

# Foucault, Surveillance, and Carbon Monoxide Testing Within Stop-Smoking Services

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## Abstract

Health professionals have adopted proactive testing for early evidence of disease. Researchers have identified that this leads to enumerated understandings and shapes behavior in productive ways. Smoking-cessation advisors regularly test clients for carbon monoxide (CO), but client views of this had not previously been explored. We interviewed 23 clients of a United Kingdom-based stop-smoking service regarding their experiences of CO testing. The majority of participants were successful quitters. We used ATLAS.ti 7 as a data-management tool during structured qualitative analysis. Our findings reveal that clients believed the results of their CO tests. Many became enumerated in their understanding, and thus placed themselves in a hierarchy with other members of their group. Almost all clients found that knowing their CO test score was motivating. We conclude that additional research is needed to understand the experiences of CO testing among clients who do not quit.

## Keywords

addiction / substance use; behavior change; health care, users' experiences; intervention programs; interviews, semistructured; research, qualitative; smoking cessation; tobacco and health

Within this article, we examine literature from a Foucauldian perspective, which examines how power and surveillance have been present in health care. This provides a context for United Kingdom-based stop-smoking services, which routinely test clients for carbon monoxide. We argue that people might come to understand their health risk behaviors in relation to their test results. These are usually presented numerically, and researchers have identified that people might understand their health risk in terms of the number (they become enumerated), or a more general sense of their health in relation to others. This might in turn influence how they behave in the future.

Foucault argued that “power is everywhere” (Foucault, 1976, p. 93), and the concepts of power and surveillance were a common theme in much of his writing (Foucault, 1961, 1963, 1972, 1976, 1977). Foucault (1963) argued that in the modern era, power was enacted through physical spaces and organizations, including health institutions, in which health professionals routinely conducted surveillance. Within the clinical arena, health professionals' surveillance could be directed toward two distinct foci. First, “symptoms,” which were visible, and second, “signs,” which made it “possible to outline chances and risks” in relation to ill health—which was not readily observable (1963, p. 109). In relation to smoking-related disease, an example of a common “symptom” is a cough,

whereas a “sign” includes damage to the lungs made visible by an X-ray, or an elevated level of carbon monoxide found in expired air or by a blood test.

Signs were the “original truth” of disease, and as such, Foucault (1963) suggested that the medical profession should attempt to identify and monitor them. Subjecting patients to tests for signs was an example of medical power, which has been seen as disempowering its subjects because of its pastoral nature and the need to “subtract the individual, with his particular qualities” from clinical decision making (Foucault, 1963). In contrast, Foucault (1972) linked knowledge and power, and thus predicted that receiving test results might empower patients. Despite this contradiction, Foucault (1972) viewed surveillance as productive and functional for society.

Increasingly, Western medicine has been proactive. This includes attempts to find “signs” of future harm via routine and targeted screening (Armstrong, 1995; Clarke,

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Shim, Mamo, Fosket, & Fishman, 2003). Proactive monitoring has been encouraged by the United Kingdom Department of Health, which has paid primary care physicians additional sums to perform screening on patients since 2004 (National Health Service [NHS] Employers, 2014). Moreover, researchers have found that technology existed which allowed patient-generated data to be shared with clinicians at other sites (Hung & Shang, 2003), providing the opportunity for an increased medical gaze. Despite evidence of increasing surveillance in the recent past, there have been reported instances when high-risk patients have been refused screening by medical professionals, illuminating the power imbalance within this area (Frich, Malterud, & Fugelli, 2006).

Alongside proactive monitoring, since the late 1990s intensive support programs have been introduced to reduce health risk behavior, on the basis that this would reduce health inequalities (Department of Health, 1999). The majority of these interventions were directed at members of groups at risk of disease, some of whom might have already been symptomatic. Within such voluntary programs, there was the opportunity for surveillance of signs and interpretation of results by the expert clinician. Within United Kingdom National Health Service stop-smoking services, intensive behavioral support occurred in closed group-based clinics or on a one-to-one basis. Treatment took place in community and primary care venues, and was facilitated by trained smoking-cessation specialists.

As part of this treatment, a weekly carbon monoxide (CO) test was conducted (Michie, Hyder, Walia, & West, 2011). This surveillance served two purposes: providing verification of abstinence from smoking (West, McNeill, & Raw, 2000), included in official records (National Institute for Health and Care Excellence, 2013), and providing a “motivational tool” for clients (McEwen, Hajek, McRobbie, & West, 2006; West & Shiffman, 2004). The use of CO testing explicitly excluded the patient’s subjective account of his or her behavior in clinical decision making, while attempting to provide motivation. The use of CO testing within stop-smoking services has been positively associated with short-term smoking cessation (Michie et al., 2011). However, the use of comparison of CO readings between clients attending group behavioral support has not been tested as a treatment component (Michie et al.; West, Evans, & Michie, 2011), and was not included in training for advisors (McEwen, 2012).

### **Patients’ Reactions to the Identification of Signs**

Alongside an increase in testing, Hacking argued that Western European society grew to recognize people in terms of probability of risk, and thus people became “enumerated” as opposed to deterministic (Hacking,

1990). In this instance, enumerated was a state in which people understood their risk numerically, either in relation to a normal score or that of other people. Accordingly, people created their sense of self “as subjects of knowledge” (Hacking, 1986, p. 236), and thus medical “truth” resulted in subjectivity (Clarke et al., 2003). This altered perception led to self-regulation, or the “invisible” gaze (Foucault, 1977, p. 214), contextualized within society’s moral codes (Hacking, 1986). In this context, we can expect the identification of signs to result in change to subjects’ identities, perceptions, and behaviors if they were high on the public consciousness. This might have accounted for the improvement in treatment outcomes in stop-smoking services using CO testing.

