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Running Head: Social-cognitive and emotional factors on testicular self-examination

## The Role of Social-Cognitive and Emotional Factors on Testicular Self-Examination

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### **Abstract**

*Objective:* This study determined the role of social-cognitive and affective factors in promoting testicular self-examination.

*Methods:* Male participants (N = 115) rated their perceptions of testicular cancer, social-cognitive variables (attitude, subjective norm and perceived control), and their emotions towards testicular cancer (anxiety and shame) and testicular self-examination (anticipated regret and relief). Participants also stated whether or not they had performed a testicular self-examination within the last month.

*Results:* Perceived control and anticipated relief positively predicted testicular self-examination within the last month. Both these factors also positively predicted the intention to self-examine in the future. Intention was also positively predicted by attitude and negatively predicted by shame.

*Conclusions:* These results highlight the importance of social-cognitive and emotional factors in promoting health screening. Targeting these factors might improve the effectiveness of testicular self-examination interventions.

**Keywords:** Cancer; Oncology; Testicular self-examination; Screening; Emotions

## Background

Young men are more likely to be diagnosed with testicular cancer than any other form of cancer, with over 2,000 men in the UK being affected by the condition each year [1]. Worryingly, incidences of testicular cancer have doubled in the last 40 years [2], and recent statistics indicate this trend will likely continue in the future [3]. As with most cancers, early detection is likely to substantially increase survival rates [1]. Unlike most other forms of cancer, men can perform an initial testicular screening without liaising with medical professionals. This involves men examining their testicles for lumps or abnormalities. Therefore, it is relatively easy for men to detect potentially cancerous lumps at an early stage. Despite the ease of self-examination and the fact that this is an incredibly curable condition, very few men regularly perform testicular self-examination [4,5]. Therefore, the aim of this research is to determine factors that promote and prevent testicular self-examination.

The theory of planned behaviour suggests that behaviour is guided by three social-cognitive factors: people's attitudes towards the behaviour (attitude), whether they believe significant others (i.e., friends and family) support the action (subjective norm), and their beliefs about the ease at which they can perform the action (perceived control) [6]. In this model, these factors predict people's intention to undertake the action, which in turn predicts behaviour. In line with this theory, research has demonstrated that testicular self-examination is predicted by attitude [7], subjective norm [8], and perceived control [9].

The theory of planned behaviour constructs have been shown to be influential in predicting health screening behaviours. However, it is also important to consider the role of emotional factors [10,11,12]. Although there is an affective component to attitudes [13], this is based upon more basic emotions and is unlikely to incorporate the variety of complex emotions that may guide behaviour [14]. Indeed, research has indicated that these complex emotions may be stronger predictors of some health behaviours than social-cognitive factors

[15,16]. There are a variety of emotional factors that are likely to promote and deter screening behaviours such as testicular self-examination.

*Anxiety and shame.* Thinking about testicular cancer may cause men to feel anxiety and shame. These emotions may stem from having a condition [7,17], losing one's masculinity through the removal of a testicle [18,19], and visiting healthcare professionals [20,21]. Moreover, both these emotions are associated with avoiding health screening [22,23,24]. Therefore, anxiety and shame might act as a barrier to testicular self-examination.

*Anticipated regret.* Although emotions are often regarded as having a detrimental effect on health behaviours [20], there is evidence to suggest that emotions may also serve a beneficial self-regulatory function [14,25]. One beneficial emotional factor that has received considerable attention in the health domain is anticipated regret [11]. Anticipating regret for not engaging in a health behaviour has been found to increase exercise [26], condom use [27] and organ donation [15], and decrease binge drinking [28]. Anticipated regret has also been associated with screening behaviours. Indeed, anticipated regret increases cervical screening attendance [16] and, most relevant to the current study, positively predicts men's intentions to engage in testicular self-examination [7,8].

*Anticipated relief.* The vast majority of the health literature has focused on the role of negative emotions on screening attendance. However, both positive and negative anticipated emotions have been found to predict health behaviours [29,30]. Rarely, however, have researchers considered whether positive anticipated emotion predicts screening behaviour. Conducting regular testicular self-examinations may result in men feeling a sense of relief because they can be reassured there are no lumps or abnormalities on their testicles. The anticipated relief of performing a testicular self-examination may motivate men to regularly undertake this action. Therefore, anticipated relief might positively predict testicular self-examination.

### ***The Present Study***

The research cited above suggests there are a number of social-cognitive and emotional factors that might predict testicular self-examination. Although some research has assessed the role of emotions on testicular self-examination [7,31], this work has generally assessed the role of one or two emotions on self-examination. As such, it is difficult to determine the unique predictive power of different affective factors. Therefore, the current study extended research in this area by assessing the unique predictive power of a variety of emotional factors (anxiety, shame, and anticipated regret and relief) on testicular self-examination. Moreover, this study adds to the health literature by assessing the role of anticipated relief in predicting screening behaviour.

