



## Women smokers' experiences of an age-appearance anti-smoking intervention: A qualitative study

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**Objectives.** This study was designed to investigate women's experiences of engaging in an age-appearance anti-smoking intervention.

**Methods.** Ten 18- to 34-year-old women gave accounts of their experiences after engaging in an age-appearance facial morphing anti-smoking intervention in interviews ( $n = 7$ ) and a focus group ( $n = 3$ ), and 37 women gave their accounts while they were engaged in the intervention. Transcripts were analysed using a thematic analysis broadly informed by the procedures of Grounded Theory.

**Results.** Women were very concerned about the impact of ageing on their faces in general, and in particular the additional impact of smoking on their skin. Women were concerned about other people's reactions to them as older smokers with wrinkled skin, and many experienced a physical shock reaction (including reports of nausea) to seeing how they would age if they continued to smoke. They reported that seeing their own face aged on the computer screen increased their perceived risk of skin wrinkling. Women reported being highly motivated to quit smoking as a result of the intervention, and many reported that they would take active steps to quit having seen how they would look if they continued to smoke. This was linked with increased perceived personal responsibility for quitting.

**Conclusions.** Results are discussed in relation to suggestions for anti-smoking interventions aimed at women in the 18- to 34-year-old age group. It is concluded that interventions incorporating age-appearance morphing techniques are likely to be effective in helping women to take active steps to quit smoking.

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One of the many factors that might be expected to act as a disincentive for smoking in young women is concern that smoking will age their skin. Smoking is linked to skin ageing and other negative effects such as yellowing of the teeth (Department of Health, 2010). Having youthful-looking skin is generally prized in Western cultures, and youth and beauty tend to be synonymous for women (Cepanec & Payne, 2000), evidenced by increasing numbers of women referring for facial cosmetic surgery to try to create the appearance of youth (Bordo, 2003) and the significant amount of money spent on cosmetics by British and American women (Grogan, 2008).

A recent study (Grogan, Fry, Gough, & Conner, 2009) investigated how young men and women smokers and non-smokers talked about the impact of smoking on appearance, with the aim of using these accounts to inform anti-smoking campaigns. Eighty-seven men and women aged 17–24 were asked to talk about impacts of smoking on appearance in focus groups. A thematic analysis of transcripts suggested that women non-smokers were very concerned about skin ageing, and that although smokers believed that smoking made them look ‘cool’, mature, and sophisticated, they were concerned about skin ageing and would quit if skin ageing and other negative effects on appearance became evident. One of the main barriers to believing that smoking would affect their appearance was the fact that they had not experienced any obvious impacts on their skin to date so did not believe that skin ageing was a realistic and self-relevant risk. It was concluded that appearance concerns are relevant to the decision whether to quit smoking, and that smoking-related interventions focusing specifically on appearance were worth further investigation.

The recent Department of Health ‘Give Up To Save Face’ smoke free campaign in the United Kingdom targeted young women who smoke, encouraging them to quit because smoking can damage their teeth, age their skin, and increase the likelihood of wrinkles around the eyes and mouth (Department of Health, 2010). This campaign was built on the assumption that fears about skin ageing and tooth damage are significant disincentives for young women in this age group. However, there are very few appearance-based interventions focusing on facial ageing in the existing literature (and no British work to date) and results from existing studies are inconclusive due to lack of control in study design. Most research on appearance and smoking tends to focus on concern about weight gain relating to smoking cessation rather than more general appearance issues (Grogan, Hartley, Fry, Conner, & Gough, 2010).

Women smokers in the Grogan *et al.* (2009) study did not believe that skin ageing was a realistic and self-relevant risk. We decided that, to be effective, an intervention needed to convince women smokers that the risk to facial appearance was both realistic and self-relevant. One potentially very effective way to highlight self-relevance is to show young women realistic images of effects of smoking on their own faces. This has recently become possible through the development of sophisticated computer techniques such as age-progression software. This may be an important mechanism for making a valued long-term outcome more immediate and so more likely to influence behaviour (Hall & Fong, 2007). Most age progression software enables a digital picture of a person’s face to be aged up to around 80 years-old. Developments in software have now made it possible to show the differential effects of not smoking versus smoking (Hysert, Mirand, Giovino, Cummings, & Kuo, 2003; Semer *et al.*, 2005). This is achieved through using wrinkling/ageing algorithms that are based on photographs of groups of smokers and on published data relating to specific effects on the skin produced by smoking (Hysert *et al.*, 2003). A digital photograph is taken of the participant, and within 5 minutes a series of pictures can be produced showing how

the person's face would look with and without smoking at 1- to 2-year intervals as they age.

