relatively good outcomes, especially if the internet intervention is directed to those who use alcohol or tobacco and if alcohol consumption is high. The results from primary prevention studies of starting alcohol use or smoking are not promising. General population Internet applications seem to be effective for smoking and especially for alcohol problems. Computer applications were also effective for alcohol, smoking, and illicit drug addiction in the general population while the success rate in student populations (6 out of 11 studies) was not very good. As with the Internet, the new computer-based programs were tested with students and the results from these studies have then been used in larger scale general population programs. Telephone-based applications have shown to be effective in smoking cessation and, to some extent, in the alcohol problems. However, they have not been used much in the illicit drug therapies (one study) and gambling problems (no studies).

In general, getting more individualized telehealth programs based on the personal characteristics and increasing the length and frequency of the sessions improve outcomes. Several of the studies had problems, especially in making the patients that started the programs to use the designed services and then to respond to the follow up surveys. However, a large majority of the studies were large scale RCTs, which indicates that these results are relatively reliable.

The results of this review indicate that the Internet, computer, and telephone applications in alcohol and smoking addictions are at least as effective as conventional services, especially when we review more recently published applications that utilize personalized, interactive modular settings. There was some evidence from telehealth in the area of illicit drugs applications, but the number of studies was still relatively small (eight studies). There is a need for further studies which use telehealth for gambling addiction. Although telehealth applications are expected to be less expensive than individual face-to-face therapies, there is no good quality literature in the cost-effectiveness of telehealth applications in the studied addictions. More economic analysis in telehealth in addiction is urgently needed.

APPENDIX A: SEARCH STRATEGY

Database	Time Frame	Search Terms/Strategy
PsycINFO	1987 to May Week 3 2009	<ol style="list-style-type: none"> 1 telemedicine/ (1020) 2 telecommunications media/ or teleconferencing/ (1295) 3 online therapy/ (473) 4 (telemedic\$ or teletherap\$ or telepsych\$ or telehealth\$ or telecare or tele-care or telehomecare or telenurs\$ or tele-educat\$ or teleprevent\$ or telescreen\$ or telerehab\$ or telediagnos\$.mp. (1281) 5 satellite communication\$.mp. (8) 6 ((remote or video) adj2 (monitor\$ or consult\$)).mp. (468) 7 (teleconferenc\$ or teleconsult\$ or telemonitor\$ or videoconferenc\$.mp. (908) 8 (e-health or ehealth or e-mental health or emental health or emedicine or e-medicine).mp. (199) 9 (telemental health or tele-mental health).mp. (17) 10 computer assisted therapy/ (134) 11 (computer-assisted education or computer-assisted instruction or computer assisted therapy or computer-mediated or computeri?ed therap\$.mp. (10432) 12 ((web-based or web-assisted or internet-based or internet-delivered or internet or computer-based or computer-tailored or text messaging or technology-based or online or multimedia) adj4 (intervention\$ or application\$ or program\$ or method or support)).mp. (3027) 13 (worldwide web or world wide web or virtual reality or virtual world\$.mp. (3873) 14 computer mediated communication/ (1979) 15 virtual classrooms/ (111) 16 ((email\$ or e-mail\$ or electronic mail\$) adj3 (intervention\$ or application\$ or program\$ or method\$ or support)).mp. (165) 17 (chat feature or chat service or online chat\$ or chat group\$ or chat room\$.mp. (396) 18 discussion board\$.mp. (91) 19 ((hotline\$ or helpline\$ or quitline\$) and (online or internet or electronic or computer\$)).mp. (52) 20 online social networks/ (157) 21 websites/ (653) 22 or/1-21 (19750) 23 exp addiction/ (23837) 24 exp drug abuse/ (53795) 25 exp drug abstinence/ (2292) 26 exp drug rehabilitation/ (16564) 27 exp drug usage/ (80737) 28 smoking cessation/ (5826) 29 ("substance use" or substance abuse or substance dependence).mp. (28376) 30 ("drug use" or drug abuse or drug dependence).mp. (38152) 31 ("alcohol use" or alcohol abuse or alcohol dependence or

		alcoholi\$.mp. (38797) 32 addict\$.mp. (20106) 33 exp gambling/ (2802) 34 or/23-33 (114023) 35 22 and 34 (613) 36 (screening or assessment).mp. (159482) 37 self help.mp. (4942) 38 intervention\$.mp. (129361) 39 exp counseling/ (35789) 40 counseling.mp. (39980) 41 exp support groups/ (3726) 42 cognitive behavior therapy/ (5016) 43 cognitive behavi?ral therap\$.mp. (5286) 44 (therap\$ or treatment\$).mp. (375078) 45 or/36-44 (566491) 46 35 and 45 (442) 47 limit 46 to yr="1999 -Current" (416) 48 internet/ (10939) 49 34 and 48 and 45 (304) 50 limit 49 to yr="1999 -Current" (302) 51 50 not 47 (145) 52 from 51 keep 65 (1) 53 47 or 52 (417) 54 questionnaire\$.mp. (110465) 55 35 and 54 (53) 56 limit 55 to yr="1999 -Current" (50) 57 56 not 47 (16) 58 from 57 keep 1-16 (16)
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APPENDIX B: SUMMARIES OF THE REVIEWED ARTICLES

Table B.1: Clinical and economic studies in Internet-based applications by type of addiction

a) Internet applications in alcohol addiction

First author and study design	Objectives	Setting and subjects	Approach	Results /Conclusion	Limitations	Implications for decision making
Bersamin M. et al. 2007 ⁸ Large RCT USA	To assess the effectiveness of a new online alcohol-misuse prevention course among drinkers and nondrinkers.	After completing a pre-college survey (N=622) in a northern California university, authors randomly assigned college freshmen to intervention and control groups.	Intervention group (n=310) completed an online 3 hour non-credit College Alc course while the control group had no intervention. Groups were stratified based on past alcohol use. Weekly email reminders were sent to intervention group.	Freshmen who were regular drinkers in the program reduced the frequency of drinking, drunkenness, and negative alcohol consequences. For nonusers (past 30 days) the program didn't have any impact.	Sample not representative to all college freshmen. Post-intervention survey response rate was not high (59.5%).	The online program may be effective for students with a history of alcohol use.
Bewick B et al. 2008 ² Large RCT UK	To establish the effectiveness of an electronic web-based personalized feedback intervention	506 university students who registered in the study in a university in UK and they were randomly assigned to control or intervention groups.	Intervention participants received electronic personalized feedback and social norms information on their drinking behavior by login onto the website at any time during the 12-week period.	A significant difference in pre- to post-survey mean difference of alcohol consumption per occasion was found with intervention group having a larger mean decrease. No change in units of alcohol consumed per week or CAGE score. However, students found the feedback to be helpful. Web-based approach was a feasible and potentially effective method to reduce students' alcohol intake.	About two thirds of students answered the post-survey. Exact recall of alcohol consumption during the last week could be changed to average weekly consumption.	Web-based approach can be used to reduce per occasion consumption of alcohol. More information is needed on how the components of the program impacted to the alcohol consumption.

<p>Cummingham et al. 2010²² and Cunningham et al.⁹⁸ Large RCT Canada</p>	<p>To conduct a randomized controlled trial to evaluate Internet-based "Check Your Drinking (CYD)" screener.</p>	<p>185 subjects were recruited through a general telephone survey and were assigned randomly to the CYD or a non-intervention control group. Intervention targeted to general population of problem drinkers who are non-treatment seekers. Recruitment used an ongoing randomized general population phone survey in Ontario, Canada to identify individuals with risky alcohol consumption (AUDI-C test).</p>	<p>Risky drinkers were offered to participate in the Internet program. Consenting drinkers with baseline survey data were randomized to intervention and control group. In the intervention group, the subjects first filled a brief online assessment and they received a "Personalized Drinking Profile". The CYD includes: normative feedback pie charts that compare the participant's drinking to others in the same sex, age, and country (US, Canada, UK) group and a summary of the participant's severity of alcohol problem. The control group subjects didn't get any feedback material, but they got a list of components that could be included in a computerized summary for drinkers. Participants in all three (0, 3, 6 months) assessments got \$60.</p>	<p>Follow-up rate was very high (92%). Problem drinkers accessing CYD had a six to seven drink reduction in their weekly alcohol consumption (a 30% reduction in typical weekly drinking) compared to one drink in week in the control group at both 3 and 6 months follow-ups.</p>	<p>About 1/3 of subjects in the intervention group never accessed CYD. The study also lost a significant number of potential participants who decided not to participate. The study may not fully represent the problem drinkers population.</p>	<p>CYD is one of the growing number of Internet-based interventions showing efficacy to reduce alcohol consumption. The Internet can increase the range of help-seeking options for problem drinkers.</p>
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<p>Doumas et al. 2008 and 2009^{10,11,13} Two small RTCs USA</p>	<p>To evaluate efficacy of web-based personalized feedback program (WPF) in freshman athletes and mandated college students</p>	<p>WPF was compared to web-based education (WE) during their first college year. Studies included 76 mandated students and 52 athletes (in Boise State University, ID, USA).</p>	<p>In the WPF group, students completed a 15-minute Web-based program designed to reduce high-risk drinking by providing personalized feedback and normative data regarding drinking and its risks. WE options included websites that took 15 or 45 minutes to go through.</p>	<p>Both studies show that students in the WPF group had better outcomes. WPF students changed their estimates of peer drinking and reduced their own drinking.</p>	<p>The study samples are relatively small and the attrition rate was not very high. Follow ups (30 days and 3 months) were fairly short to measure long-term effects.</p>	<p>Providing personalized Web-based feedback as an intervention for students is effective to reduce the quantity and frequency of drinking.</p>
<p>Doumas D & Hannah E 2008¹² Small RCT USA</p>	<p>To evaluate efficacy of web-based personalized feedback program delivered in workplace to young adults.</p>	<p>124 participants (18-24 years) were randomly assigned to web-based feedback program (WI), WI plus 15min motivational interviewing (MI), or control. Participants were offered \$10 or movie tickets for participating in the baseline and follow up assessment.</p>	<p>WI program based on personalized normative feedback about the participants drinking by web. Program is free on www.CheckYourDrinking.net The base assessment takes about 15 minutes and feedback is given immediately. In the MI program, the participants received the same WI process as above. After that they took the personalized feedback to a certified counselor with whom they discussed using MI about 15 minutes about the feedback.</p>	<p>Participants in the WI and MI groups reported significantly lower levels of drinking after 30-day follow up. This was true particularly in high-risk drinkers at baseline. No difference was found between WI and MI groups.</p>	<p>Only 46% of eligible employees elected to participate and of those only 63% returned to the 30-day follow up. Participants were primarily Caucasians and 70% of them were female.</p>	<p>The study supports the use of web-based feedback as a stand-alone alcohol prevention program for young adults in the workplace.</p>

