

“Smoking Does Not Make You Happy”

Unlearning Smoking Habits Through Mobile Applications on Android OS

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Abstract: We analyze in-depth five smoking cessation apps on Android OS, examining how they teach users to quit smoking and what they learn from users. Apps advise would-be ex-smokers how to perceive the world, how to deal with their emotions, and how to act on their bodies and environment. Still, they learn little from their users, and even less from the scientific literature on smoking cessation. We discuss the potential for improved customization of advice to users' profiles and we propose a simple inventory of online scientific resources as a starting point for developers looking to create better apps.

1 INTRODUCTION

There has been a recent increase in the use of technologies for smoking cessation interventions. Online programs and sites assist people who want to quit smoking (Quit Net, Smoke Free, Make Smoking History, Verizon Health Zone, Dit Digitale Stopprogram etc.). SMS Services of support and counseling (Guerrilla Interactive SMS Service, MiQuit, Mobily Naqa, etc.) send messages tailored to the situation of the recipient, giving advice and encouragement.

A current advancement consists in mobile applications designed to help people unlearn their smoking habits, and learn a new identity with its associated routines: the ex-smoker. They are available on multiple platforms and mobile operating systems (iPhone, Android, Windows 8 etc.), being released by a variety of actors, such as independent developers, software development companies, non-profit organizations for public health, or public institutions.

Smoking cessation applications are, essentially, attempts at 1) unlearning through re-interpretation of smoking, and 2) assembling a new set of daily life routines to support the transition to a new identity. Their first challenge is to encourage users to reframe smoking from a positively charged behavior (understood in terms of prestige in group, belonging to a group or social class, sign of capital assets, personal and psychological relief etc.) to a damaging

action (as regards risks for self and others of premature death, disability, low fitness and degraded beauty; financial costs; low environmental comfort etc.). Their second challenge is to support users through withdrawal symptoms and craving moments, thus avoiding a relapse.

This paper reports a case study consisting of in-depth, qualitative analysis of five smoking cessation applications on Android OS. We focus on communication with users, addressing the following questions: What do apps teach users? What do apps learn from users? What evidence-based resources are available for developers to improve the fit between users' profiles and app messages?

2 SMOKING CESSATION APPS

The market of smoking-related applications contains both pro-smoking software (promoting tobacco products and smoking) and anti-smoking applications (framing tobacco consumption as negative). Even if there are some smoking-supporting applications (e.g. smoking simulators) which claim to help people quit, and could possibly be of assistance in some instances, most of the pro-smoking application are designed as brand advertisements, as wallpapers or widgets, and as claims to protect the right of smoking enthusiasts (BinDihm et al., 2012).

A comprehensive review of smoking cessation

applications for mobile phones show that most quitting applications do not adhere to key medical guidelines: “Few, if any, apps recommended or linked the user to proven treatments such as pharmacotherapy, counseling, and/or a quit line” (Abroms et al., 2011). The applications propose what we can term a “lone rider” model of the user: a heroic vision of quitting unassisted by medicine or professionals. A similar conclusion is advanced by a review of alcohol quitting apps (Cohn et al., 2011).

We start from this observation and we examine in-depth advice and tips offered by five smoking cessation apps which are, in our evaluation, typical for apps that are based on a combination of quantification, gamification, community, and textual communication, the most frequent type on the Google Play market. We then discuss our findings by pointing out missed opportunities for personalization of advice, and missed opportunities for learning from the available online scientific discussion on smoking cessation.

3 DATA AND METHOD

For our case-study we selected for in-depth analysis five smoking cessation applications on Android: [1] *Stop Smoking* (developed by Konrad Müller, last updated: November 2011), [2] *Quit Smoking Coach* (developed by Studios BrainLag, last updated: August 2013), [3] *Kwit - Quit Smoking is a Game* (developed by Geoffrey Kretz and Nicolas Lett, last updated: August 2013), [4] *Stop Smoking Assistant* (“As If” Licence, last updated: September 2012) and [5] *Exsmokers iCoach* (developed by Saatchi & Saatchi Brussels for the European Commission, April 2013).

Through this selection we cover *application variability in terms of design features* (Abroms et al., 2011): the selected apps illustrate quantified communication, textual advice and tips, games and gamification, and community support. We have also selected for analysis apps among those that include *richer textual messages for users*, so that we could examine their patterns of communication. We have identified and analyzed a total of 498 pieces of advice and panic tips provided by these five apps. We excluded tools that are based on hypnosis or subliminal messages because depend on strong assumptions, addressing a specific niche of users.