Pre- and post-demonstration responses using age-progression software have been shown to be significantly different. In one of the few controlled studies in this area, Hysert *et al.*'s (2003) US smokers reported significantly lower intentions to smoke after the presentation, and never-smokers showed attitude change on the question 'Do you think people risk harming themselves if they smoke one or less than one cigarette a day?' However, studies to date have not investigated whether these patterns of response are found in British samples, and without interviews or focus groups to look in depth at factors influencing behaviour change, such studies leave important questions unanswered. On the plus side, interventions using age-progression software are quick, easy, and relatively cheap to implement and have been shown to have significant short-term effects on smoking-related attitudes and behavioural intentions in Hysert *et al.*'s American sample and so are certainly worth further investigation.

This study was designed to investigate young women's experiences of engaging in an age-appearance morphing programme, to develop previous work from Grogan *et al.* (2009) that suggested that to be effective, interventions needed to convince women smokers that the risk to facial appearance was both realistic and self-relevant. We showed women smokers how their faces would age with and without smoking and recorded what they told us about the experience. We wanted to access women's in-depth, first-hand accounts of engaging in the programme to see how effective it might be in enabling women to quit smoking, and to investigate how women experienced seeing how their faces would age with and without smoking. To this end, we interviewed 10 women after they had engaged in the programme and also tape-recorded 37 other women's reactions while they were actually engaged in the intervention. We were also interested in whether being a parent or being pregnant might influence women's reactions to the intervention, expecting that appearance-related messages might be less effective with women who were parents or pregnant (who might be more concerned about health issues related to smoking than appearance), so we asked women about their parental status and whether they were pregnant so that we could compare themes that emerged from these different groups of women.

## Method

### *The intervention*

APRIL age progression ['morphing'] software was used in this study. This enabled a digital picture of a person's face to be aged using wrinkling/ageing algorithms that are based on photographs of a group of 2,000 people and on published data relating to specific effects on the skin produced by smoking (Hysert *et al.*, 2003). A trained Research Assistant (the second author) seated the participant in front of the laptop computer with a full view of the screen. Clothes were adjusted slightly if necessary so that there was a clear view of the woman's face and neck and three digital photographs were taken of her head and shoulders in slightly different lighting to ensure a clear final picture that was selected for the intervention. The software then morphed the woman's face and produced two pictures on the screen showing how her face would be likely to look in 2-year intervals (a) with and (b) without smoking. Pictures were aged from current age up to 72 years-old (the age-limit for the APRIL programme). Participants were also shown how the 'non-smoking' picture could be switched backwards and forwards to a 'smoking' image to enable them to see clearly the differences in facial wrinkling and other smoking-related

changes between the two images. Participants were able to look at the images for as long as they liked and to adjust the time-line as many times as they wished to consider the impact of smoking at different ages. The pictures were also rotated to show the impact on facial ageing in three-dimensions (3D) that enabled clearer viewing of the depth of facial wrinkles. In the 3D condition, women's hair was removed from the photograph to enable focus on facial features. The intervention sessions lasted between 6 and 14 min.

### **The facilitator/interviewer**

The Research Assistant who administered the interventions and ran the interviews and focus groups was a 24-year-old woman (the second author) who does not smoke.