<p>Finfgeld-Connett and Madsen 2008¹⁴ Small RCT USA</p>	<p>To evaluate a Web-based, self-guided alcohol treatment program among rural women.</p>	<p>44 women from Missouri, US were randomized to standard care and web-based care and were followed for 3 months.</p>	<p>Treatment components were distributed via WebCT software and consisted from eight referenced modules and 15 decision making modules. Women in the standard care were mailed the same material in 48 page booklets and instructions. Web group had access to an asynchronous bulleting board and synchronous chat feature to interact with researchers and other participants.</p>	<p>At 3-month follow up, both treatment groups decreased their drinking (not significant?). No difference was found between the change in standard and web-based care.</p>	<p>Small sample and more severe patients should have been in the sample. Study based on self-report and 3 months not long period to follow. Attrition rate was only 34%.</p>	<p>Web-based program is promising among middle-aged rural women with mild-moderate alcohol problem. More research needed in larger studies and other target populations.</p>
<p>Kypri et al. 2008¹⁵ and 2004¹⁶ Two large RCTs (report 2008 study that is mainly replication from 2004) Australia</p>	<p>To assess in a university primary care setting if web-based program reduces hazardous drinking.</p>	<p>576 consented students who scored in AUDIT in hazardous or harmful range participated the RTC from Screening and Brief Intervention (SBI) study.</p>	<p>Students were randomized to receive information pamphlets (control), a web-based motivational intervention (single e-SBI), or e-SBI with 1 and 6 months interventions.</p>	<p>Compared to control group, the single dose e-SBI produced at 6 months significantly lower frequency of drinking less total consumption and fewer academic problems. At 12 months there were still significant difference in total consumption and academic problems. Multi-dose e-SBI produced about the same results than single-dose e-SBI.</p>	<p>The study was based on self-reported data which was not seen to be a problem. Although students were randomized, they may have discussed with students in other groups.</p>	<p>Single-dose e-SBI reduced hazardous drinking and the effect lasts 12 months. Additional sessions don't seem to improve the effect.</p>

Neighbors et al. 2009 ¹⁷ Large RTC USA	To reduce 21-year birthday drinking among college students.	259 college students who intended to drink two or more drinks in their 21 st birthday. They were assessed 1 week before their birthday and randomized to Web-based personalized feedback and assessment only.	Web group got feedback that included; normative information, protective behaviors, and personalized blood alcohol concentration information. Follow up assessment was done about 1 week after 21 st birthday.	Results show significant reduction in blood alcohol concentration in intervention group. This was moderated by drinking intentions and the intervention was effective primarily among those who intended to get high levels of intoxication.	Low participation rate to screening limits the results, as the measurement method of the mediators and outcomes.	Web-based personalized feedback can be used as intervention for specific events associated with extreme drinking.
Riper et al. 2008 ¹⁸ Large RCT The Netherlands	To test whether effective self-help drinking programs can be transferred to be delivered by internet.	Study was conducted in the Netherlands in 2003-04. Two hundred sixty-one adult problem drinkers were randomized to either online drinking less (DL) or control condition (PBA).	DL is a free-access web-based self-help intervention (www.minderdrinken.nl) without therapist guidance for problem drinkers. It is based on cognitive-behavioral and self-control principles. It has four stages and a peer-to-peer discussion forum. Recommended treatment period was 6 weeks.	At follow up, 17.2% in the intervention group had reduced to within the guideline norms while in the control group only 5.4% reduced (p=0.006). Intervention group also significantly reduced their weekly alcohol intake compared to control.	Lost in follow up ratio was relatively high.	Web-based self-help intervention without a therapist is effective to reduce problem drinking among adult general population.
Saitz et al. 2007 ¹⁹ Large RCT USA	To test the feasibility and effectiveness of online alcohol screening and brief intervention (BI).	University freshmen (N=4008) got an email inviting them to do a self-assessment (general or alcohol specific). Those with unhealthy alcohol use (AUDIT >=8) were randomized to minimal or more extensive alcohol BI.	The intervention was based on elements of BASICS, motivational interviewing, self-change approaches, and feedback about social norms. Minimal BI consisted from three web screens (norms and information). In the more extensive BI group students got three additional screens including more depth information from alcohol.	In extensive group students were more ready to change (women) and seek help (men). After one month 33% women and 15% of men with unhealthy drinking at baseline had no longer unhealthy alcohol use. There was no difference between the two groups.	Self-reported data, half of the students answers couldn't be linked between assessments.	Web-based screening and brief intervention program shows promise for addressing unhealthy alcohol use by college students.

<p>Walters, Vader, Harris 2007²⁰ Large RCT USA</p>	<p>To test the efficacy of the electronic Check-Up to Go (e-CHUG) a commercially available Internet program at reducing drinking of at risk college freshmen.</p>	<p>106 college freshmen in Texas, USA, who reported heavy drinking were randomly assigned to receive feedback or to assessment only.</p>	<p>After providing consent, participants received an email directing them to a secure web-site. After baseline assessment, the feedback group received a personalized report which was displayed immediately on the screen. At 8 weeks and 16 weeks they were sent an email prompting them to complete a follow up assessment (two reminders). Control group got feedback after 16 weeks assessment.</p>	<p>At 8 weeks the feedback group showed significant decrease in weekly drinking, but by 16 weeks the control group also declined to a point where there was no difference between groups. An additional 245 abstainers and light drinkers who were also randomized didn't show any intervention effect.</p>	<p>Convenience sample with relatively short follow up period.</p>	<p>The study shows preliminary support for the efficacy of this intervention at reducing short term drinking among at-risk students.</p>
<p>Weitzel JA, et al. 2007²¹ Small RCT USA</p>	<p>To investigate the feasibility and short-term outcomes of a tailored intervention, delivered by text messages to wireless computers.</p>	<p>40 college students in a southeast US university were randomly assigned to two groups. Students have to drink more than once during a week, were 18 years or older, and be a U.S. citizen.</p>	<p>In the control group, they answered questions daily about their drinking behavior to wireless handheld computers. In the treatment group they also got individualized messages to their units. The messages addressed consequences of alcohol use and were tailored to respondents' reported behavior, self-efficacy, and outcome expectancies related to alcohol related consequences.</p>	<p>All treatment group students got messages and most of them got them 12-14 days. Treatment group reported drinking significantly fewer drinks per drinking day than persons in the control group. In follow up, treatment group had lower expectations that they would get in trouble due to alcohol than did controls. Researchers got both positive and negative feedback from the messages.</p>	<p>Sample size was small and the data was primarily self-reported. The study period was only 2 weeks and the intervention dose was relatively small.</p>	<p>Tailored messages to wireless handheld computers had positive but small effect to alcohol related attitudes and behavior.</p>

b) Internet applications in gambling addiction/problems

First author and study design	Objectives	Setting and subjects	Approach	Results /Conclusion	Limitations	Implications for decision making
Carlbring 2008 ⁵¹ Small RCT Sweden	To lower the barriers for help seeking of pathological gamblers by offering an online therapy alternative.	Sixty-six pathological gamblers who lived in Sweden, were at least 18 years old, and had no severe depression were randomized to a wait-list or 8-week Internet-based cognitive behaviour therapy (CBT).	The CBT therapy was divided into eight modules and was adapted for the Internet. The first four modules were based mainly from motivational interviews and the last four were based on the CBT. Each module included information and exercises and ended with three to eight essay-style questions. They posted at least one message to online discussion group in a module. Feedback to assignments was given by email in 24 hours. A therapist made a phone (15 minutes) call once a week for 8 weeks.	The Internet intervention had favorable changes in pathological gambling, anxiety, depression, and quality of life. Composite between-group effect size at post-treatment was 0.83. The 6-, 18-, and 36-months follow ups indicated that the effect sizes were maintained over time. Study shows that the Internet application is effective for pathological gamblers.	All the diagnostic interviews were done by telephone so the diagnosis may be somewhat compromised. The study didn't have a comparison treatment (compared to wait-list).	Study indicates that internet can be used for pathological gamblers to deliver CBT type of treatment. It is not known if more severely depressed individuals would benefit from this treatment.

c) Internet applications in drug addiction/problems

First author and study design	Objectives	Setting and subjects	Approach	Results /Conclusion	Limitations	Implications for decision making
King et al. 2009 ⁵² Small RCT USA	To assess the effectiveness of an Internet-based videoconferencing platform for delivering intensified drug abuse counseling.	Patients from the Baltimore area, US, testing positive for illicit substance (n=37) were randomly assigned to e-Getgoing or onsite group counseling and follow up for 6 weeks. Patients were enrolled between February 2006 and February 2007.	Patients in the methadone maintenance clinic had one individual and two group sessions/week and urine testing weekly. In videoconferencing group (n=20) patients used Internet-based system to connect. The same manual-guided relapse control counseling condition was used in both groups.	Patients in both groups responded favourably to treatment and achieved at least 2 consecutive weeks of abstinence and 100% attendance to return to less-intensive care. Both groups were satisfied with the treatment. Internet group expressed preference to Internet-service.	Study sample was small and utilized only one fixed-site patients. Also, the follow-up was only 6 weeks.	Integrating Internet-based group counseling with on-site treatment services could help expand the continuum of care in methadone maintenance clinics.

d) Internet applications in smoking addiction/problems

First author and study design	Objectives	Setting and subjects	Approach	Results /Conclusion	Limitations	Implications for decision making
An et al. 2008 ³⁰ Large RCT USA	To determine the efficacy of providing online cessation intervention for college smokers.	Five hundred seventten college smokers at the University of Minnesota were enrolled via Internet health screening (control=260, intervention=257) in Fall 2004.	The intervention groups received \$10 weekly incentives to visit an online college life magazine that provided personalized smoking cessation messages and peer email support. Evaluation assessments occurred at baseline and 8, 20, and 30 weeks after enrollment. The outcome is self-reported 30-day abstinence at week 30. Carbon monoxide (CO) breath testing was performed for participants reporting 30-day abstinence at week 30.	Intervention participants completed an average of 18.9 (SD 2.5) of 20 weekly website visits. The rate of 30-day abstinence at week 30 was significantly higher for the intervention compared to the control group. CO testing showed low rates of under-reporting. There was no difference in self-reported 6-month prolonged abstinence at week 30.	Not preventing nor quantifying the degree of contamination. Not ascertaining the relative contribution of each component of intervention. CO testing is insensitive measure of occasional smoking. Using a high level of incentives to encourage adherence. The study population is homogeneous.	Providing an online multi-component smoking cessation intervention with financial incentives to participate is feasible and increases short-term abstinence rates among college smokers. Yet more innovation work is needed to improve long-term quit rates and to determine efficacy in the context of lower cost incentives or in higher risk groups of young adults, such as those not attending college.