It has been argued that engendering an understanding of numerical data in patients is challenging for a number of reasons, including lack of effective communication on the part of the clinician presenting results (Skubisz, Reimer, & Hoffrage, 2009). Patients have also been found to lack numerical literacy (Reyna, Nelson, Han, & Dieckmann, 2009; Skubisz et al., 2009) and the skills to interpret the meaning of the results (Altman et al., 2008). It has been reported that test results are commonly recalled by patients in terms of verbal descriptors, such as “high” or “low” (Adelswärd & Sachs, 1996; Altman et al., 2008; Washburn, 2014), in which case they did not become fully enumerated in their understanding. Having lived in an area of deprivation was also linked to becoming less enumerated than those who lived in more wealthy areas (Adams et al., 2011). For those who did not become fully enumerated, it can be expected that the level of subjectivity experienced would have been less than for those who became fully enumerated, and thus their accompanying self-regulation might not have occurred.

Researchers who examined cholesterol testing highlighted that, in some instances, patients did not trust the accuracy of test results (Adelswärd & Sachs, 1996). In contrast, participants in research that examined biomarkers for environmental pollutants believed that their test results reflected the truth (Adams et al., 2011; Altman et al., 2008; Hatcher, 1982; Washburn, 2014). Moreover, in some instances, participants expressed a responsibility for the pollutant that was in their body, over which they had possessed very little control (Hatcher; Washburn).

Differing responses to evidence of signs have been reported. Some participants have identified the need for information on how to reduce exposure to environmental pollutants (Altman et al., 2008), whereas others called on corporations and regulators to reduce pollutants (Adams et al., 2011; Washburn, 2014). Receipt of results indicating a “safe” level has led to inactive responses (Adelswärd & Sachs, 1996), but also active responses designed to further reduce risk (Washburn). In this instance, however, pregnancy might have accounted for this difference

(Lupton, 2012), because society valued fetuses highly at the time of Lupton's (2012) research, which prescribed societal norms and behaviors (Hacking, 1986).

At the time of writing, researchers who had examined enumeration had focused on a variety of public health harms, largely related to diet and/or environmental pollutants; however, smoking was, and is, a risk activity unlike eating; no safe level of smoking has been identified (Doll, Peto, Boreham, & Sutherland, 2004). Smoking behavior was thus socially and morally constructed within this discourse of unavoidable harm. Moreover, increasing stigma has been attributed to smokers in recent years (Bayer & Colgrove, 2002; Graham, 2012). Whereas smoking has been considered amoral in society at large, smokers have created their own moralities and hierarchies of smoking practices (Lupton, 1995). Moral judgments about smoking are thus not confined to a distinction between smoking and not smoking, but have also included differences in smoking behaviors (Holdsworth & Robinson, 2008). Identified hierarchies of perceived harms might also have influenced responses to clinical tests showing signs of smoking-related harm (Hacking, 1986).

To date, there has been no exploration of how CO testing is experienced by users of stop-smoking services. Researchers who carried out an ethnographic study of a weight-loss group found that although being monitored by the group leader and other members of the group motivated some participants, it disempowered others (Darmon, 2012). Therefore, there was the potential for variability in how CO test results were received. Recent research has shown that general satisfaction with NHS stop-smoking services is high (May & McEwen, 2011; May et al., 2009); however, there were high levels of dropout, relapse following short-term quits, and also variations in effectiveness between services (Brose et al., 2011). As such, the way in which CO testing impacts on how quitters construct their identities, including in relation to other smokers, was the focus of our research.

## Method

Researchers should acknowledge and reflect on their nonneutral status within research (Becker, 1966). Accordingly, during this research, we were "on the side" of smokers, the majority of whom became addicted to nicotine in childhood, and NHS stop-smoking services, which played a valuable role in supporting smokers to combat their addiction with greater success than unsupported quit attempts. We undertook semistructured telephone interviews with 23 stop-smoking service clients to gain a deeper understanding of their experiences of CO testing within intensive behavioral support for smoking cessation. Our approach included an examination of the

acceptability of testing to clients, how testing was linked to motivation to remain abstinent, the role stigma played in CO testing, and how this impacted on service users. We were commissioned to carry out the research by the stop-smoking service as part of a wider evaluation of the service, and were granted a favorable review by the NHS Trust's<sup>1</sup> research governance committee.

## Participants

We were not given permission to directly contact service users, as can be the case in health services research (Feldman, Bell, & Berger, 2003). To reduce the inherent likelihood of recruiting all highly engaged clients when utilizing advisor-facilitated recruitment, the service sent invitation letters to a random sample of 457 service users who had undertaken group smoking-cessation support in the previous 6 months and were not pregnant or awaiting elective surgery. We excluded these two groups because their motivation for quitting is often different from other smokers (Heppner et al., 2011). In total, 25 clients opted in and 23 participants were interviewed between September and December 2012, providing detailed accounts of their experiences. Each participant received a £10 shopping voucher for their time.