### **Participants**

All women were between 18 and 34 years-old and were recruited from the 'Quit for a New Life' smoking cessation service in Stoke on Trent, UK so were already considering quitting smoking. Women were pregnant and child free ( $n = 7$ ), pregnant with children ( $n = 6$ ), not pregnant and child free ( $n = 8$ ), and not pregnant with children ( $n = 26$ ). Self-defined ethnicity was not recorded. All women were able to understand English and all self-defined as current smokers when recruited. By the time the intervention took place two had commenced a quit attempt but none had reached the 4-week quit target recommended by West, Hajek, Stead, and Stapleton (2005). All are described by pseudonyms below to protect their identity. Women smoked between one and five and 21–25 cigarettes per day with a mode of 11–15 cigarettes per day. We wanted to discuss with women their experiences of the intervention both as they were engaged in it (to record their initial reactions) and afterwards when they had had a chance to think about the experience, so 10 women were asked to reflect on their experience of the intervention retrospectively and 37 provided accounts while they were engaged in the intervention. The latter group also took part in a larger study (Grogan *et al.*, In Preparation) to investigate the impact of the intervention on quantitative indicators of attitude and behaviour change.

### **Materials**

Age Progression Software: APRIL (CORE Digital Productions) age progression software, laptop with built-in camera, audio-recorder.

A list of questions was composed based on previous work and used in both phases of the study covering a range of topics. Women were asked about general experiences of using the morphing programme, before-after comparisons, possible improvements to the programme, user-friendliness of the programme, potential as a recruitment tool for smoking cessation services, programme presentation and any problems with this, and any continued perceived barriers to quitting smoking.

### **Procedure**

Forty-seven women gave accounts of their experiences of the age-appearance intervention; 37 while they were actively engaged in the intervention and 10 after having completed it. Most of the 37 participants who provided concurrent accounts took part in the intervention in their homes, although seven took part in the study at Children's Centres around Stoke on Trent. While they engaged in the intervention, we asked them

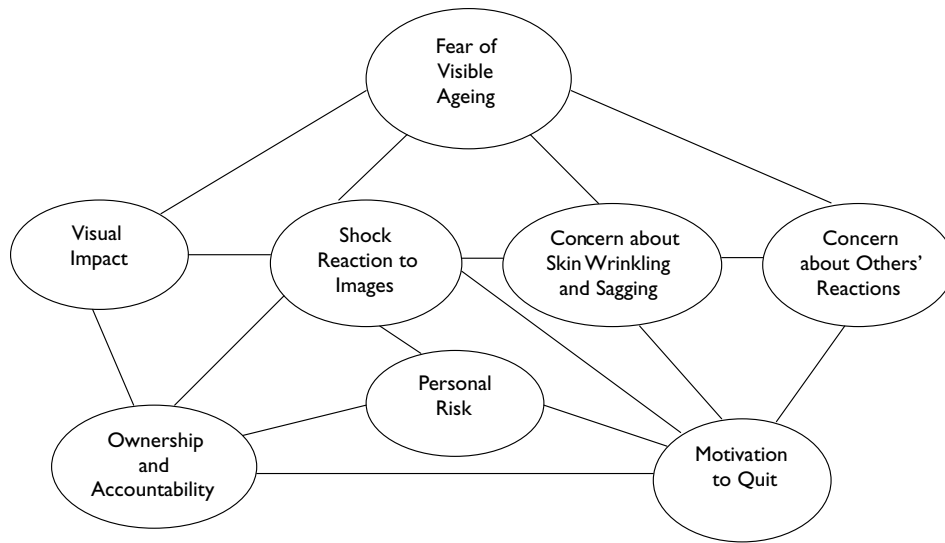
to discuss the areas above, focusing in particular on their experiences of completing the task, and we also audio-recorded their reactions to the intervention with their permission. Sessions ranged between 6 and 14 minutes. Women were debriefed at the end of the intervention and given contact details for the facilitator so that they could follow-up with any queries. Ten different women discussed their experiences retrospectively. Seven chose to be interviewed alone and three to take part in a focus group. After giving informed written consent, women completed the morphing task individually and then took part in either the focus group or an interview. One participant was interviewed in a quiet space at the University and all others in their homes or the homes of other participants. Focus groups and interviews were audio-recorded. The focus group lasted 28 minutes and the interviews ranged between 20 and 45 minutes. The interviewer/facilitator built up a good level of rapport with participants before the tape-recorder was switched on for the interviews and focus group enabling women to feel comfortable with her and producing a good degree of disclosure, and sessions only closed when participants reported that they had said all they wanted to say about their experiences. Women were asked to reflect on the experience of completing the task and any effect on their intention to smoke. They were told that we were piloting the intervention and any comments on how to make it more effective would be recorded. Women in the focus group were encouraged to discuss their views among themselves, with minimal input from the facilitator. They were debriefed at the end of the focus groups and interviews and given contact details for the facilitator should they wish for any more information about the study.