<p>Brendryen and Kraft 2008³⁴ Large RCT Norway</p>	<p>To assess the long-term efficacy of a fully automated digital multi-media smoking cessation intervention.</p>	<p>World wide web study based in Norway. Three hundred ninety-six subjects who were 18 years or older willing to quit smoking were recruited via Internet advertisement.</p>	<p>Two arm RCT. The treatment group received the Internet- and cell-phone-based Happy Ending (HE) intervention. The intervention program lasted 54 weeks and consisted of more than 400 contacts by email, web-pages, interactive voice response, and short message service technology. The control group received a self-help booklet. Both groups were offered free nicotine replacement therapy. Abstinence was defined as "not even a puff of smoke for the last 7 days", and assessed by Internet surveys or telephone interviews. The outcome was repeated point abstinence at 1, 3, 6 and 12 months following cessation.</p>	<p>Treatment group reported clinically and statistically significantly higher repeated point abstinence rates than the control. Improved adherence to free nicotine replacement therapy and a higher level of post-cessation self-efficacy were observed in the treatment group compared with the control.</p>	<p>Generalizability is a main concern of this trial due to recruitment by self-selection. In addition, free nicotine replacement therapy being a part of recruitment inducement may have influenced the representativeness of the sample.</p>	<p>This study adds to the promise of digital media in supporting behaviour change.</p>
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<p>Brendryen et al. 2008³⁷ Large RCT Norway</p>	<p>To describe the rationale for the design of Happy Ending (HE), to assess 12-month efficacy of HE in a sample of smokers willing to quit without the use of free nicotine replacement therapy and to explore the potential effect of HE on coping planning and self-efficacy (prior to quitting) and whether coping planning and self-efficacy mediate treatment effect.</p>	<p>World wide web study based in Norway. Two hundred ninety subjects who were 18 years or older willing to quit smoking without the use of free nicotine replacement therapy were recruited via Internet advertisement.</p>	<p>Two arm RCT. One hundred forty-four participants in intervention group received HE (see above). One hundred forty-six controls received a 44-page self-help booklet. Abstinence was defined as "not even a puff of smoke for the last 7 days" and was assessed by Internet surveys or telephone interviews 1, 3, 6 and 12 months post-cessation. The main outcomes were repeated point abstinence. Coping planning and self-efficacy were measured at baseline and at the end of the preparation phase.</p>	<p>Treatment group reported clinically and statistically significantly higher repeated point abstinence rates than the control. Higher levels of coping planning and pre-cessation self-efficacy were observed in the treatment group.</p>	<p>This trial overcomes the representative problem due to inducement of the free nicotine replacement therapy in the previous trial, but not generalization problem due to recruitment by self-selection. This trial could not bio-chemically verify self-reported claims of abstinence.</p>	<p>This trial documents a long-term treatment effect of a fully automated smoking cessation intervention without the use of free nicotine replacement therapy adding to the promise of digital media in supporting behaviour change</p>
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<p>Cobb et al. 2005⁹⁸ Cross-sectional survey USA</p>	<p>To report results, challenges, and limitations of a preliminary, large-scale evaluation of a broadly disseminated smoking cessation website (QuitNet).</p>	<p>Web-based survey of consecutive registrants of QuitNet smoking cessation system during a 14-day window 90-days prior to follow up survey. QuitNet was free for study participants. Two e-mail reminders were sent to participants offering \$20 and \$40 incentives.</p>	<p>Consecutive registrants (N=1501) were surveyed 3 months after they registered on the website to assess 7-day point prevalence abstinence. 30% of those surveyed who indicated that they had already quit smoking at registration were excluded. The QuitNet includes: 1) diagnostic tool, 2) social support available 24/7/365 from peers and experts, and 3) recommendations and support for USFDA – approved pharmacotherapy.</p>	<p>An intention-to-treat analysis yielded 7% point prevalence abstinence (for the responders only, abstinence was 30%). A range of plausible cessation outcomes (9.8%-13.1%) among various subgroups illustrates the strengths and limitations of conducting web-based evaluation, and the tension between clinical and dissemination research methods. Process-to-outcome analyses indicated that the use of social support, was associated with more than three times greater point prevalence abstinence and more than four times greater continuous abstinence.</p>	<p>Threats to both internal and external validity are:</p> <ul style="list-style-type: none"> - Low response rate (25.6%). - Short follow-up period. - Lack of randomization to a comparison condition. 	<p>Despite its limitations, the study provides useful information about the potential efficacy, challenging design and methodological issues, process-to-outcome mechanisms of action, and potential public health impact of Internet-based behaviour change programs for smoking cessation.</p>
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<p>Etter and Norman 2005³⁸ Large RCT Switzerland</p>	<p>To compare the efficacy of two Internet-based, computer-tailored smoking cessation programs.</p>	<p>Web-based smoking cessation program users. 11969 current (74%) and former (24%) smokers answered the baseline questionnaire, and 4237 (35%) participated in the follow-up survey.</p>	<p>Visitors to a smoking cessation website were randomly assigned to either an original online, interactive smoking cessation program or to a modified program. Both programs consisted of tailored, personalized counseling letters, followed by monthly email reminders. The original program was based on psychological and addiction theory. The modified program was shorter and contained more information on nicotine replacement therapy and nicotine dependence and less information on health risk and coping strategies. Participants were invited by email to answer the same tailored questionnaire, 1 and 2 months after entering the study, in order to receive a second counseling letter.</p>	<p>In an intention-to-treat analysis, abstinence rates in baseline current smokers were respectively 10.9% and 8.9% (OR=1.24, 95%CI: 1.08-1.43) in the original and modified programs and 25.2% and 15.7% (OR=1.81, 95%CI: 1.51-2.16) in baseline former smokers. There were statistically significant differences in quitting rates in smokers in the contemplation stage favoring the original program, but not in the pre-contemplation and preparation stages of change.</p>	<p>More non-respondents in the modified than in the original program could produce an artificial advantage for the original program in intention-to-treat analyses where non-respondents are counted as smokers. Not including a non-treatment group. Study measured point prevalence of abstinence after 2.5 months, not long-term continuous abstinence rates. No bio-chemical verification of smoking status.</p>	<p>In smokers in the contemplation stage of change and in former smokers, the original program produced higher smoking abstinence rates than the modified program.</p>
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<p>Japuntich et al. 2006⁴⁶ Large RCT USA</p>	<p>To gauge efficacy of an Internet-based smoking cessation intervention.</p>	<p>Participants were 284 smokers, including 134 from Milwaukee and 150 from Madison research centers, Wisconsin, US.</p>	<p>Two-arm RCT with 140 in the treatment and 144 in the control group. The control received bupropion plus counseling alone. The treatment received bupropion and counseling in addition to 12 weeks of access to the Comprehensive Health Enhancement Support System for Smoking Cessation and Relapse Prevention (CHES SCRCP, a website providing information on smoking cessation and support). There were incentives for participants.</p>	<p>Access to CHES SCRCP was not significantly related to abstinence at the end of treatment or at 6-month postquit, but the number of times participants used CHES SCRCP per week was related to abstinence at both end of treatment and at 6-month follow-up.</p>	<p>Study used the research centers, formal participant recruitment, an intensive adjuvant treatment and an intensive way of subject contact. These limit generalizability and produce ceiling effect in abstinence rates</p>	<p>Participants used CHES SCRCP frequently, CHES SCRCP use was related to success, but the effects in general did not yield intergroup effects. This demonstrates a need for more rigorous investigation into the area of Internet intervention for smoking cessation</p>
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<p>Klatt et al. 2008³¹ Large RCT USA</p>	<p>To examine the relationship between peer email support and cessation outcomes among intervention participants.</p>	<p>University of Minnesota Twin Cities from Fall 2004-Spring 2005. Respondents eligible for this study if they >=18 years, smoked cigarettes in the past 30 days, and intended to be in school for the next two semesters.</p>	<p>A random sample of undergraduates was invited to screen themselves via Internet. Smokers were randomized to Control group (access to Quitnet n=260) and Intervention: (n=257) a web-site (RealU) where students were asked to have 20 weekly visits. E-pals wrote weekly emails to RealU students encouraging healthy behaviors including smoking abstinence. The number of email replies sent by the participants to their E-pal was tracked as a measure of email engagement. The outcome was self-reported 30-day abstinence at the end of intervention period.</p>	<p>Email engagement was a significant predictor of 30-day abstinence. Greater peer engagement via email was associated with increased smoking abstinence and reduced frequency of smoking.</p>	<p>The observed association between email engagement and abstinence may be confounded by greater overall engagement with all components of the online intervention. Limited generalizability to student population. Substantial financial incentives for participants to visit the website</p>	<p>Online peer support may be an important strategy when delivering Internet-assisted cessation programs to young adults.</p>
<p>Lenert et al. 2004⁴⁴ Two consecutive series of individuals USA</p>	<p>To determine whether an automated email messaging system that sent individually timed educational messages (ITEMs) increased the effectiveness of an Internet-based smoking cessation intervention.</p>	<p>Based on email and web technology. Studied subjects were participants of two web-based self-help style smoking cessation interventions.</p>	<p>The authors compared the outcomes in 199 participants of a single-point-in-time educational intervention and 286 participants of an enhanced intervention that also sent ITEMs timed to participants' quit efforts. The outcomes were 24-hour quit attempts and 7-day point-prevalence of abstinence measured 30 days after each subject's self-selected quit date.</p>	<p>ITEMs increased the rate at which individuals set quit dates, and the rate of reported 24-hour quit efforts among the respondents to follow-up questionnaires. The 30-day intent-to-treat quit rates were higher in the ITEMs group. Receiving ITEMs was associated with an increase in the odds ratio for quitting of 2.6 (95%CI: 1.3-5.3).</p>	<p>The ITEMs intervention included a journal and an online tracker for cigarette use in addition to the reinforcing email messages. These components could also have contributed to the observed results.</p>	<p>ITEMs sent on strategic days in smokers' quit efforts enhanced early success with smoking cessation relative to a single-point-in-time Web intervention. The effect appears to be mediated by ITEMs' causing smokers to plan and undertake quit efforts more frequently.</p>

McKay et al. 2008 ⁴⁷ Large RCT USA	To assess effectiveness of a web-based smoking cessation program (Quit Smoking Network; QSN) comparing it to Web-based exercise enhancement program (with some smoking information).	Web-based advertisement campaign for individuals who searched "quit/stop smoking" in Internet and who gave their consent and answered the initial assessment questions.	Two-arm RCT: 2318 participants recruited online were randomly assigned to either QSN or a web-based exercise enhancement program (Active Lives). Outcome (smoking abstinence) was measured at 3 and 6 months after the start of intervention.	No between-condition differences in smoking abstinence were found at 3- and 6-month follow-up assessment between Internet intervention and intended control group. Participants were not as engaged as expected to Internet program.	A high participant attrition rate of 55.6%.	Engagement of participants and simplifying program content and architecture are important for online smoking cessation programs.
Mermelstein et al. 2006 ³² Large cluster RCT USA	To evaluate the effectiveness of enhancing the American Lung Association's Not on Tobacco program (NOT) with a Web site adjunct (NOT Plus)	Twenty-nine high schools in Illinois, Chicago, US. Smoking students were volunteers and got information from the program from different types of advertisements and referrals. 53.8% of them were female and their age ranged from 14 to 19 years.	Cluster randomized two-arm trial with 29 schools randomly assigned to condition: standard NOT (a 10 session group-based program), or NOT Plus, which included access to a specially designed website for teens, along with proactive phone calls from the group facilitators. Self reported smoking behavior was obtained at end-of-program and at a 3-month follow-up.	There was a marginally significant condition effect at end-of-treatment and a significant effect at 3-month follow-up favoring the NOT Plus. Among NOT Plus condition, use of the website was associated with cessation significantly at end-of-program. Adolescents in urban schools visited website more frequently than rural schools.	Completion rate=65%. Data collection methods were restricted to paper and pencil questionnaires, with mail-in returns, thus limiting ability to access youth in a variety of ways. Biochemical verification was available only at the end of treatment.	This trial found encouraging support for the benefits of adding a web-based adjunct to a face-to-face group smoking cessation program for adolescents.