We achieved an equal gender split within the sample, and a range of ages and nicotine-dependence levels, as shown in Table 1. These were similar to the mean characteristics of users of the service; however, the sample differed from the mean demographic of service users in some ways. It contained a higher proportion of clients from high-social-class groups, engagement with the service (4.5 vs. 3.3 out of a maximum of six sessions attended), and successful 4-week quitters (82% vs. 59%) than would be expected from the service's population. As such, we felt that we had a sample which broadly reflected the service's more engaged users from higher occupational groups, and thus was appropriate to answer our research question in the context of highly engaged service users from higher occupational groups (Morse, 2000).

## Data Collection

It has been argued that data from telephone interviewing could be inferior when compared with face-to-face interview data because the lack of visible facial expressions might reduce rapport (Shuy, 2003), and data loss can occur through nonverbal data such as body language, environmental contextual data, and distortion of verbal data being removed (Novick, 2008). However, high-quality data being provided within qualitative telephone interviews has been recognized in recent years (Irvine, 2012; Sturges & Hanrahan, 2004). This includes comparable

**Table 1.** Demographic Characteristics and Smoking Status of Participants.

Variable	Characteristic	Sample Count	Sample Percentage <sup>a</sup>
Gender	Men	11	48
	Women	12	52
Age band (years)	25 to 34	4	17
	35 to 44	6	26
	45 to 54	3	13
	55 to 64	6	26
	65 to 74	3	13
	>75	1	4
Social class (Office for National Statistics, 2014)	Higher managerial and lower professional (1 & 2)	14	61
	Intermediate (3 & 4)	2	9
	Lower supervisory and semi-routine (5 & 6)	6	26
	Routine (7)	0	0
	Never worked (8)	0	0
	Unable to classify	1	4
Nicotine dependence (Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991)	Low (<5)	5	22
	Medium (5)	5	22
	High (6 to 7)	10	43
	Very high (8 to 10)	3	13
Engagement with stop-smoking services (treatment sessions attended)	Low (0 to 1)	3	13
	Medium (2 to 4)	9	39
	High (5 to 6)	11	48
4-week quit status <sup>b</sup>	Yes: self-report	19	83
	Yes: CO validated	14	61
	No: self-report	4	17
Self-reported quit at time of interview	Yes	14	61
	No	9	39

<sup>a</sup>Not all percentages total 100 because of rounding.

<sup>b</sup>The 4-week quit status was measured by stop-smoking services in two ways: self report and CO validation. We display the total of those who self-reported that they quit, and those who were CO validated, alongside those who reported that they had not quit, so the three columns total more than the sample size.

length of interview and rich detail provided (Grant, 2011; Irvine, 2011), and increased openness when sensitive or potentially embarrassing matters are discussed (Novick; Sturges & Hanrahan).

We utilized telephone interviews rather than face-to-face interviews because of the time and travel savings, alongside recognizing that high-quality data could be collected in this way when discussing sensitive topics. Our interviews followed a semistructured approach, which allowed participants to describe their experiences of smoking cessation at length, but we gently guided participants to discuss areas of particular interest (Mason, 2002). Following early interviews, we recognized that participants' experiences of CO testing was a salient theme, and we made this topic more prominent on the interview topic guide, providing thick description of this area in the majority of interviews (Seale, 1999). The mean length of our interviews was 31 minutes.

## Analysis

We digitally recorded all interviews, including the process of gaining informed consent. Audio recordings were transcribed by a professional transcription company. The quality of the recording of one interview was very poor, and it would not have been possible to produce a full transcript; instead, the interviewer wrote comprehensive field notes immediately after the interview and we used these as data (Sanjek, 1990). We input all data into ATLAS.ti, version 7, to facilitate analysis (ATLAS.ti Scientific Software Development GmbH, 2014). First and second authors Aimee Grant and Kathryn Ashton independently coded the data, with discrepancies discussed and resolved between them. In our analysis we used a structured, three-step qualitative approach (Miles & Huberman, 1994; Miles, Huberman, & Sadana, 2014), which allowed us to reduce the data (code), display it into salient subthemes, and verify it with the other coder before conclusions were

drawn. We identified key themes from the literature and from reflecting on the research process with any new themes being introduced into data collection and analysis as they emerged.

## Findings

Our analysis identified several key themes. Clients viewed the results of CO testing as an objective truth. Moreover, knowledge of such results produced an enumerated or partially enumerated self, which was explicitly related to motivation not to smoke at the time and in the future. Participants understood their CO testing results within the context of other clients' readings, which created a hierarchy of quitting behavior and resulted in a sense of competition for some. The potential for stigma was a prominent theme throughout.

### Truth and Enumeration

We asked participants to describe their experience of undertaking the CO test for the first time, and anxiety was a key feature for a minority; this was explicitly related to how they believed they would be ranked within the group:

Well the first one, I was terrified because...I think I'd been smoking longer than most of the people there were aged [laughs]. Yeah, you just blew into it and [I thought], "Oh, I'm going to be the worst!"