### **Data analysis**

All interview data were transcribed, including the facilitator's speech. In the transcripts below round brackets are used to indicate pauses, and (.) to indicate a pause of less than one second. Pseudonyms are used to protect the identity of the participants. RI after the participant name indicates retrospective interviews, RFG means retrospective focus group, and CRC concurrent report condition. The notations P (pregnant) and NP (not pregnant) are used to indicate pregnancy status below, and C (children) and NC (no children) to indicate parental status. Participant age is also given in years, and line numbers from transcripts are also indicated.

Data from women who had reported retrospectively and concurrently were combined for analysis. Transcripts were submitted to a thematic analysis adopting a critical realist perspective, recognizing that it was possible to acquire an insight into women's experiences of the intervention through their accounts, but also that we as researchers had a role in constructing knowledge (Madill, Jordon, & Shirley, 2000; Willig, 2001) and broadly informed by the procedures of Grounded Theory (Strauss & Corbin, 1990). The analysis summarized the accounts produced by the participants through the development of abstract categories to integrate and explain the data. This involved several phases of analysis in which we attempted to develop an understanding of how these young women talked about the experience of taking part in the intervention.

The analysis, informed by guidelines produced by Strauss and Corbin (1990), involved line-by-line open coding to identify initial categories, axial coding where relational sampling and constant comparison were used to modify, confirm and elaborate categories combining similar and related categories and investigating the relationships between them, and selective coding with systematic sampling from both sets of transcripts to confirm and verify the categories and to make changes where necessary, examining



**Figure 1.** Core category and links between categories.

negative instances, and ensuring that theoretical saturation had been achieved so far as possible. The core category Fear of Visible Ageing was chosen on the basis (following Holton, 2010) that it is central to accounts, relates to as many other categories and their properties as possible, and accounts for a large proportion of the variation in accounts. Categories and themes were validated by the second author, and then with the third author through face-to-face discussion prior to determining the final model (Figure 1). This analysis led to a series of interlinked categories that are described below.

## Results

The model (Figure 1) applied to women irrespective of their parental status, age, or whether they were pregnant. Comparisons between sub-groups indicated that there was evidence of each category within each sub-group, and although we have been selective in choices of quotes to save space, we have chosen quotes from each sub-group to evidence this.

### ***Fear of visible ageing: 'I don't want to get wrinkly and old'***

The core theme was Fear of Visible Ageing, linked with visceral/emotional shock reactions to the visual appearance of the images and concern about these physical changes and other's reactions to them (Figure 1). All women reported being scared of the impacts of ageing on their skin. Many reported anxiety about how they would look as they aged even before seeing the aged morphed images. Women used words such as 'nervous', 'apprehensive', 'anxious', and 'scared' to describe how they felt before seeing the images. For instance:

I just, I don't know. I'm interested though because obviously you always want to know what you're going to look like when you're older but I'm a bit scared (Camilla, NP, C, age 34 years, CRC, L 33–38);

I'm a bit nervous to see what it looks like (Elizabeth, NP, C, age 27 years, CRC, L36).

All women reported that visible ageing scared them. For instance:

It scares me getting old (Sarah, P, NC, age 20 years, CRC, L71);

Hmm (2) yeah I don't want to get wrinkly and old [laughter] (2) makes you think about skin care (Rebecca, P, NC, age 18 years, CRC, L50-51).

For many, the main fear was the unknown. For instance:

I didn't know what, what to expect as in I didn't know (1) how I would look in the age process (Olivia, NP, C, age 31 years, CRC, L120-123).