<p>Munoz et al. 2006³⁹ Series of four Internet studies USA</p>	<p>Report a series of four Internet smoking cessation studies examining both outcome (self-reported 7-day abstinence) and mechanisms related to outcome (the impact of major depressive episodes on the likelihood of quitting).</p>	<p>Web-based. Over 4000 smokers from 74 countries who used smoking cessation web-sites one in English and one in Spanish (between April 2000 and September 2003).</p>	<p>Review of four studies. Studies 1 and 2 evaluated a standard smoking cessation guide (the Guia). Studies 3 and 4 were randomized trials comparing the Guia+ITEMs (individually timed educational messages) to the Guia+ITEMs+a mood management course. ITEMs were emails inviting participants back to the site at specific times.</p>	<p>Incentives and follow-up phone calls increased the rates of completion. Self-reported 7-day abstinence rates were 6% in studies 1 and 2, 10-14% in study 3 and 20-26% in study 4. The Guia+ITEMs condition tended to have higher quit rates. RCTs involving international samples are feasible over the Internet.</p>	<p>Self-selected nature of the samples limits generalizability. Social desirability may influence self-reported data. Smoking abstinence was not verified biochemically. Results from four studies were not directly comparable.</p>	<p>The potential public health impact of providing evidence-based Internet interventions to such a large proportion of humanity deserves concerted efforts by international health agencies.</p>
<p>Patten et al. 2006³⁹ Large RCT USA</p>	<p>To evaluate a novel Internet-based delivery method of the adolescent smoking treatment.</p>	<p>Participants were recruited from communities at three geographically and ethnically diverse sites: Rochester, Minnesota; Madison, Wisconsin; Hartford, Connecticut.</p>	<p>Adolescent smokers 11-18 years were randomized to a clinic-based, brief office intervention (BOI; n=69) consisting of four individual counseling sessions; or to Stomp Out Smokes (SOS), an Internet, home-based intervention (n=70), consisting of 24 week access to the SOS site.</p>	<p>This RCT was not able to tap the potential capabilities of the Internet versus a health care model for adolescent smoking cessation. A clinic-based BOI is feasible for adolescent smoking cessation; further studies are needed to test its efficacy.</p>	<p>Lack of a standard control condition. Relatively small sample size. Not considering frequent use of Internet of participants.</p>	<p>Augmenting the SOS type of intervention with more structure, personal and proactive patient-education components delivered in-person or by telephone or email is recommended.</p>

<p>Pike et al. 2007⁷ Large RCT USA</p>	<p>To test a hypothesis that clients randomized to interactive sites would have significantly higher quit rates than those randomized to a static site.</p>	<p>Internet-based smoking visitors to the American Cancer Society's Internet site. Participation was limited to English-speaking, daily smokers in the United States.</p>	<p>6451 eligible smokers were randomized to receive access either to a static Internet site with quitting advice or to one of five interactive sites: Center for Addiction and Mental Health, Oregon Center for applied science, QuitNet, ProChange, and SmokeClinic. 3-month follow up survey was conducted via email or telephone to assess quitting success.</p>	<p>No significant overall difference in cessation rates among participants assigned to the interactive or the static sites. Large differences in the utilization of the five interactive sites. 3-month cessation rate was higher among participants assigned to the more highly utilized sites than among those assigned to the less utilized sites.</p>	<p>Low follow-up response rate: 54% of participants provided follow-up data. Smokers using interactive websites usually pay a fee and findings from this study, in which enrollment was at no cost to the participant, certainly can not be generalized to those who pay for access to such sites.</p>	<p>Interactive Internet sites yielding high levels of utilization can increase quitting success among smokers seeking assistance via the Internet.</p>
<p>Rabius et al 2008⁴⁰ Large RCT</p>	<p>To describe long-term smoking cessation rates associated with six different Internet-based cessation services and the variation among them, to test the hypothesis that interactive and tailored Internet services yield higher long-term quit rates than more static web-posted assistance, and to explore the level of site utilization and a self-reported indicator of depression on long-term cessation rates.</p>	<p>Web-based. In 2004-05 a link was placed on the American Cancer Society (ACS) website for smokers who wanted help in quitting via Internet. The link led smokers to the QuitLink study website, where they could answer eligibility questions, provide informed consent, and complete the baseline survey.</p>	<p>6451 enrolled participants were randomly assigned to receive emailed access to one of five tailored interactive sites provided by cooperating research partners or to a targeted, minimally interactive ACS site with text, photographs, and graphics providing stage-based quitting advice and peer modeling. Follow up survey was done 13 months after randomization yielded 2468 respondents (38%).</p>	<p>Participants reporting an indicator of depression at baseline had significantly lower 13-month quit rates than those who did not report the indicator. Among those who did not report an indicator of depression at baseline, the more interactive, tailored sites, as a whole, were associated with higher quitting rates than the less interactive ACS site.</p>	<p>Self reported data without verification. High attrition rate.</p>	<p>The findings show that Internet assistance is attractive and potentially cost-effective and suggest that tailored, interactive websites may help smokers who do not report an indicator of depression at baseline to quit and maintain cessation.</p>

<p>Stoddard et al. 2008⁴⁸ Large RCT USA</p>	<p>To determine the utilization of and satisfaction with two versions of a smoking cessation website (smokefree.gov) and to measure changes in smoking behaviour 3 months after enrollment in the study.</p>	<p>Federal employees or contractors >=18 years old and having a willingness to quit smoking in 30 days were included.</p>	<p>1375 participants were randomly assigned to either the asynchronous bulletin board (BB condition) or the publicly available version-usual care (UC). Both versions included: 1) online quit guide and 5 self-help materials, 2) link to reach one-on-one counselor, 3) interactive list of clinical trials seeking smokers, 4) interactive smokers risk tool, and 5) positive health outcomes after cessation. Study assessed the number of minutes of website use and satisfaction with each condition as well as changes in smoking behavior.</p>	<p>Quit rate for participants were similar to other web-assisted tobacco interventions, with the most favorable outcomes demonstrated by smokers ready to quit at the time of enrolling in the trial and smokers using pharmacotherapy. Utilization of the BB was lower than expected and did not have an impact on outcomes (quit rates).</p>	<p>Limit generalizability. The attrition rate was high. Can not rule out possible contamination between conditions. Used a very primitive measure of website use/utilization, which did not include more sophisticated methods available in the field.</p>	<p>Given the demand for credible online resources for smoking cessation, future studies should continue to evaluate use of and satisfaction with web features and to clarify results in terms of time since last cigarette as well as use of pharmacotherapy.</p>
<p>Strecher et al. 2008⁴¹ Large RCT USA</p>	<p>To identify active psychosocial and communication components of a web-based smoking cessation intervention and to examine the impact of increasing the tailoring depth on smoking cessation.</p>	<p>1866 smokers aged 21 to 70 years in two HMOs: Group Health in Washington State and Henry Ford Health System in Michigan, USA. They also needed Internet and email connection. Recruitment was between September 2004 and July 2005.</p>	<p>Randomized fractional factorial design. Intervention was a web-based smoking cessation program based on cognitive behavioral method, plus nicotine patch. Five components of the intervention were randomized using a fractional factorial design: high- versus low-depth tailored success story, outcome expectation, and efficacy expectation messages; high- versus low-personalized source; and multiple versus single exposure to the intervention components. Primary outcome was 7-day point prevalence abstinence at the 6-month follow-up.</p>	<p>Abstinence was most influenced by high-depth tailored success stories and a high-personalized message source. The cumulative assignment of the three tailoring depth factors also resulted in increasing the rates of 6-month cessation, demonstrating an effect of tailoring depth.</p>		<p>Relevant components of smoking cessation intervention that should be generalizable to other cessation interventions. The importance of higher-depth tailoring in smoking cessation programs. The use of a novel fractional factorial design was efficient.</p>

<p>Strecher et al. 2005, 2006^{35,36} Large RCT USA</p>	<p>2005: To assess the efficacy of web-based tailored behavioral smoking cessation materials among nicotine patch users. 2006: To examine moderating and mediating factors of the efficacy of web-based tailored behavioral smoking cessation materials.</p>	<p>3971 subjects who purchased a particular brand of nicotine patch and logged on to use a free web-based behavioral support program in England and the Republic of Ireland.</p>	<p>Design: two-group randomized controlled trial. Intervention was web-based tailored behavioral smoking cessation materials or web-based non-tailored materials. Outcomes: 28-day continuous abstinence rates were assessed by Internet-based survey at 6-week follow-up and 10-week continuous abstinence rate was assessed by Internet-based survey at 12-week follow-up.</p>	<p>Participants in the tailored condition reported clinically and statistically significantly higher continuous abstinence rates and satisfaction with the program than those in the non-tailored condition. Significant moderators, indicating a significant difference in program efficacy between subgroups, included presence of tobacco-related illness, presence of non-smoking children in the household, and frequent alcohol consumption. Perceived program relevance at 6-week follow-up was a mediator of cessation at 12-week follow-up.</p>	<p>Could not verify abstinence biochemically. Relatively short follow-up periods.</p>	<p>Web-based tailored behavioral support materials used in conjunction with nicotine replacement therapy is beneficial. A web-based program tailored program had significant advantages over a web-based non-tailored one. Moderating variables may be useful to address in tailored messaging. The mediating factor of message may provide partial mechanism of effective program tailoring.</p>
<p>Swartz et al. 2006⁴² Large RCT USA</p>	<p>To test the short term (90 days) efficacy of an automated behavioral intervention for smoking cessation, the "1-2-3 Smokefree" program, delivered via an Internet website.</p>	<p>Internet-based. 351 qualified subjects (>=18 years old smokers and interested in quitting smoking in next 30 days) were notified of the study via their worksite and required to have Internet access.</p>	<p>Subjects were randomly assigned to treatment or control condition. The intervention consisted of a video based Internet site that presented current strategies for smoking cessation and motivational materials tailored to the user's race/ethnicity, sex and age. Control subjects received nothing for 90 days and were then allowed access to the program. The primary outcome was abstinence from smoking at 90 day follow up.</p>	<p>At the follow up, the cessation rate at 90 days was 24.1% for the treatment group and 8.2% for the control group (p=0.002). Using an intend-to-treat model, 12.3% of the treatment group were abstinent compared to 5.0% in the control group (p=0.015).</p>	<p>Self-reported data and smoking status was not biochemically confirmed. High attrition rate. Need a longer follow up to determine the long-term impact.</p>	<p>These evaluation results suggest that a smoking cessation program with at least short term efficacy can be successfully delivered via Internet.</p>