Based on our previous exploratory survey of anti-smoking apps, we consider that the five selected solutions are broadly representative of the available smoking cessation apps found on Google Play,

integrating the most frequent options available in this type of work. Our case study serves to illustrate significant patterns and to open a discussion on the potential for improving advice for people who attempt to quit.

4 RESULTS

Smoking cessation applications often propose one or several frames for the communication with their users. Some of the most common frames are:

- 1) Coach or assistant: the application guides the user through the difficult venture of quitting;
- 2) Game: the application offers a gameful environment in which smoking cessation is a quest, or in which ex-smokers can enjoy games as rewards for their abstinence;
- 3) Community: the application facilitates an online support community of ex-smokers.

Communication between the application and users mostly occurs in the coach/assistant frame. It is bi-directional, although the two flows are, as a rule, clearly separated. Users are required to provide for the application a profile of their smoking habits, which are their most important identifier: this information typically includes the number of cigarettes smoked per day, time spent while smoking a cigarette, the number of cigarettes per pack, and the cost of a pack. Additional information on smoking inception and type of cigarettes may also be solicited. Users are also expected to honestly communicate each cigarette smoked; if the user has identified herself / himself as an ex-smoker, reporting a relapse usually resets all indicators and progress measures to zero. Last but not least, users are expected to ask for tips in case of cravings and feelings of panic. In turn, the application provides two different types of information:

- 1) A quantitative representation of the user’s transformation and foreseeable future, with a focus on health benefits and financial savings (see app front pages illustrated in Figure 1); this representation usually include a combination of numbers and percentages, progress bars and other charts;
- 2) Advice, consisting of motivational quotes or panic tips; some applications also include motivational graphic images illustrating smoking-induced damage.

Therefore, apps learn from users, and teach users how to deal with smoking cessation. As we argue below, smoking cessation apps do a minimal work in learning from users, as user information is only

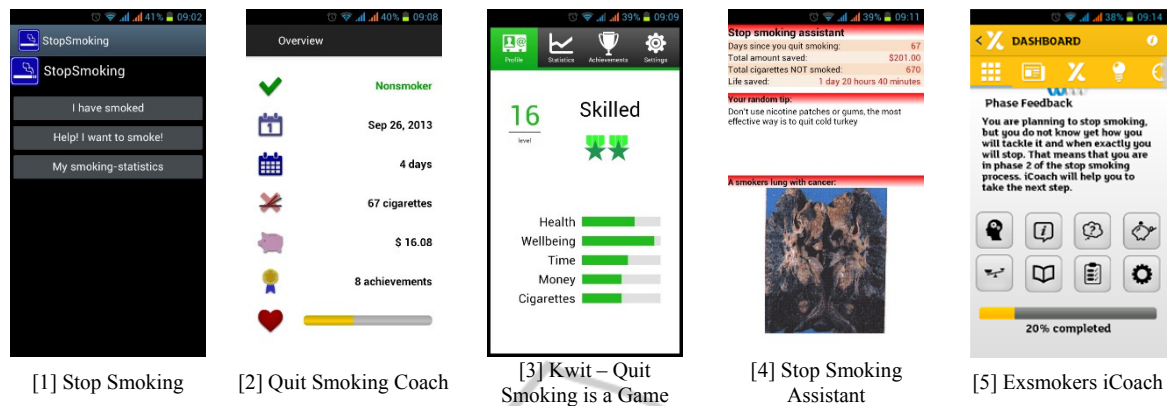


Figure 1: The front page of smoking cessation applications.

employed in the quantitative engines that generate numerical indicators and predictions, with little relevance for advice and tips.

4.1 Teaching Users

Apps are in charge of assisting users in a transition from a life structured by smoking routines, to a smoking-free life, through a period of withdrawal symptoms and craving. To this purpose, applications teach users to perceive the world differently, to manage their emotions and see themselves in a new way, and to engage in specific behaviors to minimize risks of relapse. We examine below in detail how apps teach users to deal with the experience of smoking cessation on four domains: perceptions, emotions, bodily actions, and environmental contexts (Figure 2).