None of the women said that they felt positive about ageing or that they felt that ageing would improve the way that they looked.

### **Shock reaction to images: Feeling physically sick**

Reaction to seeing themselves after smoking was even more extreme and women reported that they were more shocked by the 'smoking' images than by the 'non-smoking' images. All women in the concurrent report condition reported shock at the difference between the two images, linked to fear of ageing. For instance:

Quite shocked really to see how many wrinkles and how it does age ya' (Tracey, NP, C, age 27 years, CRC, L73);

So it's really (1) shocked me that has (Diane, P, C, age 30 years, CRC, L95-99).

There was also a consistent physical reaction to seeing the impact of smoking on their skin with many women reporting that they felt sick or nauseous in reaction to the 'smoking' picture. For instance:

Sick, I felt sick when I saw it (Jackie, NP, C, age 24 years, RFG, L168);

I felt sick, my tummy was turning it was (Adele, NP, C, age 26 years, CRC, L91);

Just, it just makes you want to throw up doesn't it? (Beth, NP, C, age 26 years, CRC, L74-78).

In total, seven women across the two conditions reported feeling physically sick as a result of seeing the 'smoking' image.

### **Visual impact: Making changes associated with smoking 'real'**

The impact of the intervention was linked to making the long-term effects of smoking on the face visible. For instance:

It makes it a bit more real when you see things like that rather than someone saying "oh don't smoke it's bad" actually seeing this is what you're going to look like (Matilda, NP, C, age 19 years, CRC, L113-118).

This brought the long-term impact of smoking into the present, producing a strong negative reaction. Seeing changes presented on the computer screen helped women to visualize the impact of smoking and made it more real. For instance:

Yeah you can sort of picturize yourself and it sort of flips backwards and forwards and you can see a true difference of what it can do (Eleanor, NP, NC, age 26 years, RI, L183-184).

Women reported that seeing the 'smoking' image on the computer screen had convinced them that smoking was damaging and that others would be persuaded to give up smoking, if they were exposed to the intervention. For instance:

I think that a lot of people when they smoke they don't really look at the differences it can make to their looks or appearance erm but I think if people can see this and it's out there then maybe they might do something about it you know (Fay, NP, C, 30 years, RI, L110-112).

### **Concern about skin wrinkling and sagging**

Directly linked to fear of visible ageing, women were concerned by the differences between the two (smoking and non-smoking) morphed faces. For instance:

You know it definitely shows what the differences are between the two faces (Hayley, NP, C, 29 years, RI, L348);

Yes there is a lot of difference isn't it (Imogen, NP, NC, 25 years, RFG, L34).

Many used the words 'horrible', 'vile', and 'disgusting' to describe the look of their face aged with smoking. For instance:

Oh that's disgusting (5) (Cheryl, NP, C, age 34 years, CRC, L50).

All women said that the main things that caused them concern and made them look old were the wrinkles in the forehead and around the mouth and looseness of skin (skin sagging). For instance:

I need to quit smoking cause I'm not having wrinkles like that ok (Jackie, NP, C, age 24 years, RFG, L95);

Yes cause I don't want to be wrinkly then [laughter] (5) just the face looks all saggy I don't like that (2) I definitely don't like that (1) (Sarah, P, NC, age 20 years, CRC, L66-67).

These became particularly obvious when the morphed pictures were presented in 3D and rotated so that depth of wrinkles became apparent:

Yeah it's definitely making me want to quit now I don't want all them frown lines [laughter] (Tracey, NP, C, age 27 years, CRC, L58-59).

### **Concern about others' reactions: Social pressure to look young**

Tied in with fear of visible ageing, many women made specific mention of concern about other people's likely reactions should they start to look like the smoking-aged image in the future. For instance:

I don't like how I look like there. And I'm not a particularly really vain person but obviously being female we all like to look nice and stuff, um (1) and make up can only do so much, do you get what I mean (Olivia, NP, C, age 31 years, CRC, L111-115).

There was concern that romantic partners would be less attracted to them:

I thought oh my boyfriend's going to hate me when I'm that old [laughter] (Eleanor, NP, NC, age 26 years, RI, L171).