Other participants reported a detached scientific interest in the test, but the majority did not describe any emotional state when taking the test. It is of interest that no participant described the process of undertaking the test; for example, who held the monitor, who read the test score from the monitor, and if other people could see or hear this; thus, the value of the test was constructed entirely in the result. All participants suggested that CO monitoring provided an objective measure that was able to demonstrate their smoking behavior, and all clients referenced their test scores. In addition, none of the participants questioned why the service used CO readings instead of self-reported abstinence, and some participants actively stated that they were content to provide this objective measure: "I didn't mind at all, because all you did, really—all you were doing, really, was providing evidence that you hadn't smoked, so I was quite happy about that."

Many clients recalled specific test scores, showing the presence of an enumerated understanding and the continued importance of obtaining a low CO score several months after their treatment had ended. However, around a third of clients did not report their scores in relation to numbers. For example, participants

referenced either their level of CO exposure (e.g., "I did succeed each time on getting less and less in my lungs... It came down to virtually nothing") or if they had a result low enough to be classified as abstinent by the service (e.g., "By week three I was classed as a non-smoker"). Another participant referenced her results in relation to her advisor's understanding of her smoking behavior; thus, she exhibited a lack of an enumerated identity and disempowerment.

The majority of clients reported an account in which the advisor was the expert and provided interpretation of readings. This was particularly important to two clients who had abstained from smoking but had small levels of CO in their expired air because of environmental pollution. In these cases, advisors and other group members provided reassurance that they believed the client was not smoking and that it was normal to have a small amount of environmental CO in expired air. A handful of clients did not include the advisor in their description of any of their test results. However, three participants reported an infantilized account of receiving their test results:

Let me have a think; it was seventeen. And then it went down, and down, and it went down, and it went, actually, to zero....Every week you'd get excited, you know, about what the reading was going to be. So—and you waited for it, you know. And it was just one of those daft things, I suppose. You know, we all like being daft kids, aren't we, even at our age?

With the exception of one client, test results were viewed as motivating because they acknowledged, and thus rewarded, abstinence. This was important because clients were reliant on signs for validation that their quit attempt was successful; for example: "I thought, God, Christ, all that, you know, suffering through the week, you know, working hard at nonsmoking.... You know, it was worth it, you know, to try again another week." Another client highlighted that CO monitoring was one of the most useful elements of the stop-smoking support he had received: "One of the most useful things I found about it was the CO-two<sup>2</sup> readings every week.... You know, you can't fool the machine, so it's difficult to fool yourself then."

By comparison, one highly motivated client noted that he had not found the monitoring helpful because of the strength of his conviction that he would be able to quit. Despite the client's reported lack of belief in the utility of CO testing, it is interesting to note that the client became enumerated in his understanding:

I didn't mind doing it. I don't think it was helpful or anything, because.... Well I don't know. The first reading was thirteen, and then after that then it was on two most times, one or two the reading was, but I wouldn't say that helped me give up

smoking. It didn't bother me that I'd done them, because I knew I was going to quit, like, because I wasn't smoking anyway. I wouldn't say it was helpful, and I wouldn't say it wasn't, and it didn't bother me at all.

The majority of respondents did not explicitly demonstrate an understanding of why a low CO test score was good; however, low scores were explicitly related to providing evidence of improved health by four participants. This was described as highly motivating when clients could not yet physically identify better health, or did not appear healthier to their friends and family:

You can't actually see that your health is improving; it's very subtle, isn't it?...And I may have added a couple of years to my life, but you can't ever prove that...but the CO-two readings were just sort of spot on.

### *Subjectivity, Lapsing, and Long-Term Abstinence*

Around half of the participants did not discuss lapsing within the context of their CO test, although all described their determination not to lapse within the context of their quit-smoking attempt. Only one participant reported that he had lapsed while attending treatment sessions. In his account, the participant showed his belief that the test was objective, and that he was worried about the effect his lapse would have on his score. He also credited CO monitoring with preventing any future lapses; however, in the client's account, he noted that the machine would be judging his future performance, rather than the group leader or other clients:

I had one cigarette during the week and....I was worried when I was blowing into the machine that this one cigarette could have ruined my whole week....[Afterwards] I was determined not to crumble because I didn't want to turn up to the session and blow into the machine and it would say, "No! You've started smoking again!"

In addition, 2 participants reported instances when other members of their group had lapsed. One of these clients stated that his advisor had been nonjudgmental and supportive, but the other felt that a high CO reading had stigmatized the client who had lapsed, and ultimately resulted in withdrawal from treatment. In the following quote, it is possible to see that the participant projected shame and embarrassment, as a result of the presence of others, onto the client who had lapsed:

Someone's reading did go up and we never saw them again....You really did have to do this meter reading, and I think it would have been better if it was optional, so that if you had have messed up in the week, you could maybe just

sort of, you wouldn't have to make a bit of a show of yourself....It was all right [for me] because I didn't cheat, but this one woman didn't ever come back, and I just thought, "Maybe if she hadn't had to stand up and blow on this meter and find out that it was really high, then maybe she'd have come back."

The reported threat of being "caught out" by CO testing provided specific motivation not to lapse for 6 clients. However, for one client this was intrinsically linked to having an audience comprised of peers, whereas other clients explicitly mentioned the advisor's role, and thus the concept of stigma found in the above account might not have been true for all clients:

I thought it was a good idea, because I think it's more of an incentive if there was other people there and they're getting the low score it's more of an incentive to do it I think....Not to have that sneaky cigarette. You couldn't because he [the advisor] would know.