As regards *perceptions*, there are four teaching areas:

- 1) Perceiving the future: users are presented with information about the distant future, especially concerning their improved health status in 10 to 20 years; users are also faced with descriptions of the closer future – a period free of cravings and dependency, in which the benefits of cessation are already visible and the costs have become memories;
- 2) Perceiving one’s body in time: users are prompted to consider the gradual transformations of their bodies, while and after giving up smoking;
- 3) Changing one’s perception of cigarettes as objects of consumption.
- 4) Managing one’s perception of time, through time work (Flaherty 2003);

As regards one’s emotions and identity, apps purport to teach users about:

- 1) Managing one’s emotions, in a process of

- 2) Changing one’s definition of oneself, in a process of *identity work* (Schwalbe & Mason-Schrock 1996).

Last but not least, apps also teach users to act on their *body*, shaping physical needs and sensations, and to be aware of one’s context and act on the material and social *environment*.

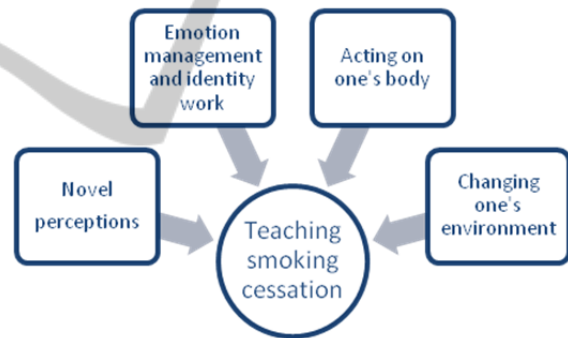


Figure 2: Four domains of app advice for users.

4.1.1 Perceiving the Future

The quantitative representation of users’ progress is the most important tool for visualizing the future. Applications take over the role of a ‘magnifying glass’, compensating for users’ myopia as regards future risks and benefits. The future is materialized as: the right end of a progress bar that fills gradually, the prospect of full recovery from smoking damage after 15 years of non-smoking, life-years gained through non-smoking, and through various metrics that display improved health and life expectancy.

Applications attempt to direct users to mind the future not only through indicators, progress bars and charts, but also through advice and panic tips (see Figure 3; in all Figures presenting application advice, the source of each quote is indicated in

square brackets, referring the application list from the Data and Methods section). Users are put in the situation to foresee their future health, but also their change of mind and emotions.

Ten years after quitting your lung cancer risk will be reduced to 50%. [A1]
 In a few months, you will no longer think about smoking. [A1]
 When you haven't smoked for a month or more you will realize how stupid it was to spend all that money on an addiction that was literally killing you! NEVER AGAIN! [A4]
 Quitting keeps you young! Research has proven that smoking affects your body's cells, accelerating the aging process. [A5]
 The most difficult thing is to resist the first few weeks, and mainly the first days. It will be easier as time passes. [A3]

Figure 3: Teaching users: Perceiving the future.

4.1.2 Perceiving One's Body in Time

Users are instructed to attend to gradual improvements in their bodily well-being. This learning project is one of the most difficult to sustain, since it is subject to the possibility of direct disconfirmation: smokers are expected to experience all these improvements but, occasionally, it is possible that they do not occur as planned. Applications address this vulnerability, at least in part, by not soliciting users to actually observe their experiences: instead, the transformations are formulated as known-facts, in the present tense or future tense. These statements actually instruct the user how to perceive her bodily functions. Health improvements cannot be possibly observed on an hourly basis – but they can be reflected upon as such. It is also likely that respiration will not improve perceptibly in three days – but the improvement that occurs is rendered visible through the application.

Without smoking your health will increase from hour to hour. [A1]
 Three days after last cigarette the function of your respiratory system is improving. [A1]
 48 hours after the last cigarette smells and tastes are being experienced more intensively. [A1]
 Your teeth, your breath and your skin thank you. Smoking leads to tooth loss, gives you bad breath and a shallow complexion. [A3]
 Think of your sex life! Smoking influences blood circulation in the genitals, which can lead to diminished ability in bed. [A5]

Figure 4: Teaching users: Perceiving one's body.

While in the previous section we have examined the applications 'telescopic' function for seeing the future, that compensates for users' time discounting (Frederick et al. 2003), this area of advice positions the application as a 'microscope', useful for revealing users the minute, gradual, real-but-unobservable changes in their bodies.

4.1.3 Changing Perceptions of Cigarettes

Applications also attempt to change users' perception of cigarettes themselves as objects of consumption. These messages are comparatively rare: we have identified only 4 out of a total of 498 (see Figure 5).