Also that their children would not like them to look wrinkled:

If my son goes to university in 10 years time he'll probably be graduating and everything and what would I look like on his day in the photographs (Fay, NP, C, age 30 years, RI, L532-534);

Oh that's horrible (2) oh you don't want mummy looking like that do you? (1) Oh that's horrible (3) (Cheryl, NP, C, age 34 years, CRC, L35-36).

No woman reported that she would like to look older for those around her and all were very concerned about others' reactions to them if they aged as in the smoking-morphed picture.

**Personal risk: The importance of self-relevance of the morphed image**

Seeing their own face on the screen had convinced women that they were *personally* at risk of skin ageing through smoking. Linked to the Shock Reaction category, it was crucial to these women that it was their own face that was morphed. For instance:

Yeah it makes me think now if I-if I smoke then I'm gonna look like that and I don't want to look like that (Emma, NP, C, age 18 years, CRC, L82-83);

I really don't want to smoke if that's what I'm going to look like (Nicola, NP, C, age 25 years, CRC, L76).

Many women stressed that it was seeing what they *themselves* would look like, if they continued to smoke that was the most effective part of the intervention for them in terms of prompting them to quit smoking (linking to Motivation to Quit, and Ownership and Accountability below). For instance:

This photograph is more personal (Jasmine, NP, C, age 26 years, RFG, L235);

If you carry on smoking this is you at 30 this is what you're going to look like at 60 cause that's what's going to make people stop and look at it (1) not the silly photographs at the back of the cigarette packet (Fay, NP, C, age 30 years, RI, L417-410).

**Ownership and accountability: Taking responsibility for quitting smoking**

One of the most interesting categories to emerge was Ownership and Accountability where women acknowledged that they were responsible for quitting smoking, taking ownership of their quit attempts, and accepting responsibility for smoking cessation. This was directly linked to Visual Impact. For instance:

But I do I it does make you think about you know what you're doing to your skin and the damage your doing really (Hannah, NP, NC, age 23 years, CRC, L112-113).

Many women reported that they were not responsible for health effects of smoking, but that they were responsible for the impacts on their faces. For instance:

Yeah so that gives you a sense of reality then and makes it sort of your own ownership (Kelly, P, NC, age 24 years, RI, L456).

Women suggested that they did not relate to damage to their internal organs in the ways that they related to damage to their faces, and the fact that smoking had an impact on their faces made it a significant concern:

It's showing your face and you relate more to your face than an organ you don't see (Hayley, NP, C, age 29 years, RI, L361).

Several women reported that they were shocked (linking with Shock Reaction above) at what they were doing to their faces by smoking and now felt responsible for giving up. For instance:

What am I doing to myself? Yes, that's my face (Imogen, NP, NC, age 25 years, RFG, L183).

### **Motivation to quit: Taking the next step**

Twenty-four out of 37 women reported that the intervention had made them determined to quit smoking and that they would now take concrete steps to quit. For instance:

It has definitely like triggered me to not smoke a lot more compared to if I hadn't seen it (Hayley, NP, C, age 29 years, RI, L320);

Yeah (1) it's definitely made me more I'm definitely yeah (3) I'm going to quit (Chloe, P, C, age 26 years, CRC, L73);

Looking at that does make me want to quit for definite (Tracey, NP, C, age 27 years, CRC, L113).

Many reported that they would now make an appointment to see the Stop Smoking Advisor and used words like 'determined' to describe how they now felt:

I really need to pack in. It has made more determined to pack in (Fay, NP, C, age 30 years, RI, L279);

I'm never touching a fag again (Emma, NP, C, age 18 years, CRC, L64).