<p>Woodruff et al 2007³³ Large cluster RCT</p>	<p>To test an innovative approach to smoking cessation that might be particularly attractive to adolescent smokers.</p>	<p>Participants were adolescent smokers recruited from high schools in San Diego County from 2002-2004.</p>	<p>136 adolescent smokers were randomized to the intervention or control condition. The intervention used an Internet-based, virtual reality world combined with motivational interviewing conducted in real-time by a smoking cessation counselor. Participants were surveyed at baseline, post-intervention, 3-month and 12-month post-intervention</p>	<p>At the immediate post-intervention, the intervention group reported significantly more than the controls that they had abstained from smoking during the past week, smoked fewer days and fewer cigarettes in the past week, and considered themselves a former smoker. Only the number of times quit was significantly higher at one year follow up assessment in intervention group.</p>	<p>The attrition rate differed by condition. Differential recruitment strategies that resulted in non-equivalent groups at baseline. No objective validation of smoking/quitting.</p>	<p>Real-time Internet communication may be an appealing and effective approach to help young smokers quit or reduce smoking in the short term, but additional support is probably needed for longer-term success.</p>
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Table B.2: Clinical and economic studies in computer-based applications by type of addiction (includes CD-Rom applications but excludes primarily Internet (online) applications).

a) Computer applications in alcohol addiction

First author and study design	Objectives	Setting and subjects	Approach	Results/Conclusion	Limitations	Implications for decision making
Barnett et al. 2007 ⁵³ Large RCT USA	To evaluate the efficacy of two brief interventions and the inclusion of a 1-month booster session among college students.	225 college students who were referred to attend alcohol education following an alcohol-related incident.	Participants were randomly assigned to receive one session of a Brief Motivational Interview (BMI) or computer-delivered intervention (CDI) with the Alcohol 101 CD-ROM. Participants were also randomly assigned to booster/no-booster.	At 3 months BMI group reported greater help seeking and use of behavioral strategies to moderate drinking. At 12 months BMI group was drinking more frequently and CDI participants were consuming a greater number of drinks per occasion than in baseline. Booster didn't have any effect to outcomes.	No non-intervention group in the study. Sample had high number of freshmen and the primary incident may have biased the baseline measurement.	In-person brief interventions may be a promising approach to reduce drinking volume among identified at-risk students.
Hester et al. 2005 ⁶¹ Small RCT USA	To study the effectiveness of a computer based brief motivational intervention, the Drinker's Check-up (DCU) as a stand alone intervention for problem drinkers.	Participants were recruited through media ads drawing from southwestern metropolitan population in New Mexico, US.	After screening the alcohol problems (AUDIT) and given the consent, 61 persons started the study. Thirty-five were randomized to the immediate group and 26 to the delayed treatment group. The DCU assess the client and makes a Brief Drinker's Profile (BDP). The program also includes feedback (based on norms) and decision making modules.	Outcomes strongly support the experimental hypothesis and long-term effectiveness of the treatment. Overall, the participants reduced the quantity and frequency of drinking by 50% and had similar reductions in alcohol-related problems that were sustained through 12-months follow-up.	12-month follow-up rate was 82%. The population was not seeking treatment at the baseline. DCU was not directly compared to other (face-to-face) BMIs.	The DCU seems to be effective in enhancing problem drinkers' motivation for change.

<p>Kay-Lambkin et al. 2009⁶² Small RCT Australia</p>	<p>To evaluate computer-versus therapist-delivered psychological treatment for people with comorbid depression and alcohol/cannabis use problem.</p>	<p>Community based participants in New South Wales, Australia. Ninety-two people with comorbid depression and substance abuse problems received brief intervention (BI) and were then randomized to no additional BI or additional therapy.</p>	<p>After BI participants were randomized to no further treatment (BI alone); or nine sessions of motivational interviewing and cognitive behavior therapy (intensive MI/CBT). The intensive MI/CBT patients were randomly allocated to receive live (psychologist) or via a computer-based program (brief weekly psychologist input).</p>	<p>For depression, live intensive MI/CBT was the best. For alcohol, response to BI alone was good but even better to intensive MI/CBT. Intensive MI/CBT was significantly better than BI alone in reducing cannabis use and hazardous substance use, with computer-based treatment showing the largest treatment effect.</p>	<p>The replicability of the study is difficult due to complicated depression and substance abuse problem population.</p>	<p>12 month outcomes for depression and substance abuse are mainly as good for computer based program than in face-to-face. For Alcohol BI alone is efficacious.</p>
<p>Lewis, et al. 2007⁵⁴ Large RCT See also: Neighbors et al. 2004⁵⁵ and Neighbors et al. 2006⁵⁶ USA</p>	<p>To evaluate the efficacy of a computer-delivered personalized normative feedback (PNF) in reducing alcohol consumption among high-risk drinking college freshmen.</p>	<p>Freshmen in a first-year orientation course in a midsized Midwest university (US). Screening survey was completed by 891 (46.9%) of all incoming freshmen. From them, 437 (48.9%) met the screening criteria and 316 (53.8% female) were successfully recruited.</p>	<p>After baseline assessment students were assigned randomly to either freshmen-specific PNF that was gender specific or not, or to assessment only as a control. Study included baseline/intervention, 3- and 5 month follow-ups. Students got \$50 from each assessment. After assessment PNF groups got the specific feedback on the computer to read and then it was given to them as print out.</p>	<p>Findings demonstrated that students had normative misperceptions for typical; freshmen drinking behavior and that perceptions of typical same-sex freshmen drinking were positively associated with riskier drinking behavior. At follow-up, PNF group reduced perceptions of typical freshmen drinking behavior and personal drinking behavior relative to those who didn't get the PNF.</p>	<p>The study included all students who had measured in BAC test 0.26 or higher in previous month, regardless of the PNF condition. Also, all drinking measures were self-reported.</p>	<p>Findings of these three studies suggest that computer-based PNF for incoming freshmen utilizing specific freshmen norms that are gender specific may constitute a promising prevention strategy.</p>

<p>Neumann et al. 2006⁶⁰ Large RCT Germany</p>	<p>To test if computer technology can be used to screen and provide an intervention that reduces at-risk drinking in injured Emergency Department (ED) patients.</p>	<p>In all, 3026 sub-critically injured patients admitted to an ED were screened for an Alcohol Use Disorder (AUD) using a laptop computer that administered AUD Identification Test (AUDIT).</p>	<p>Patients with positive AUDIT (1139) were randomized to an intervention (n=563) or control (n=576) group. The computer generated a customized print-out based on patient's own alcohol use pattern, level of motivation, and personal factors, which was provided in the form of feedback and advice.</p>	<p>85% of patients used the computer with minimal assistance. At the beginning, a similar proportion of people met the criteria of at-risk drinking. At 6 months 21.7% in intervention group and 30.4% in control group were at-risk drinking level (p=0.008). Intervention group reduced their alcohol intake by 35.7% while control group decreased 20.5% (p=0.006). At 12 months alcohol intake was still lower in intervention group (p=0.023).</p>	<p>A significant number of patients were excluded from the study due to physical or psychological impairment, including concurrent severe intoxication. Results may not be applicable to all injured patients in the ED.</p>	<p>Computer-generated intervention was associated with a significant decrease in alcohol use and at-risk drinking. Further research is need for computer-assisted technologies to provide prevention in the ED.</p>
<p>Schinke et al. 2004⁵⁷ and Schinke et al. 2005⁵⁸ Large RCT USA</p>	<p>To test a CD-ROM intervention with and without a parent involvement component to reduce risk of alcohol use among an urban sample of early adolescents.</p>	<p>Youths (N=514, mean age 11.5 years) were assigned randomly by community site to receive the CD-ROM intervention, CD-ROM intervention plus parent intervention, or no intervention.</p>	<p>CD-ROM group completed a 10 sessions, each 45-minutes long, prevention program. The method grounded in social learning and problem behavior theories and included different kind of skills avoiding alcohol. Booster sessions (each 30 min) reinforced previously covered subject matters and introduced new areas where problem-solving can be used.</p>	<p>Over time alcohol use increased in all groups. In 3-year follow-up alcohol use was lower in CD-ROM plus parent group compared to CD-ROM alone and again lower than in control group. Intervention groups had also lower cigarette smoking and marijuana use rates. In high-risk youth group there were no differences between intervention groups and pre/post tests.</p>	<p>Participants were pretty young and thus didn't use much alcohol. Study based on self-reported alcohol utilization. Randomization was done by sites.</p>	<p>CD-ROM interventions can be used in alcohol use prevention programs as a medium to engage high-risk youths, and it may reduce alcohol use risks among urban early adolescents.</p>

<p>Schinke et al. 2009⁵⁹ Large RCT USA</p>	<p>To evaluate a gender-specific, computer-mediated intervention to prevent underage drinking among early adolescent girls.</p>	<p>Study participants were 202 pairs of adolescent girls (mean age 12.2; SD 0.95) and their mothers (mean age 41.07 (SD=6.8) years from new York, New Jersey, and Connecticut who responded to adds.</p>	<p>Stratified by age and ethnicity, the girls were randomly assigned to control and study arms. Intervention arm participants interacted with 14-module underage drinking-prevention program. Program was on CD-Rom and it was also available online. The pairs completed four to five modules per week at home and received email reminders twice weekly. Post program test was done at the end and 2 months after the program.</p>	<p>Two months after the program, girls and mothers in the intervention arm had improved their mother-daughter communication skills and other perceptions and normative beliefs for underage alcohol use. Girls reported improved self-efficacy not to drink and reported less alcohol consumption compared to control arm.</p>	<p>Although the internal validity is good due to randomization, the external validity is not that good since not all girl-mother pairs have computer available at home. Sample was relatively small and was based on self-reported data.</p>	<p>The study outcomes modestly support the viability of a mother-daughter, computer-mediated program to prevent underage drinking among girls.</p>
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b) Computer applications in illicit drug addiction

First author and study design	Objectives	Setting and subjects	Approach	Results /Conclusion	Limitations	Implications for decision making
Bischof et al. 2008 ⁸⁴ Large RCT USA	To evaluate the efficacy of an interactive computer-based behavioral therapy intervention grounded in the community reinforcement approach (CRA) and voucher-based contingency management model of behavior therapy.	One hundred thirty-five volunteer adults who met DSM-IV criteria for opioid dependency. All participants had buprenorphine maintenance treatment and they were treated as outpatients in Univ. of Vermont clinic.	Patients were randomized to a) therapist-based CRA treatment with vouchers, b) computer-assisted CRA with voucher, or c) standard treatment. In the computer assisted group, over 80% of the therapy was delivered by interactive computer program. The therapy lasted for 23 weeks. The continued abstinence resulted in maximum of \$1317 voucher earnings.	The therapist and computer assisted CRA plus voucher interventions produced comparable weeks of continuous opioid and cocaine abstinence and significantly greater weeks of abstinence than the standard intervention.	As a whole, these treatments are not very effective, which makes the assessment somewhat challenging.	The similar results of therapist and computer-assisted interventions may enable more widespread dissemination of the evidence-based CRA plus voucher intervention.
Carroll et al. 2008 ⁷⁸ and 2009 ⁷⁹ Small RCTs USA	To evaluate the efficacy of a computer-based version of cognitive-behavioral therapy (CBT) for substance dependence.	Seventy-seven individuals seeking treatment for substance dependence at an outpatient community setting who didn't have untreated psychotic disorder.	Patients were randomized to either standard treatment as usual (TAU) or TAU with 8 weeks of biweekly access to computer-based training for CBT (CBT4CBT). The computer program (six modules) was in a protected environment in the clinic. Modules included, for example, movies that showed how to cope with situations where drugs were offered.	The CBT group patients submitted significantly more urine specimens that were negative for any of the drugs and tended to have longer continuous periods of abstinence during treatment. Eighty-two percent of participants were reached in the 6-month follow-up. Patients in TAU group increased their drug use over time while the CBT4CBT group slightly improved.	The study didn't compare clinician and computer delivered CBT therapy. The time that patients used in computer was not monitored. Attrition of the study was 65%.	The computerized CBT therapy appears to have both short-term and long term effect on drug use.