I didn't want to seem like I'd failed in front of people, so I think it was beneficial to do it as a group, because it gives you a little bit more emphasis on trying to make sure you hit your target. I think maybe if it was individual there would have been a lot less pressure so, so I say pressure, but it would have been a little bit too easy to fail in terms of one person rather than as a group, so it did definitely help blowing into the little machine.

One client reported that she had found the regular scrutiny of a health professional so useful that when her treatment sessions ended, she had enrolled on a community pharmacy smoking-cessation scheme to continue to have her CO level monitored. The participant subsequently relapsed after 6 months of abstinence, approximately 2 months after her additional treatment sessions with the pharmacist had ended. Although the client reported that she had found the monitoring useful, she described the paternal relationship between the client and health professional as an undesirable long-term relapse-prevention strategy:

When I was doing it with the local chemist [pharmacist], I went down there to have my reading done there. And it did stop me from smoking, but you can't be babysat all your life, and kept going to have these readings done on a regular basis [laughs], can you?

In addition to the motivation provided at the time of monitoring for the vast majority of participants, CO monitoring had longer reported effects for some clients; for example, the written record of CO test scores was motivating to some clients. In particular, 2 clients noted that they had both kept their record card and knew where it was stored in their home several months after completing

their treatment sessions. Alongside this, one client reported that he found continued motivation not to lapse from the idea that his CO reading would have immediately escalated if he did relapse, despite the lack of opportunity for him to receive CO testing at the time of interview:

At least once a day I get the urge, and then I think, "Nah!" If I get that urge and have that cigarette, I'll be worse than ever, and then I won't be at one if I ever do blow in that thing again.

### *Subjectivity Within Group Behavioral Support*

As well as recalling their own CO readings, the majority of clients referenced the readings of other clients in their group. Many mentions were brief, but all highlighted a client who had been given a higher CO reading than the participant at that point in their smoking-cessation journey. Some of the participants particularly reported clients who were seen as a different kind of smoker to themselves. For example, one participant noted a client in her group who had produced an unusually high CO reading. By comparison, the participant's CO level was constructed as very low, and thus she identified herself as a more responsible smoker:

I mean one woman, they actually said they didn't know how she was still alive, because her reading was so high, and they said they'd never seen a reading that high before, because it was in the eighties or something like that....And I think mine had started off on about six or seven.

Other clients portrayed the difficulties in these less-successful clients' lives as a factor in their smoking trajectories. As such, from the comments quoted below, we learned that the client had caring responsibilities and that she had attempted, but not succeeded, to reduce the number of cigarettes she had smoked:

I think the highest we had in our group was twenty-five, and that was the lady with the autistic son. Well, she got it down to twelve, and then other times it was going up and then coming back down, but I don't think she got any lower than twelve. But I think two of us got down to one, and she [the advisor] said, like, "It's gone to zero but it won't sit there. One to zero is nothing really; that's where you want to be." And as I said, mine stuck at that one to zero through the whole course.

Encouraging comparison of CO readings was not part of the service's treatment protocol, and participants provided no evidence that advisors facilitated a spirit of competitiveness; however, it was reported that 3 of the clients were in competition with other members of their group.

For 2 participants, this was expressed as an internal desire to have a "better" score than other clients, with no overt discussion between clients. In this example, the client noted that he had also taken part in weigh-ins as part of a weight-management program, and thus he might have learned that health-promotion interventions were competitive:

You blow into the old meter to show what—if there's anything in your lungs, you know? And I think it's like everything else. I did Weight Watchers [a weight-loss program] many years ago, and I think it works the same way: You try to be better than the other people in the room, you know?

For other clients, this competition was a very open arrangement with other group members they had not previously known, which was seen to be beneficial to all of their quit attempts:

Each week you go, you like to try and beat them, kind of thing....Obviously we used to try and beat each other with our carbon monoxide scores....It got to be a weekly thing between three of us....So we used to always make a joke about things like that, really.

### **Discussion**

Guidance to stop-smoking practitioners (McEwan et al., 2006) stated that CO monitoring was highly motivating for clients, and our findings support this for highly engaged clients, most of whom were from managerial occupational groups. Participants reported that they believed test results were true, and none questioned the rationale for CO testing. Levels of enumeration in this research can be viewed as being on a scale, from fully enumerated to not at all enumerated. Despite this, the vast majority of participants reportedly found it motivating to receive their results, and a small group correlated a reduction in scores with "seeing" that their health was improving, whereas others valued having their abstinence acknowledged. One participant had lapsed, and used the immediate impact of his CO score as motivation to remain abstinent. A second participant reported that having a lapse identified via CO testing had led to withdrawal from the service.

The motivational aspects of CO monitoring were often constructed in terms of not wanting to be "caught out," and many clients recalled other clients' CO scores, whereas a minority actively compared readings with others in the group, thus showing the importance of group norms on the interpretation of test results (Hacking, 1986). Data saturation occurred regarding many of the themes discussed; however, additional data would have been valuable to more fully understand two phenomena:

first, the effect that CO testing has on those who have lapsed and second, the overt comparison of CO readings between members of group smoking-cessation services.

### **Who Does Surveillance in Stop-Smoking Services?**

Within the arena under investigation, CO testing facilitated three types of surveillance: by the advisor during the immediate time in which the test was taken; by other members of the group during the time in which all members of the group were tested; and by themselves throughout their entire 7-week treatment period as part of the “invisible gaze.” Thus, within smoking cessation, three elements of power were present: medical surveillance, self-regulation (Coveney, 1998), and peer judgment (Darmon, 2012). Although all participants expressed their intentions to stay smoke free while part of the treatment program, some appeared to be more empowered than others. Some participants became fully enumerated whereas others viewed their results in terms of verbal descriptors (Washburn, 2014), and others became infantilized (Foucault, 1963).