## **Discussion**

### **Summary of results**

Asking some women to think retrospectively about the experience of the age-appearance morphing programme and others to talk to us as they engaged in the intervention programme enabled us to access women's immediate experiences of the intervention and also to glean more complex accounts when some had a chance to think about the experience for a few minutes afterwards. The key factor underlying women's experiences of the programme was fear of visible ageing (Figure 1) that was linked directly with emotional/visceral reactions to the visual images and concerns about reactions of others, and indirectly to issues of self-relevance such as personal risk, ownership, and motivation to quit. This was found across sub-groups of women and (like other categories) was unaffected by pregnancy, parental status, or age within this 18- to 34-year-old group. Even before they had seen the aged images, women in the concurrent report condition reported anxiety about what they would look like as they aged. Seeing themselves either with or without smoking as they aged produced a fear and anxiety reaction. This is perhaps not surprising in a Western societal context where women are expected to look youthful (Cepanec & Payne, 2000) and where looking young and being perceived as attractive are culturally enmeshed (Bordo, 2003; Grogan, in press).

Seeing the differences in their faces when they were aged with smoking compared to without smoking produced most marked impact on participants. All participants in the concurrent report condition expressed some form of shock reaction in response to seeing their smoking-morphed face. No woman reported that she preferred her face with smoking and many reported feeling physically sick when they were exposed to this image. This shock reaction was consistent across women and we were careful to ensure that all women were thoroughly debriefed at the end of the session and left the session feeling well, as although we wanted to encourage them to be motivated to quit smoking we did not want to make them feel ill. Following suggestions from various authors (e.g., Lerman *et al.*, 1993), we also did not want women to be so worried about the appearance risks that they avoided thinking about the intervention afterwards. Women explicitly linked this shock reaction with their intention to quit smoking. Protection Motivation Theory would suggest that raising awareness of personal vulnerability (as this intervention seems to have done) would be likely to impact on threat appraisal and promote protection motivation and behaviour change (Rippetoe & Rogers, 1987). Certainly women's responses suggested that they now believed that skin ageing was a serious and self-relevant threat, that the response required to reduce the threat was within their reach, and that they intended to change their smoking behaviour.

Women reported that it was seeing the likely impact on their *own* faces that had convinced them to quit, emphasizing the importance of self-relevance of the images shown. The importance of showing women images that are self-relevant links with suggestions from previous focus group work where smokers reported that they did not believe that smoking would have an impact on their own faces and said that if they started to see an impact of smoking on their own skin they would stop smoking (Grogan *et al.*, 2009). Women generally reported feeling responsible for maintaining the look of their faces, and changing their behaviour to avoid unnecessary skin damage, although they did not feel responsible for their health. This was partly explained as being the result of not 'relating to' internal organs due to their invisibility, whereas their face was visible (to themselves and others). Making the effects of smoking visible was key to the impact of the intervention according to these women. Showing young women how smoking will affect their skin in the future brings a long-term risk into the present, making it easier for them to believe that smoking will affect their own skin. This may be an important mechanism for making a valued long-term outcome more immediate as suggested by Hall and Fong (2007). Seeing the differences that smoking would make to their own skin in the future convinced these young women that the risk was relevant to them in the present.

Linked to concern about visible ageing was fear of others' reactions to their smoking-aged faces, and there was general agreement that both romantic partners and their children would not respond positively to them as they aged with smoking. This had a direct impact on motivation to quit. Social pressure and perceived social support can have a significant impact on young women's (and men's) smoking (Fry, Grogan, Gough, & Conner, 2009; Gough, Fry, Grogan, & Conner, 2009; Grogan *et al.*, 2009), so the realization that others may react negatively to them if they continue to smoke has the potential to be a significant disincentive for smoking.

### **Implications for smoking cessation**

Raising concerns about facial ageing using a morphing intervention seems to be a highly effective tool for helping to motivate women to take active steps to plan their quit

attempt, and equally effective in women varying on parental and pregnancy status, and in stage of young adulthood within the 18–34 years range. Making long-term changes visible and immediate led to the majority of women who took part in these two studies reporting that they now intended to quit smoking. Findings support Hysert *et al.*'s (2003) suggestion that facial ageing technology can be an effective smoking cessation tool. Women reported that they had enjoyed seeing their morphed faces, and it was relatively easy to recruit women smokers into the intervention, as they were interested to see the impact of smoking on their faces. This suggests that the intervention may also be a useful way to recruit women into stop-smoking services. This is a novel, short, and interesting intervention that many women will enjoy, although they will find it challenging in terms of raising concerns about long-term effects of smoking on their skin. Semer *et al.* (2005) suggested that concern about facial wrinkling may act as an effective incentive to join a smoking cessation programme, and our findings support this. Twenty-four women reported at the end of the intervention that they were now motivated to start their quit attempt.