<p>Gilbert et al. 2008⁸⁰ Group RCT study USA</p>	<p>To evaluate an interactive patient-tailored computer program developed in the US to improve clinic-based assessment and counseling for risky behaviors.</p>	<p>Between Dec 2003 and Sept 2006, a parallel group randomized controlled study at five San Francisco area outpatient HIV-clinic.</p>	<p>Upon completion of the risk assessment, the "Positive Choice" Program on laptop, immediately played the Video Doctor clips for participants randomized to computer group. Interactive risk reduction messages were based on Motivational Interviewing (MI) principles. Video clips were tailored to patient's gender, risk profile, and readiness to change. At the end of the session, the program printed Educational worksheets (patient) and Cueing sheets (for providers). Standard care group didn't have access to Video Doctor or program printed material.</p>	<p>Compared with the control group, the computer group reported fewer continuing use of illicit drugs at 3 (p=0.014) and 6 months (p<0.001) and unprotected sex. Intervention participants reported fewer mean days of ongoing illicit drug use (p= NS).</p>	<p>There may have been different exposure of sensitive behavior between groups.</p>	<p>The program achieved significant cessation of illicit drug use and unprotected sex at the group level.</p>
<p>Kay-Lambkin et al. 2009⁶² Small RCT Australia</p>	<p>To evaluate computer-versus therapist-delivered psychological treatment for people with co-morbid depression and alcohol/cannabis use problem.</p>	<p>Community based participants in New South Wales, Australia. Ninety-two people with co-morbid depression and substance abuse problems received brief intervention (BI) and were then randomized to no additional BI or additional therapy.</p>	<p>After, BI participants were randomized to no further treatment (BI alone), or nine sessions of motivational interviewing and cognitive behavior therapy (intensive MI/CBT). The intensive MI/CBT patients were randomly allocated to receive live (psychologist) or via a computer-based program (brief weekly psychologist input).</p>	<p>For depression, live intensive MI/CBT was the best. For alcohol, response to BI alone was good but even better to intensive MI/CBT. Intensive MI/CBT was significantly better than BI alone in reducing cannabis and hazardous substance use, with computer-based treatment showing the largest treatment effect.</p>	<p>The replicability of the study is difficult due to complicated depression and substance abuse problem population.</p>	<p>12 month outcomes for depression and substance abuse are mainly as good for computer based program than in face-to-face. For Alcohol BI alone is efficacious.</p>

<p>Williams et al. 2005⁷⁶ Large RCT USA</p>	<p>To examine the efficacy of a substance abuse-preventive intervention using CD-ROM technology among adolescents in the sixth and seventh grades (12-13-years).</p>	<p>12 to 13-year old children were randomized to group using CD-ROM programs that used interactive audio and video content. Two hundred thirty students whose parents gave consent to participate came from 23 middle schools.</p>	<p>The CD-ROM was based on the LifeSkills Training Program (LST), a state-of-the-art school-based drug abuse-prevention program. The program consists of 10 sessions and was designed for use in the home and in after-school setting. The content uses both interactive audio and video content. Comparison was made to delayed-intervention group.</p>	<p>There was a significant intervention effect on pro-drug attitudes, normative expectations for peer and adult substance abuse use, anxiety reduction skills, and relaxation skills knowledge.</p>	<p>The study participants and their parents were well motivated to this study. It is not known how this program works in less motivated groups.</p>	<p>Study shows that CD-ROM technology is efficacious in school-based prevention programs for substance abuse. More research is needed for delivery at school and home using CD-ROM.</p>
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c) Computer applications in smoking cessation applications

First author and study design	Objectives	Setting and subjects	Approach	Results /Conclusion	Limitations	Implications for decision making
Aveyard et al. 1999 and updated 2001 ^{64,65} Large Cluster RCT UK	To examine whether a year long program based on the trans-theoretical (stage of change) model of behavior change, incorporating three sessions using an expert system computer program and three class lessons, could reduce the prevalence of teenage smoking.	8352 students (smokers and non-smokers) in grade 9 (age 13-14 years) at 52 schools in the West Midland region, UK.	Cluster randomized trial comparing by incorporating three sessions using an expert system computer program and three class lessons to a control group exposed only to health education as part of the English national curriculum. Main outcome is prevalence of teenage smoking 12 months after the start of intervention. Updated: positive change in stage and smoking status 1 and 2 years after the start of intervention.	The intention-to-treat odds ratio for smoking in the intervention group relative to control was 1.08 (95%CI: 0.89-1.33). Updated: Adjusted OR (95%CI) for positive stage movement was 1.13 (0.91-1.41) at 1 year and 1.25 (0.95-1.64) at 2 years and for regular smoking was 1.14 (0.93-1.39) at 1 year and 1.06 (0.86-1.31) at 2 years.	It is difficult to control for all potential (unobservable) confounders due to heterogeneous-ness between clusters.	There is no evidence that the computerized expert system based on the trans-theoretical model is effective in smoking prevention and cessation among school children aged 13-14.
Aveyard et al. 2003 ⁶⁶ Large Cluster RCT UK (See above)	To examine whether disengagement from an adolescent smoking prevention and cessation intervention is an independent risk factor for regular smoking 1 and 2 years later	Data was from the trial above, but this article based on 7413 and 6782 pupils present at 1 and 2 years follow-ups, respectively.	The intervention group undertook three sessions using an interactive computer program. Pupils were classed as engaged if they thought the intervention was both useful and interesting. The outcome was regular smoking 1 and 2 years later.	For participants using the intervention three times but not engaged once, risk of regular smoking increased significantly both 1 and 2 years later. For those engaged three times, the risk did not significantly change. There was a significant interaction with baseline smoking status, with disengagement acting as a stronger risk factor among baseline never-smokers.	It's difficult to control for all potential confounders due to heterogeneous-ness between clusters	Disengagement from intervention is a risk factor for smoking independently of experimentation with cigarettes. Possibly, disengagement from school, an established risk factor for smoking, generalizes to disengagement from didactic school-based health promotion programs.

<p>Aveyard et al. 2005⁷¹ Large Cluster RCT UK</p>	<p>To examine if smoking cessation intervention in pregnancy could influence a woman's social behavior and her partner's smoking behavior.</p>	<p>16 out of 19 midwifery services (mainly in community setting) for West Midland, UK were recruited. Midwives recruited all women aged 16 years or older who were smoking at booking for maternity care. 42% (918 women) of the smokers were participated.</p>	<p>The midwives (thereby 918 women) were randomly allocated into three interventions: standard care, self-help manual and enhanced stage-based counseling, or self-help manual, enhanced stage-based counseling and use of an interactive computer program. The outcomes were change in social support received by women between booking for maternity care and 30 weeks gestation and 10 days postpartum and reported cessation in the woman's partner at these times.</p>	<p>Few pregnant woman's partner stopped smoking and the probability of quitting did not differ significantly by trial arm. Women's scores on the Inventory of Socially Supportive Behaviors showed a slight decline from booking to 30 weeks gestation, and a slight increase to 10 days postpartum, but these changes did not differ significantly by trial arm.</p>	<p>It's difficult to control for all potential confounders due to heterogeneity between clusters. Only 42% of women smoking at the booking participated.</p>	<p>The self-help and midwife intervention had a small beneficial effect on women's smoking but no benefit on either partner's smoking or on women's social functioning. More comprehensive interventions to address factors outside of the women's smoking, particularly target both partners in pregnancy might be the most effective.</p>
<p>Fritz et al. 2008⁶⁷ Quasi RCT USA</p>	<p>To evaluate a computerized intervention designated to assist high school aged smokers to consider not smoking and move forward in the "Stages of Change".</p>	<p>High school students who smoke in a large Midwestern metropolitan area, US.</p>	<p>A pretest-posttest pilot was conducted with 121 high school students who completed questionnaire baseline assessment. Following the baseline, the experimental group (n=61) completed four, 30-minute computerized sessions known as Computerized Adolescent Smoking Cessation Program (CASCP). Immediately following completion of the program and 1 month later, the experimental subjects were reassessed. Control subjects completed baseline assessment and were reassessed 4 to 5 weeks later.</p>	<p>CASCP increased the number of quit attempts. Twenty percent of the experimental group quit smoking at 1 month after the intervention. Of those subjects who did not quit smoking, nicotine dependence and the number of cigarettes smoked decreased daily. Overall, there was a forward movement in the experimental group's stage of change.</p>	<p>No biochemical verification of the self-reported data. Hawthorn effect. Only 1 month follow-up.</p>	<p>CASCP is an effective an inexpensive intervention that motivates adolescent smokers to consider smoking cessation, move forward in the stage of change, and decrease nicotine dependence.</p>