Participants identified the unequal power relationship with advisors, and for many the thought of being “caught” and identified as a smoker resulted in abstinence. Some participants explicitly related this to being caught by their advisor. Many others related this to the group dynamic—for example not wanting to be “the worst”—showing that power was shared between all members of the group (Foucault, 1972).

All clients framed their own behavior within that of the group, and gave accounts of clients who performed worse on the CO test than they had, showing that they were a more successful quitter (Hacking, 1986; Holdsworth & Robinson, 2008). This brought significant potential for shame and stigma for those who were performing poorly relative to the rest of the group. Participants stated that the potential to be identified as having lapsed in the presence of the advisor and the group provided a strong motivation not to smoke between sessions, and clients were strongly policing their own behavior to achieve a low CO reading during treatment sessions (Darmon, 2012). Stop-smoking advisors should carefully consider how they report test scores to clients. Training should be provided to ensure that clients do not experience stigma, or become disempowered by the inherent unequal power relations.

### **The Moral Dimension of CO Testing**

Our findings indicate that CO testing within the stop-smoking group setting had a strong social and moral

aspect, which acted as a motivator but also contributed to anxiety or stigmatization. By providing evidence that participants accepted as truth, CO testing did not allow for any subjective interpretation of behavior, and thus many clients contextualized their behavior in relation to the test results of others, creating a hierarchy of risk and acceptability of smoking behavior (Hacking, 1986; Holdsworth & Robinson, 2008). Furthermore, one participant indicated that a member of her group who had relapsed might have been stigmatized by her CO reading, or the group’s response to it, and subsequently left the group. This is an important issue to explore in greater detail in subsequent research, because CO monitoring could be motivating for those who have abstained from smoking but could have different effects for those who have failed to abstain.

Clients often discussed the threat of being “caught out” by CO monitoring as being an incentive to not have a cigarette when they were tempted between sessions. This monitoring could infantilize clients. However, it appeared that some clients responded positively to the monitoring, whereas others felt stigmatized by it, as in commercial weight-loss groups (Darmon, 2012). Participants in our research reported that CO testing could be a very effective tool for stop-smoking services, which fits comfortably alongside West et al.’s (2011) finding that services that routinely monitored clients’ CO levels were more successful in facilitating abstinence. However, our research highlighted that CO testing required careful management to ensure clients were not stigmatized or disempowered. Rates of dropout were high in NHS stop-smoking services, and it was not known which element(s) of the service resulted in a decision not to return; therefore, additional research is necessary to fully understand CO testing and to facilitate the development of additional training for stop-smoking advisors.

### **Conclusion**

CO monitoring was generally viewed by participants as being a useful motivating tool. However, the sample included a high proportion of successful quitters and clients reporting that they were from a managerial occupation; thus, additional research is needed to understand the impact of CO monitoring on those who do not quit, and on those from other occupational groups. In addition, some stop-smoking services now place most clients into one-to-one support, and it might be that the impact of CO testing varies without an audience. This warrants additional investigation. Whereas the social and moral incentive provided by CO monitoring was viewed as being helpful for those who had successfully stopped smoking, the issues of stigmatizing and demotivating those who



(re)lapse need to be considered, particularly given the tendency to compare ratings within the group.

Additionally, the long-term implications of this technique need to be considered, because CO monitoring might be helpful in the short-term but cannot be relied on indefinitely. Future investigations are needed to understand how motivation can be sustained independently having used CO testing as a motivational tool within stop-smoking services. Finally, in contrast to the sample in our study, who volunteered to take part in stop-smoking services and thus have their CO level tested, CO testing of pregnant women in the United Kingdom is currently mandatory (National Institute for Health and Care Excellence, 2010). Accordingly, research is required to understand this group's experiences of CO testing.

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### Notes

1. NHS Trusts are public-sector corporations that provide services to the publicly funded National Health Service.
2. It was relatively common for participants to mistakenly refer to CO (carbon monoxide) monitoring as "CO<sub>2</sub> [carbon dioxide] monitoring."

### References

Adams, C., Brown, P., Morello-Frosch, R., Brody, J. G., Rudel, R., Zota, A., & Patton, S. (2011). Disentangling the exposure experience: The roles of community context and report-back of environmental exposure data. *Journal of Health and Social Behavior*, 52(2), 180–196. doi:10.1177/0022146510395593

Adelswärd, V., & Sachs, L. (1996). The meaning of 6.8: Numeracy and normality in health information talks. *Social Science & Medicine*, 43(8), 1179–1187. doi:10.1016/0277-9536(95)00366-5

Altman, R. G., Morello-Frosch, R., Brody, J. G., Rudel, R., Brown, P., & Averick, M. (2008). Pollution comes home and gets personal: Women's experience of household chemical exposure. *Journal of Health and Social Behavior*, 49(4), 417–435. doi:10.1177/002214650804900404

Armstrong, D. (1995). The rise of surveillance medicine. *Sociology of Health & Illness*, 17(3), 393–404. doi:10.1111/1467-9566.ep10933329

ATLAS.ti Scientific Software Development GmbH. (2014). ATLAS.ti (Version 7) [Computer software]. Berlin: Author.