#### **What does this study add to previous work on effectiveness of age-appearance morphing interventions?**

Prior to this study, only two published studies (Hysert *et al.*, 2003; Semer *et al.*, 2005) had looked directly at the impact of age-appearance morphing software on smoking. Both previous studies focused on smoking intentions and attitudes in young people (Hysert *et al.*, 2003, 9–25 years; Semer *et al.*, 2005, 14–19 years) in the United States involving closed-ended questions relating to attitudes and behavioural intentions. The current study focused on a British sample and on adult women and investigated in-depth experiences of engaging in the morphing programme. Through looking systematically at what women told us, we have gained some understanding of how adult women smokers might experience this kind of intervention, and what factors seem to underlie its effectiveness. This has already helped us in designing a randomized controlled trial to be reported separately and in making recommendations to people using this technique in public health contexts.

#### **Limitations**

There may have been some implicit pressure on women to tell us that they found the intervention effective and that they were going to change their smoking behaviour. Since women were introduced to us through National Health Service (NHS) staff and since they knew that we were piloting an intervention designed to enable women to quit smoking, it may have been difficult for them to say that their intentions to quit smoking were not affected by the intervention. However, their shock reactions to the differences between the two images, consistent across women in the concurrent report condition, did not appear 'staged', and we were convinced that they were surprised and shocked by what they saw and that their reported intentions to quit were genuine. These women may also have been more motivated to quit than other women smokers, since we accessed them through the Stop Smoking Service. However, ongoing work comparing these women to others recruited through the Stop Smoking Service who have been exposed to NHS anti-smoking materials instead of this morphing intervention (who are arguably under similar pressures to report intentions to quit smoking) has suggested that intentions to

quit can be differentiated between the two groups. Also, as with any intervention, the impact of the person administering it may be an important factor in its effectiveness. The Research Assistant who administered the intervention is extremely positive about the intervention and may have enthused the women who took part, making it more likely that they reported a positive impact on their intentions to quit smoking. Future work with other programme administrators will determine the importance of this in terms of programme effectiveness.

#### **Future research directions**

The next stage is to test the effectiveness of this morphing programme using randomized controlled trials. We are currently in the process of determining effects of the programme on quantitative measures of attitudes, behavioural intentions, and behavioural measures such as smoking (including an objective CO measure) and perceived addiction to smoking, comparing a group of women exposed to the intervention with a control group. We are also designing a study to investigate impact of the intervention on men's smoking behaviour. It may be that the differential social pressures on men and women to look youthful (Bordo, 2003; Grogan, in press) mean that men are less affected by this intervention. Another issue that emerged from the current study was that women said that the intervention should be used in schools to reduce smoking initiation in adolescents. In an additional investigation, we are looking at the impact of the intervention on adolescents.

#### **Conclusions**

This study investigated women's experiences of a facial morphing technique and showed that women were very concerned about the impact of smoking on their skin. All women found the difference between the smoking and non-smoking images shocking. Seeing their own face aged on the screen increased their perceived personal risk of skin wrinkling caused by smoking and women reported being highly motivated to quit smoking as a result of the intervention. The intervention led to reports of increased perceived personal responsibility for quitting and women were very concerned about other people's reactions to them if they continued to smoke and damaged their skin. This study suggests that interventions incorporating age-appearance morphing techniques are likely to be effective in helping women to take active steps to quit smoking. The intervention was well received by the women who took part and they were interested to see how their faces would change with and without smoking. It was a novel experience for them, and although they found it shocking, they generally enjoyed taking part in the intervention. For this reason, this kind of age-appearance intervention may be a good way to encourage women to refer to stop-smoking services. The intervention was quick and easy to implement and relatively cheap compared with the alternatives. We have also shown here that it had marked short-term effects on reported smoking-related attitudes and behavioural intentions in the women who took part in our study.

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