<p>O'Neill et al. 2000⁶⁸ Small RCT USA</p>	<p>To test a computer-administered intervention based on the stages of change model that presented young adults smokers with stage-matched information and activities designed to enhance their motivation to quit smoking.</p>	<p>Undergraduate smoking students in a Midwestern university.</p>	<p>Sixty-five participants were randomly assigned to either the experimental condition, which specifically targeted cigarette smoking, or to the control condition, which addressed other health behaviours. Both group completed a pretest assessment, three computer-administered interventions, a posttest assessment, and follow-up telephone contacts at 1, 3, and 7 months</p>	<p>The objective was achieved: almost half (48%) of the experimental group advanced in stage of readiness to quit smoking over the 6-week study, compared with only 21% of the control group. There was a non-significant trend for smokers in the experimental condition to report higher cessation rates than controls at both 1 and 3 month follow-ups. By the 7 month follow-up, ~30% of participants in both groups reported an abstinence from smoking.</p>	<p>Small sample size hampered ability to detect between group differences in smoking cessation. No objective verification of abstinence. Lack of non-treatment control condition makes it difficult to determine the extent to which positive outcomes are due to non-specific factors. Sample may not be representative of young adult smokers.</p>	<p>A brief computer-administered intervention based on the stages of change model may be an effective means of enhancing the stage of readiness to quit smoking among young adults. If further research with young adult smokers supports the value of this approach, it might be applied to other smoking populations or to other health behaviours.</p>
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<p>Prochaska et al. 2001⁷² Large RCT USA</p>	<p>To determine if enhancing the expert system by adding proactive telephone counseling or a stimulus control computer designed to produce nicotine fading could produce preventive programs with greater population impacts.</p>	<p>3967 smokers screened from 24,178 members of a managed care company clients were recruited.</p>	<p>A 4 (interventions) x 4 (occasions) (0, 6, 12 and 18 months) design was used. Of the 3967 smokers, 1447 were randomly assigned to one of four groups: (a) the interactive expert system intervention based on individualized computer feedback; (b) the expert system intervention plus counselor calls; (c) the expert system intervention plus the stimulus control computer; and (d) an assessment only (four times) condition.</p>	<p>At 18 months, the expert system resulted in 23.2% point prevalence abstinence, which was 33% higher than that of assessment only. The counselor enhancement produced increased cessation at 12 months but not at 18 months. The stimulus control computer produced no improvement to assessment only.</p>		<p>The enhanced conditions failed to out-perform the expert system alone. The study also demonstrated the ability of the interactive expert system to produce significantly greater cessation in a population of smokers than assessment only.</p>
<p>Prokhorov et al. 2008⁶⁹ Large group RCT USA</p>	<p>To examine the long-term impact of A Smoking Prevention Interactive Experience (ASPIRE), a theoretically sound computer-based smoking prevention and cessation curriculum for high school students.</p>	<p>Computer-based. Sixteen high schools in the greater Houston area, Texas, were randomly assigned to the two arms. 1098 non-smokers and 62 smokers at baseline were included.</p>	<p>ASPIRE was a 4-year, nested cohort, group-randomized, controlled trial designed to compare the effect of a CD-ROM-based smoking prevention and cessation intervention against the effect of a standard care intervention (receipt of the National Cancer Institute's Clearing the Air self-help booklet) among culturally diverse high-school students.</p>	<p>At an 18-month follow-up among baseline non-smokers, smoking initiation rates were significantly lower in the ASPIRE condition. Students receiving ASPIRE also demonstrated significantly higher decisional balance against smoking and decreased temptations to smoke. There was a non-significant trend toward improved smoking cessation with ASPIRE but low recruitment of smokers precluded conclusions with respect to cessation.</p>	<p>Small sample of smokers at baseline. Self-reported outcomes.</p>	<p>ASPIRE demonstrated the potential for an interactive multimedia program to promote smoking prevention. Further studies are required to determine ASPIRE's effects on cessation.</p>

<p>Prokhorov et al. 2008⁷⁰ Group RCT USA</p>	<p>To evaluate the impact of a computer-assisted, counselor-delivered smoking cessation program that addresses personal health risks and readiness to change smoking behavior among community college students.</p>	<p>Students who smoke at least one cigarette per day were recruited from 15 community college campuses located in or near Houston, Texas.</p>	<p>A group-RCT was used to assess the intervention in a sample of 426 students from 15 pair-matched campuses.</p>	<p>At the 10-month follow-up assessment, the cotinine-validated smoking cessation rates were 16.6% in the experimental condition and 10.1% in the standard care condition (p=0.07).</p>	<p>Relatively small sample size. At mid-point, one of the targeted campus had to be replaced with another.</p>	<p>The computer-assisted intervention holds considerable promise in reducing smoking among community college students.</p>
<p>Riley et al. 2002⁷³ Small RCT USA</p>	<p>To test the feasibility of two self-help behavioral interventions to reduce and maintain a 50% reduction in smoking among those unable or unwilling to quit, and to evaluate the impact of smoking reduction on subsequent quit attempts.</p>	<p>Television advertisements in the greater Washington, DC area for adult smokers who wanted to participate in a research program "designed to help people reduce their smoking" were used to recruit eligible subjects.</p>	<p>Ninety-three smokers who desired to reduce rather than quit smoking were randomly assigned to either computerized scheduled gradual reduction (CSGR) or to a manual-based selective elimination reduction (SER).</p>	<p>Both groups produced significant reductions in smoking, which were maintained over 1 year. The CSGR group reported greater mean percent reductions in smoking from pre- to post-treatment and a greater percentage of subjects meeting the 50% reduction goal compared to the SER group. Although subjects with a current desire for smoking cessation were excluded, one-third of subjects reported a 24-hour quit attempt in the year following study initiation and 8.6% met 7-day point-prevalence criteria for abstinence (CO validated) at the 12-month follow-up.</p>	<p>Not adequate power to fully evaluate the effect of smoking reduction interventions on subsequent quit attempts. Smoking rates were self-reported.</p>	<p>The results lend support to the feasibility of self-help behavioral interventions to produce sustained reductions in smoking rates without apparent negative impact on subsequent quit attempts.</p>

<p>Smith et al. 2007⁷⁴ Large RCT USA</p>	<p>To evaluate the incremental effectiveness and cost-effectiveness of a staged-based, computerized smoking cessation intervention relative to standard care in an urban managed care network of primary care physicians.</p>	<p>Primary care physician (PCS) practices in the four largest boroughs of New York City. Participants in the RCT included urban primary care physicians and their patients who were current smokers. Seventy PCPs (35 in each arm) and 10 smoking patients per PCP were studied.</p>	<p>Decision-analytic model based on results of a RCT. Effectiveness was measured in terms of 7-day point-prevalence abstinence at 6 months post-intervention. QALYs and cost-effectiveness (CE) were calculated with CE measured as cost per patient per life year saved and per QALY saved. CE was adjusted for partial behaviour change as measured in terms of progression in stage of readiness to quit.</p>	<p>Intervention patients were 1.77 times more likely to be smoke-free at 6 months follow-up than those in standard care (p=0.078). The intervention generated an additional 3.24 quitters per year. Intervention group was better in progression in stage of change and number of days quit (p<0.05). Annualized incremental costs were \$5570 per primary care practice and \$41 per smoker. ICER=\$1174 per life year saved (\$869 per QALY). When adjusted, ICER declined to \$999 per life year saved (\$739 per QALY).</p>	<p>The incremental 7-day point prevalence abstinence estimates were much higher than those seen in other studies testing similar intervention. The testing of the expert system was confined to the four boroughs of NYC. Small sample size: study under-powering may have contributed to the marginal significance of the outcome.</p>	<p>From a physician's perspective the stage-based computer tailored intervention was cost-effective relative to standard care. Incorporation of partial behaviour change into the model further enhanced favorability of the cost-effectiveness ratio.</p>
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Table B.3: Telephone applications in addictions

a) Telephone applications in alcohol addiction

First author and study design	Objectives	Setting and subjects	Approach	Results /Conclusion	Limitations	Implications for decision making
Bischof et al. 2008 ⁸⁴ Large RCT Germany	To compare a full care brief intervention for patients with different alcohol abuse/dependence with a stepped care approach including telephone based intervention.	Patients were from general practices in two Northern German cities. In total 10,803 screenings with M-CIDI and 408 individuals were randomly allocated to three study groups (mean age 36 years, 32% female).	After assessment participants were randomly assigned to 1) stepped care (SC): a computerized intervention plus up to three 40 min telephone-based intervention depending on the success of the previous intervention; 2) full-care (FC): a computerized intervention plus a fixed number of four 30-min telephone-based interventions, and 3) an untreated control group (CG). The computerized feedback based on core construct of the Transtheoretical Model (TTM). The FC group got brief counseling sessions based on MI and behavioral change counseling methods.	SC participants got about half of the amount of intervention in minutes than FC participants. Both groups didn't differ in drinking outcomes in 12 month follow up. Compared to CG, intervention showed small to medium effect size for at-risk drinkers.	Only half of the individuals screened positive entered to the study. Relatively small sample size makes it hard to detect differences in outcomes in smaller sub-samples of the study.	Study shows that telephone-based stepped care approach can be effective and potentially save resources as a form of brief intervention for individuals with at-risk drinking (not that much for alcohol dependent individuals).

<p>Brown et al. 2007⁸⁵ Large RCT USA</p>	<p>To assess the effectiveness of telephone and mail intervention for primary care patients with alcohol use disorder who were not seeking assistance for their drinking.</p>	<p>897 primary care patients in 18 Wisconsin clinics with alcohol use disorder who were not seeking assistance for their drinking and were between 21 and 59 years of age, and exceeded recommendations of low-risk drinking; met DSM-IV criteria for alcohol abuse or dependency, and were not suicidal.</p>	<p>28,622 patients were approached in waiting rooms and were then screened in several steps to get the study population (N=897). Stratified randomization by clinics was used to assign patients to experimental and control groups. Intervention group got up to six sessions of protocol driven telephone counseling based on principles of motivational interviewing and stages of readiness to change. A personalized feedback letter was sent after each counseling session. Control group obtained a pamphlet on healthy lifestyles.</p>	<p>At 3 months, male experimental subjects had 30.6% decline in risky drinking days compared with controls (8.3%) (p<0.001). The total consumption decreased by 17.3% and 12.9% respectively (p=0.001). Among females both risky drinking days and amount of consumption decreased slightly in both groups (p=NS). Greater numbers of telephone counseling sessions were associated with greater decline in drinking.</p>	<p>16% of patients drop out from the 3 month follow up, however, results didn't change in intention to treat analysis.</p>	<p>Combined six telephone counseling and mail out intervention was more effective than pamphlets for men with alcohol dependency or abuse who did not seek for treatment in primary care setting.</p>
<p>Helzer et al. 2008⁸⁶ Large RCT USA</p>	<p>To explore the feasibility and efficacy of Interactive Voice Response (IVR) as a possible therapeutic enhancement for Brief alcohol Intervention (BI).</p>	<p>Providers in 15 primary care clinics were briefed about BI. Interested patients (N=338) who were adults and exceeded the recommended weekly consumption 7 or 14 standard drinks (female and male respectively) or met the heavy drinker criteria 4/5 drinks a day. People with mental illness or other substance dependency were excluded.</p>	<p>Participants were randomized to one of four groups: 1) No IVR: BI and standard follow up treatment only; 2) IVR: daily phone calls for 6 months to the automated IVR system to report alcohol consumption and other items for the past 24 hours; 3) IVR with feedback: 6 months of daily calls plus monthly feedback in the form of a mailed printed graph showing daily consumption compared to targets and a note from PI; IVR with feedback and compensation: as previous one plus a financial incentive based on the number of daily calls (max \$13 per week).</p>	<p>The IVR proved to be feasible for self monitoring (more than half called the 6 month period). IVR and the feedback had an impact on drinking awareness. The therapeutic effect of IVR was mixed partly due to measurement bias. However, adding feedback to IVR had significant positive impact.</p>	<p>Some patients in no-IVR group self monitored which may have had impact on the results. IVR included several other items that were not necessary for feedback but that prolonged the call. This may have had negative impact on the continuation of the IVR patients.</p>	<p>IVR is feasible technology for behavioral self monitoring in primary care setting. IVR with regular feedback may be an effective therapeutic enhancement to BI.</p>