Each cigarette shortens your life expectancy for 8-10 minutes. [A1]
 Light cigarettes will not help... you will simply smoke more of them or inhale deeper to get same effect. Just don't smoke. [A4]
 Think of the many poisons in a cigarette: ammonia, acetone, methanol,... still want to light up? [A5]
 By panicking, you give the cigarette too much power. Some perspective: a cigarette is nothing more than some tobacco wrapped in paper. Nothing special. [A5]

Figure 5: Teaching users: Perceiving cigarettes.

4.1.4 Changing Perception of Time

Time work refers to people's actions undertaken to transform the experience of time – that is, either to speed it up or slow it down, or modify its rhythms and flavors (Flaherty 2003). This is particularly relevant for ex-smokers: applications provide instructions for managing the objectively short but subjectively long periods of craving (see Figure 6).

Delay: Craving usually passes quickly. Tell yourself that you must wait "just 10 more minutes" until craving passes. [A2]
 The urge to smoke is due to the lack of nicotine, it doesn't last more than 5 minutes. Stand firm and drink a big glass of water. [A3]

Figure 6: Teaching users: Time work.

Users are made aware of the temporary and brief nature of cravings, and they are taught a variety of actions that could serve to distract attention and make time pass more quickly.

4.1.5 Emotion Work

Hochschild (1979) introduces the concept of 'emotion work' to refer to the actions through which

people conform to emotion rules, adjusting their emotional displays and experiences in accordance with the situation. Emotion work is a central element of advice for smoking cessation applications, as recent ex-smokers are expected to confront many negative feelings.

The applications use several generic resources: a focus on the pride of transformation, positive emotions induced through gratifications, acceptance of negative emotions, and plain reframing: "smoking does not make you happy. It is simply very addictive [A1]" (see Figure 7).

Actually, smoking is no longer fun for you? [A1]
 Smoking does not make you happy. It is simply very addictive [A1]
 You will be very proud of yourself as an ex-smoker [A1]
 Buy something nice: It's ok, you are saving a lot of money though not smoking. Reward yourself. [A2]
 Think positive thoughts about how awesome it is that you are quitting smoking and getting healthy. Be patient with yourself. [A3]
 Take 5 minutes and mentally review your list of reason to quit smoking. Remember how you felt when you decided to quit. [A3]
 Be prepared for a rollercoaster ride of emotions: denial, anger, bargaining, depression, acceptance, and complacency. These are normal emotions for your body when going through withdrawal. [A4]

Figure 7: Teaching users: Emotion work.

People adjust quickly to feeling fitter. Remember that it's the fact you've quit that makes you feel so good. [A5]
 Speak to yourself in a positive manner: 'I'm working on a healthy future', 'I'm doing well'... convince yourself to keep going. [A5]
 You might sometimes glorify the past and miss smoking. This is nothing more than the 'rose-tinted spectacles' phenomenon! [A5]
 The more you fight against difficult moments, the more intense they feel. The key to success lies in accepting and letting go. [A5]
 Use your wildest imagination to exaggerate this moment, just like in a dramatic film. You'll soon see how ridiculous it is. [A5]
 Humour helps to put moments of panic into perspective. Laughter reduces stress. Even anticipating a laughing fit ('this'll be fun!') can help! [A5]
 Everything has its time, even your panic. Instead of being afraid of it: observe this feeling, it is something you can bear.[A5]

Figure 8: Teaching users: Emotion work in finer detail.

Exsmokers iCoach (App 5) differs from the other

applications by engaging emotion work in more depth: smokers are oriented to observe processes of emotional adjustment to change, to avoid nostalgia, to use humor and 'wild imagination' to combat cravings, to observe panic and to actually talk to themselves - in a clearly observable instance of emotion work (see Figure 8).

4.1.6 Identity Work

Schwalbe & Mason-Schrock (1996) use the concept of 'identity work' to refer to the discursive actions through which people create identities for themselves and for others, by using, modifying, and creating categories and subcategories adequate to their interactional interests. We can observe how applications propose the identity category of 'ex-smoker', positioning it in conflict with the tobacco industry and in contrast with the category of 'smokers' (see Figure 9).