Bayer, R., & Colgrove, J. (2002). Science, politics, and ideology in the campaign against environmental tobacco smoke. *American Journal of Public Health*, 92(6), 949–954. doi:10.2105/AJPH.92.6.949

Becker, H. S. (1966). Whose side are we on? *Social Problems*, 14, 239–247. doi:10.2307/799147

Brose, L. S., West, R., McDermott, M. S., Fidler, J. A., Croghan, E., & McEwen, A. (2011). What makes for an effective stop-smoking service? *Thorax*, 66(10), 924–926. doi:10.1136/thoraxjnl-2011-200251

Clarke, A. E., Shim, J. K., Mamo, L., Fosket, J. R., & Fishman, J. R. (2003). Biomedicalization: Technoscientific transformations of health, illness, and US biomedicine. *American Sociological Review*, 68(2), 161–194. Retrieved from www.jstor.org/stable/1519765

Coveney, J. (1998). The government and ethics of health promotion: The importance of Michel Foucault. *Health Education Research*, 13(3), 459–468. doi:10.1093/her/13.3.459

Darmon, M. (2012). A people thinning institution: Changing bodies and souls in a commercial weight-loss group. *Ethnography*, 13(3), 375–398. doi:10.1177/1466138111-435871

Department of Health. (1999). *Saving lives: Our healthier nation*. Retrieved from [http://webarchive.nationalarchives.gov.uk/+www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH\\_4118614](http://webarchive.nationalarchives.gov.uk/+www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4118614)

Doll, R., Peto, R., Boreham, J., & Sutherland, I. (2004). Mortality in relation to smoking: 50 years' observations on male British doctors. *British Medical Journal*, 328(7455), 1519. doi:10.1136/bmj.38142.554479.AE

Feldman, M. S., Bell, J., & Berger, M. T. (2003). *Gaining access: A practical and theoretical guide for qualitative researchers*. Oxford: Altimira Press.

Foucault, M. (1961). *Madness and civilisation* (1967 ed.). London: Tavistock.

Foucault, M. (1963). *The birth of the clinic* (2009 ed.). London: Routledge.

Foucault, M. (1972). *Power/knowledge: Selected interviews and other writings* (1980 ed.). Brighton, Sussex, United Kingdom: Harvester Press.

Foucault, M. (1976). *The history of sexuality: An introduction*. London: Penguin.

Foucault, M. (1977). *Discipline and punish: The birth of the prison* (1991 ed.). London: Penguin.

Frich, J. C., Malterud, K., & Fugelli, P. (2006). Women at risk of coronary heart disease experience barriers to diagnosis and treatment: A qualitative interview study.