<p>Horng and Chueh 2004⁸⁷ China</p>	<p>To study the effectiveness of telephone follow up and counseling for alcoholism outpatients on abstinence, readmission, alcohol consumption, addiction severity and adjustment at 3 month follow up.</p>	<p>Participants were recruited from a psychiatric center from March to September 2001 by purposive sampling. Majority (93%) of the 77 patients was male and the mean age was about 42 years. The mean quantity of drinking in control group was 266 g and 198 g in the experiment group.</p>	<p>The subjects were discharged after inpatient treatment. Thirty-nine consented patients were assigned to control group and 38 patients to experiment group. Both groups were treated with 2/3 weeks' detoxication treatment. Experimental group got telephone counseling at 1, 3, 5, 9, and 13 weeks to understand alcohol consumption and living situation; Each call lasted between 30 to 60 minutes. Controls didn't get any treatment.</p>	<p>At 3 months the abstinence rate and adjustment ($p < 0.050$) were significantly increased in the experimental group. Addict ion severity ($p < 0.001$) and readmission rate ($p < 0.05$) were significantly degreased whereas decrease in alcohol consumption was not significant.</p>	<p>Study sample was small and the study was not randomized. It was not possible to have longer than 3 months follow up.</p>	<p>The study shows that the telephone follow up intervention as aftercare for alcoholism had better outcomes than no treatment.</p>
<p>McKay et al. 2004⁸¹ and 2005^{82,83} Large RCT USA</p>	<p>To compare telephone-based continuing care with two more intensive face-to-face continuing care alternatives in alcohol and cocaine use disorders in 12 and 24 months follow ups.</p>	<p>Patients in two outpatient substance abuse treatment programs, one community-based and one at Veterans Affairs medical center, who were alcohol and/or cocaine dependent patients (n=359) and who had completed 4-week intensive outpatient program.</p>	<p>Patients were randomly assigned to one of the three 12 week continuing care treatments: weekly telephone based monitoring and brief counseling contacts combined with weekly supportive group sessions in the first four weeks (TEL), twice-weekly cognitive-behavioral relapse prevention (RP), and twice-weekly standard group counseling (STND).</p>	<p>At 12 months, the treatment groups didn't differ on abstinence related outcomes in the complete sample. The participants in alcohol dependence only TEL group produced better outcomes than STND on all measures examined and better outcomes than RP on some of the outcomes. At 24-months. TEL participants had higher rates of total abstinence over the follow up than in STND ($p < 0.05$). In most comparisons TEL was better than or as good as the other alternatives.</p>	<p>The study didn't have an alternative for no continuing care after initial treatment. The patients in this study were those who finished the 4-week intensive outpatient program, so they were the most motivated and had the best prognosis of these types of patients.</p>	<p>Telephone based continuing care appears to be an effective form of step-down treatment for most patients with alcohol and cocaine dependence who complete an initial stabilization treatment.</p>

<p>Mello et al. 2008⁸⁸ Large RCT USA</p>	<p>To report 3 months outcome data of a randomized controlled trial of injured patients at ED, using a novel model of telephone-delivered brief interventions (BI) after ED discharge.</p>	<p>Participants (N=285) were recruited from the ED of a large, urban, academic, Level I trauma center and two smaller community hospital EDs in a nearby suburban setting between Nov 2003 and June 2006. All non-critically injured adults (18and +) were screened and persons using alcohol on risky level were elicited.</p>	<p>After discharge, patients received an assessment of alcohol use and impaired driving by telephone and then were randomized to treatment (n=140) and standard care (n=145). Treatment consisted of two sessions of BI done by phone, focusing on risky alcohol use. At 3 months both groups had an assessment of alcohol use and impaired driving.</p>	<p>95% of patients completed 3 month follow up. The mean AUDIT score decreased in both the treatment groups (p=NS). The difference in impaired driving was also non-significant. There was treatment effect only in the highest scoring alcohol problem group at baseline in impaired driving.</p>	<p>Screening of the patients for alcohol problems in ED is not easy.</p>	<p>Telephone brief intervention for alcohol may offer effective treatment soon after discharge from ED by slightly decreasing impaired driving.</p>
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b) Telephone applications in illicit drug addiction

First author and study design	Objectives	Setting and subjects	Approach	Results /Conclusion	Limitations	Implications for decision making
McKay et al. 2004 ⁸¹ and 2005 ^{82,83} Large RCT USA	To compare telephone-based continuing care with two more intensive face-to-face continuing care alternatives in alcohol and cocaine use disorders in 12 and 24 months follow ups.	Patients in two outpatient substance abuse treatment programs, one community-based and one at Veterans Affairs medical center, who were alcohol and/or cocaine dependent patients (n=359), and who had completed 4-week intensive outpatient program.	Patients were randomly assigned to one of the three 12 week continuing care treatments: weekly telephone based monitoring and brief counseling contacts combined with weekly supportive group sessions in the first four weeks (TEL), twice-weekly cognitive-behavioral relapse prevention (RP), and twice-weekly standard group counseling (STND).	At 12 months, the treatment groups didn't differ on abstinence related outcomes in the complete sample. The participants in alcohol dependence only TEL group produced better outcomes than STND on all measures examined and better outcomes than RP on some of the outcomes. At 24-months, TEL participants had higher rates of total abstinence over the follow up than in STND (p<0.05). In most comparisons TEL was better than or as good as the other alternatives.	The study didn't have an alternative for no continuing care after initial treatment. The patients in this study were those who finished the 4-week intensive outpatient program, so they were the most motivated and had the best prognosis of these type of patients.	Telephone based continuing care appears to be an effective form of step-down treatment for most patients with alcohol and cocaine dependence who complete an initial stabilization treatment.

c) Telephone applications in gambling addiction

First author and study design	Objectives	Setting and subjects	Approach	Results /Conclusion	Limitations	Implications for decision making
Hodgins et al. 2001 ¹⁰⁰ and 2004 ⁸⁹ Small RCT Canada	To compare the effectiveness of brief motivational treatment via telephone plus self-help booklet to self-help booklet alone and to waiting-list controls.	Participants were recruited via media announcement from persons who were concerned about their gambling and wanting to cut down or quit on their own. Sample included 102 people with mean age of 46 years and 52% of them were women.	Patients randomized to workbook only (WO) treatment first got a short telephone assessment and then they got the workbook by mail. Patients in the motivational intervention and workbook (MW) group were interviewed by a clinical psychologist via phone. During the motivational enhancement interview (20-30 min) the basic assessment information was obtained. After that the booklet was mailed to the patient with a personalized handwritten note of encouragement.	Participants who got MW treatment showed better outcomes than those in the WO group at 3 and 6 months follow ups. At 12 months only the MW patients with less severe gambling problems had the advantage over WO group. At 24 months the two intervention groups didn't differ in a 6 month abstinence. However, the MW participants gambled fewer days, lost less money, had lower South Oaks Gambling Screen scores, and were more likely to be considered as improved.	The study didn't have an ongoing control group for the study period. Results were based on self-report. Study group was small and didn't have power to do some statistical test after 6 months.	The results support the effectiveness of a brief telephone- and mail-based treatment for problem gamblers.

APPENDIX 3: ONLINE SCREENING TOOLS

Online alcohol screening tools						
Hester and Squires 2008 ²⁶	To compare web-based version of the Drinking Inventory of Consequences (DrInC) to a sample of heavy drinkers in project MATCH.	A sample of 1564 heavy drinkers filled DrInC as part of their web-based motivational intervention.	Comparison of the DrInC score data in the current web-based study and the MATCH data that is usually used as the reference values.	The web-based population showed lower norm values than the MATCH population. As a non-web-based population is used as a norm in web-studies, it will underestimate the alcohol problems in the population.	Participants were motivated enough to pay \$25 for use of the program. Web-based clients may be different from general populations.	The norm values in web-based studies may be different compared to face-to-face approach in alcohol interventions.
Thomas and McCambridge 2008 ²⁸	Compare psychometric properties of a range of existing alcohol measures when data are collected with young people.	167 U.K. young (16-24) residents who had drunk alcohol during the past week participated in a cross-sectional psychometric study with a test-re-test component.	Eight hazardous drinking measures were used in the online study.	Internal consistency and test-retest correlation statistics were generally satisfactory, providing evidence of reliability. Validation data also supported the online use of these measures. Evidence was weakest for the alcohol problems scale.		The tested hazardous drinking measures exhibit sound psychometric properties when administered online.
Telephone tools for alcohol and mixed abuse						
Tucker et al. (2007) ¹⁰²¹	To compare the Interactive Voice Response (IVR) and Timeline Followback (TLFB) interview to measure alcohol use.	44 problem drinkers from community.	Participants engaged IVR self monitoring (SM) for up to 128 days after initial resolution when the risk of relapse was high. Participants reported daily drinking, money spent on alcohol, and life-events occurred. After IVR SM they were interviewed using extended TLFB covering the same time period.	IVR and TLFB reported excellent agreement for summary measures of drinking and money spent to alcohol, but IVR reports were higher for many other measures.	Small sample.	The findings further establish the use of IVR SM with problem drinkers.

<p>Turner et al. 2005¹⁰⁰ RCT USA</p>	<p>To assess the impact of telephone audio computer-assisted self-interviewing (T-ACASI) on reporting of alcohol use, alcohol problem and illicit drug use in telephone survey of the general population.</p>	<p>Respondents were interviewed by phone in their home. Probability samples of 1543 English-speaking adults (18-45) residing in telephone accessible households in USA and 744 similarly defined adults residing in Baltimore, MD, USA.</p>	<p>Nine questions on alcohol, marijuana, cocaine, and injection drug use adapted from 1994 NHSDA and four CAGE questions on alcohol problems. Responses to T-ACASI, a pre-recorded questions that are answered using phone keys and human interviewers, were compared.</p>	<p>T-ACASI has mixed effects on reporting of alcohol use, but it did increase the reporting of one of four CAGE alcohol problems: feeling guilty about drinking. T-ACASI also obtained significantly more frequent reporting of marijuana, cocaine, and injection drug use (especially recent use of hard drugs).</p>		<p>Telephone survey respondents were more likely to report illicit drug use and one alcohol problem when interviewed by T-ACASI rather than by human telephone interviewers.</p>
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This report reviews the evidence of telehealth in substance abuse and addiction including the literature on smoking, alcohol, drug abuse and gambling. The included telehealth technologies include videoconferencing, computer, Internet, and telephone.



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ISBN: 978-1-897443-76-7 (print)
978-1-897443-77-4 (on-line)