Don't let the government and the tobacco industry earn even one more cent from you. [A1]
 On average, smokers die 7-8 years earlier than non-smokers. [A1]
 Don't be afraid to look ridiculous. The world looks up to the brave ones, even if they don't succeed at first. [A5]
 This is not buckling under pressure from others! You stop smoking for yourself. To feel good and to feel healthy. [A5]
 You are no-smoker now, and you are strong enough to resist the craving to smoke. Believe in yourself. [A3]
 Smokers are comparable to alcoholics and heroin addicts. You fool yourself, and tell yourself it's not that bad an addiction to have. Treat yourself like an alcoholic and never touch another cigarette again! [A4]
 Don't you choose what you do? As long as you keep smoking, you're at the mercy of a cigarette. Do you smoke or are you being smoked? [A5]

Figure 9: Teaching users: Identity work.

The main identity feature of the ex-smoker identity is its *autonomy*, in contrast with smokers' addiction. This autonomy is also marked as freedom from others, from the government, and from tobacco companies.

An interesting aspect of identity work in smoking cessation applications consists in the proposed differentiation between users and their 'brains' (see Figure 10). Following a cognitivist vocabulary (Coulter 1979), applications instruct users to consider their brains as agents: thus, it is brains who learn, feel pleasure, or think – while

users are positioned as observers of these neuronal processes, gaining freedom from their biological determination.

Throw away all cigarettes you have. You need to resist just a little longer. You are still getting used to non-smoking in certain situations. Your brain is still learning. [A2]
 You can train yourself to enjoy other things than smoking. Your brain's pleasure centres are currently overly focused on cigarettes as a source of pleasure. [A5]
 After quitting, your brain will be well supplied with blood, you will be better at thinking. [A1]

Figure 10: Teaching users: 'Observe your brain'.

4.1.7 Body Work

Applications commonly advise ex-smokers to engage in physical exercise and other forms of physical activity (sauna, brushing one's teeth, drinking water, raising sugar levels etc. – see Figure 11).

Instead of smoking, go swimming. [A1]
 Get physical: Physical activity reduces craving. Put on shoes and go running. Do push-ups, knee-bends, and so on. [A2]
 When blood sugar levels drop, cravings can seem more powerful while you feel less able to manage them. Eat fruit (apple, grapes, kiwi) or a yogurt to feel better. [A3]
 Craving a cigarette? Brush your teeth and enjoy that fresh taste. [A3]
 Drink cranberry juice, it helps remove the poison nicotine from your system. [A4]
 Self-control issues could be down to a lack of sugar. To keep yourself in line: eat some fruit or bread. [A5]

Figure 11: Teaching users: Body work.

The autonomy-based identity work presented in section 4.1.6 explains applications' *reluctance to direct users towards medical or pharmacological help*. Among the 498 advice messages that we have analyzed, only one instructs users to "Seek help from a doctor or pharmacist" [A2]. The second mention of a doctor serves to enhance autonomy at the expense of medical authority: "Why are you considering quitting? The motivation to quit must come from you. Don't do it to please your family or your doctor" [A5].

Unlike other solutions, Exsmokers iCoach (App 5) includes a dedicated page with a detailed presentation of pharmacological alternatives available for ex-smokers, recommending users to seek medical help.

4.1.8 Environmental Work

Last but not least, there is substantial advice related to observing and intervening on one's material and social environment. The concept of 'smoking clues' refers to situational elements that elicit the need to smoke. Applications provide some advice to diminish these contextual clues, and to enhance material and relational support for the difficult transition (see Figure 12).

Throw away everything that is associated with smoking, ashtrays, lighters, cigarettes, ... [A1]
 Distract yourself: Call somebody. Write a text message. Go for a walk. Play a game on your phone. Make a coffee. [A2]
 Escape the situation: Go to some other place. Talk to some other people. Avoid trigger situations [A2]
 Keep pictures of loved ones on you. When you will feel cravings, look at those pictures and think about all the love you have for these people. [A3]
 Where are you right now? This location is probably strongly associated with smoking. Get away for a bit. Try to stop smoking in this spot. [A5]
 Don't get caught out by events that push you back to your old habits. You're doing the right thing: keep it that way! [A5]

Figure 12: Teaching users: Environmental work.

5 LEARNING FROM USERS

As we have discussed above, apps (and app developers) gather little information from users, mostly focused on their quantified history and patterns of smoking. This information serves to customize the quantified messages that position users on a short- and long-term trajectory from heavy health risks to non-smokers' health risks. Textual advice is not personalized – with the exception of App 5 that adjusts messages according to users' stage in the process of smoking cessation.