- Scandinavian Journal of Primary Health Care*, 24(1), 38–43. doi:10.1080/02813430500504305
- Graham, H. (2012). Smoking, stigma and social class. *Journal of Social Policy*, 41(1), 83–99. doi:10.1017/S0047279-41100033X
- Grant, A. (2011). Fear, confusion and participation: Incapacity benefit claimants and (compulsory) work focused interviews. *Research, Policy and Planning*, 28(3), 161–171. Retrieved from [http://ssrg.org.uk/members/files/2012/01/Grant\\_3.pdf](http://ssrg.org.uk/members/files/2012/01/Grant_3.pdf)
- Hacking, I. (1986). Self-improvement. In D. C. Hoy (Ed.), *Foucault: A critical reader*. Oxford: Basil Blackwell.
- Hacking, I. (1990). *The taming of chance*. Cambridge: Cambridge University Press.
- Hatcher, S. L. (1982). The psychological experience of nursing mothers upon learning of a toxic substance in their breast milk. *Psychiatry*, 45(2), 172–181. Retrieved from <http://psycnet.apa.org/psycinfo/1982-31541-001>
- Heatherton, T., Kozlowski, L. T., Frecker, R. C., & Fagerstrom, K. (1991). The Fagerström test for nicotine dependence: A revision of the Fagerstrom Tolerance Questionnaire. *British Journal of Addiction*, 86(9), 1119–1127. doi:10.1111/j.1360-0443.1991.tb01879.x
- Heppner, W., Ji, L., Reitzel, L., Castro, Y., Correa-Fernandez, V., Vidrine, J., & Cinciripini, P. (2011). The role of prepartum motivation in the maintenance of postpartum smoking abstinence. *Health Psychology*, 30(6), 736–745. doi:10.1037/a0025132
- Holdsworth, C., & Robinson, J. E. (2008). 'I've never ever let anyone hold the kids while they've got ciggies': Moral tales of maternal smoking practices. *Sociology of Health & Illness*, 30(7), 1086–1100. doi:10.1111/j.1467-9566.2008.01102.x
- Hung, K., & Shang, Y.-T. (2003). Implementation of a WAP-based telemedicine system for patient monitoring. *Information Technology in Biomedicine, IEEE Transactions on*, 7(2), 101–107. doi:10.1109/TITB.2003.811870
- Irvine, A. (2011). Duration, dominance and depth in telephone and face-to-face interviews: A comparative exploration. *International Journal of Qualitative Methods*, 10(3), 202–220. Retrieved from <http://php.york.ac.uk/inst/spru/pubs/2085/>
- Irvine, A. (2012). Telephone interviewing in qualitative research. In S. Becker, A. Bryman, & H. Ferguson (Eds.), *Understanding research for social policy and social work* (pp. 297–302). Bristol, United Kingdom: Policy Press.
- Lupton, D. (1995). *The imperative of health: Public health and the regulated body*. London: Taylor Francis.
- Lupton, D. (2012). 'Precious cargo': Foetal subjects, risk and reproductive citizenship. *Critical Public Health*, 22(3), 329–340. doi:10.1080/09581596.2012.657612
- Mason, J. (2002). *Qualitative researching*. London: Sage.
- May, S., & McEwen, A. (2011). Client satisfaction with English stop smoking services. *Journal of Smoking Cessation*, 6(01), 51–57. Retrieved from <http://connection.ebscohost.com/c/articles/61192272/client-satisfaction-english-stop-smoking-services>
- May, S., McEwen, A., Arnoldi, H., Bauld, L., Ferguson, J., & Stead, M. (2009). How to measure client satisfaction with stop smoking services: A pilot project in the UK National Health Service. *Journal of Smoking Cessation*, 4(1), 52–58. doi:10.1375/jsc.4.1.52
- McEwen, A. (2012). *NCSCCT Standard Treatment Programme: One to one smoking cessation support* (2nd ed.). London: National Centre for Smoking Cessation and Training.
- McEwen, A., Hajek, P., McRobbie, H., & West, R. (2006). *Manual of smoking cessation: A guide for counsellors and practitioners*. Oxford: Addiction Press, Blackwell.
- Michie, S., Hyder, N., Walia, A., & West, R. (2011). Development of a taxonomy of behaviour change techniques used in individual behavioural support for smoking cessation. *Addictive Behaviors*, 36(4), 315–319. doi:10.1016/j.addbeh.2010.11.016
- Miles, M., & Huberman, A. (1994). *Qualitative data analysis: An expanded sourcebook*. London: Sage.
- Miles, M., Huberman, A., & Sadana, J. (2014). *Qualitative data analysis: A methods sourcebook*. London: Sage.
- Morse, J. M. (2000). Determining sample size. *Qualitative Health Research*, 10, 3–5. doi:10.1177/1049732001291-18183
- National Health Service Employers. (2014). *Quality and outcomes framework*. Retrieved from [www.nhsemployers.org/your-workforce/primary-care-contacts/general-medical-services/quality-and-outcomes-framework](http://www.nhsemployers.org/your-workforce/primary-care-contacts/general-medical-services/quality-and-outcomes-framework)
- National Institute for Health and Care Excellence. (2010). *Quitting smoking in pregnancy and following childbirth*. London: Author.
- National Institute for Health and Care Excellence. (2013). *Smoking cessation—Supporting people to stop smoking*. London: Author.
- Novick, G. (2008). Is there a bias against telephone interviews in qualitative research? *Research in Nursing & Health*, 31(4), 391–398. doi:10.1002/nur.20259
- Office for National Statistics. (2014). *The National Statistics Socio-economic Classification* (NS-SEC rebased on the SOC2010). Retrieved from [www.ons.gov.uk/ons/guide-method/classifications/current-standard-classifications/soc-2010/soc2010-volume-3-ns-sec-rebased-on-soc2010-us-er-manual/index.html](http://www.ons.gov.uk/ons/guide-method/classifications/current-standard-classifications/soc-2010/soc2010-volume-3-ns-sec-rebased-on-soc2010-us-er-manual/index.html)
- Reyna, V. F., Nelson, W. L., Han, P. K., & Dieckmann, N. F. (2009). How numeracy influences risk comprehension and medical decision making. *Psychological Bulletin*, 135(6), 943. doi:10.1037/a0017327
- Sanjek, R. (1990). *Fieldnotes: The makings of anthropology*. Cornell: Cornell University Press.
- Seale, C. (1999). *The quality of qualitative research*. London: Sage.
- Shuy, R. W. (2003). In-person versus telephone interviewing. In J. A. Holstein & J. F. Gubrium (Eds.), *Inside interviewing: New lenses, new concerns* (pp. 175–193). London: Sage.
- Skubisz, C., Reimer, T., & Hoffrage, U. (2009). Communicating quantitative risk information. In C. S. Beck (Ed.), *Communication yearbook 33* (pp. 177–211). London: Routledge.
- Sturges, J. E., & Hanrahan, K. J. (2004). Comparing telephone and face-to-face qualitative interviewing: A research note.

*Qualitative Research*, 4(1), 107–118. doi:10.1177/14687-94104041110

Washburn, R. (2014). Measuring personal chemical exposures through biomonitoring: The experiences of research participants. *Qualitative Health Research*, 24(3), 329–344. doi:10.1177/1049732314521899

West, R., Evans, A., & Michie, S. (2011). Behavior change techniques used in group-based behavioral support by the English stop-smoking services and preliminary assessment of association with short-term quit outcomes. *Nicotine & Tobacco Research*, 13(12), 1316–1320. doi:10.1093/ntr/ntr120

West, R., McNeill, A., & Raw, M. (2000). Smoking cessation guidelines for health professionals: An update. *Thorax*, 55(12), 987–999. doi:10.1136/thorax.55.12.987

West, R., & Shiffman, S. (2004). *Fast facts: Smoking cessation*. Oxford: Health Press.

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