There are two main possible ways of personalizing communication with the user. On the one hand, apps could generate a more detailed user profile, estimating the motives of smoking, the degree of addiction, and the severity of withdrawal symptoms, which is associated with the probability of relapse. These profiles can be constructed using available online scales, as we discuss in the next section. On the other hand, apps could ask users to rate the received advice and tips, and infer a profile from users' expressed preferences – that may vary as regards the domain of action (perceptions, emotions, body, or environment), tone (more or less focus on

fear from smoking damage, more or less acceptance of *guilt*, more or less *humour*) as well as a preference for shorter or longer messages, or reflective versus action-oriented tips.

6 LEARNING FROM ONLINE SCIENTIFIC LITERATURE

Our analysis supports Abrams' et al. (2011) conclusion that smoking cessation apps do not adhere to medical advice: they largely rely on a common-sense 'cold-turkey' model and ignore the helpful potential of counselling and pharmacotherapy.

There is no shortage of scientific literature on smoking and smoking cessation freely available online. We propose a brief inventory as a guide for developers in reviewing the literature.

Medical research is useful for understanding the benefits and often the necessity for nicotine replacement therapy (Benowitz 2008).

Psychological scales are relevant for better comprehending the variety in smoking motives, addiction, and withdrawal symptoms and intensity:

- Scales for assessing the *intensity of addiction to nicotine*: the Fagerstrom Test for Nicotine Dependence (Fagerstorm et al., 1990); The Cigarette Dependence Scale (Etter et al., 2003); the Nicotine Dependence Syndrome Scale (Shiffman et al., 2004); the Autonomy over Tobacco Scale (Wellman et al., 2011);
- Scales for identifying users' *motives for smoking*: The Wisconsin Inventory of Smoking Dependence Motives: WISDM 68 (Piper et al., 2004) and WISDM 37 (Smith et al., 2010);
- Scales for assessing users' *withdrawal*: the Wisconsin Smoking Withdrawal Scale (Welsch et al., 1999) and the Wisconsin Predicting Patients' Relapse Scale (Bolt et al., 2009).

Apps advice does not actually address the functions of smoking in users' daily life, as detailed in the WISDM scale, for example. Most tips only refer to cravings and loss of control; some refer to environmental cues. Taking into account the other motives for smoking may improve the subjective relevance of advice.

While social cues feature as a distinctive motive for smoking in psychological scales, the implicit social process remains rather abstract. The concrete social uses of smoking can be better understood through socio-psychological research that points to the *identity work that smokers achieve through smoking*. Smoking is often important for expressing one's gender, class, and age identities (Rugkasa et al. 2003; Barbeau et al. 2004; Amos & Bostock 2007) – a feature easily visible in smoking adds that have for long framed the cigarette as a symbol of masculinity and, respectively, femininity, in conjunction with age and social class. Apps could address the usefulness of smoking for gender and age identity work through their advice, acknowledging this function and proposing replacements.

7 CONCLUSIONS

Apps *teach users* new ways of perceiving the world and their bodies, of dealing with their emotions, of acting on their body and environment.

Still, apps learn surprisingly little *from users*: user profiles are summarily sketched to serve the quantification modules of health predictions, and there is no customization of advice and tips.

There is also little reliance on *scientific literature*. Mobile apps propose a user identity based on the core value of autonomy and the lay theory of 'cold-turkey' quitting. Users are represented as 'lone riders', in a difficult quest, assisted only by their coach – the application, and other peers (family, friends, networks). This identity project makes applications reject medical and pharmacological advice, in contrast with evidence-based recommendations for smoking cessation. Beyond medical literature, we propose that psychological research concerning scales of smoking addiction, motives, and withdrawal, and socio-psychological research on identity work through smoking offer valuable and easily accessible resources for app developers in order to create rich user profiles, develop their repertoires of advice, and personalize tips to users' preferences and needs.

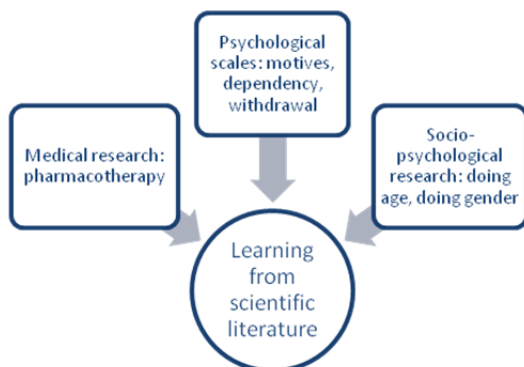


Figure 13: Domains of scientific literature on smoking.

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