## **Methods**

### ***Participants and Design***

This study was conducted at a university in the north of England between December 2014 and May 2015. Male participants were recruited through contacts, adverts on social media websites and university email lists for both staff and students. Participants were informed that to take part they must be male, 18 years or older, and must not have been diagnosed with testicular cancer. A total of 155 participants started this online study. There were 40 participants who did not complete the study and were thus removed from the sample. Therefore, the final sample consisted of 115 men. Participants were aged between 18 and 62 years ( $M_{age} = 30.37$ ,  $SD_{age} = 12.04$ ). Participants were most likely to be White (N = 108, 93.91%), either working full time (N = 45, 39.13%) or a student (N = 50, 43.48%), and in a relationship (N = 67, 58.26%). The highest education level for most participants was either an undergraduate (N = 51, 44.35%) or postgraduate degree (N = 47, 40.87%).

The general health of participants was also assessed. The mean body mass index (BMI) was 24.53 ( $SD = 3.74$ ). The majority of participants had never smoked (N = 71,

61.74%). Participants were most likely to visit their doctor 'rarely' (N = 58, 50.43%) and exercise 2-3 times a week (N = 46, 40.00%). Finally, the majority of participants (N = 111, 96.52%) did not have a close relation that had been diagnosed with testicular cancer.

This study used a correlational design. The predictor variables were the theory of planned behaviour constructs (attitude, subjective norm and perceived control) and affective factors (anxiety, shame, and anticipated regret and relief). The dependent variables were self-examination intention and behaviour.

### ***Materials and Procedure***

After giving consent, participants completed demographics and health-related measures (see above). Next, participants rated their perceptions of testicular cancer and self-examination. Participants were asked how often the Department of Health (UK) recommends they perform testicular self-examination (1 = *every day*, 6 = *never*). Participants were also asked if they found a lump how likely is it to be cancerous, how likely the average man is to have testicular cancer and how likely they think they are to have testicular cancer. All three of these items were rated on a 5-point scale (1 = *very unlikely*, 5 = *very likely*).

*Self-examination behaviour.* Participants were asked whether they have performed testicular self-examination in the last month (yes or no). This item was used to determine whether the participant was up-to-date with testicular self-examination. It is recommended that men perform testicular self-examination every month [32]. Therefore, any participant who selected 'no' was regarded as not being up-to-date with self-examination, while participants who answered 'yes' were regarded as being up-to-date. Participants then completed the following scales in the order presented.

*Theory of planned behaviour constructs.* Attitude was measured using two items 'Regular testicular self-examination is beneficial' and 'Regular testicular self-examination is important' ( $r = .83, p < .001$ ). Subjective norm was assessed using two items: 'People who

are important to me are likely to think I should regularly perform testicular self-examination’ and ‘My friends and family are likely to think that regular testicular self-examination is important’ ( $r = .62, p < .001$ ). There were two perceived control items ‘It is easy for me to regularly perform testicular self-examination’ and ‘I can regularly perform testicular self-examination’ ( $r = .75, p < .001$ ). All these items were rated on a 5-point Likert scale (1 = *strongly disagree*, 5 = *strongly agree*).

*Anxiety.* There were nine anxiety items. In line with previous research [7], these items assessed a variety of anxieties associated with testicular self-examination. In the current study these were the anxiety that the participant may have testicular cancer (‘To what extent are you afraid/worried/anxious that you may have testicular cancer?’), that medical procedures are conducted on people without their consent (‘To what extent are you afraid/worried/anxious that sometimes, medical procedures are done on people without their consent?’), and that a testicle would have to be removed if a lump was found (‘To what extent are you afraid/worried/anxious that you may have a testicle removed if you found a lump?’). These items were rated on a 5-point scale (1 = *not at all*, 5 = *extremely*), and formed a reliable measure ( $\alpha = .87$ ).

*Anticipated regret and relief.* The regret items were: ‘To what extent are you likely to feel regret if you did not check your testicles for lumps regularly?’, ‘To what extent are you likely to feel regret for not regularly checking your testicles?’ and ‘To what extent are you likely to feel regret if you did not regularly perform testicular self-examination?’ ( $\alpha = .98$ ). The relief items were: ‘To what extent would performing testicular self-examination make you feel relieved/reassured/at ease?’ ( $\alpha = .95$ ). All items were rated on a 5-point scale (1 = *not at all*, 5 = *extremely*).

*Shame.* There were nine shame items. In line with the anxiety measure, this scale assessed shame towards a variety of aspects related to testicular cancer. These were the



shame of having testicular cancer ('To what extent would you feel ashamed/embarrassed/humiliated if you were diagnosed with testicular cancer?'), discussing this with a doctor ('To what extent would you feel ashamed/embarrassed/humiliated if you had to meet with a medical professional to discuss testicular cancer?') and having a testicle removed ('To what extent would you feel ashamed/embarrassed/humiliated if you had a testicle removed?'). The items were measured on a 5-point scale (1 = *not at all*, 5 = *extremely*), and formed a reliable measure ( $\alpha = .93$ ).

*Self-examination intention.* Finally, there was a two item intention measure: 'I will regularly perform testicular self-examination in the future' and 'I am likely to regularly perform testicular self-examination in the future' ( $r = .90, p < .001$ ). Both items were rated on a 5-point Likert scale (1 = *strongly disagree*, 5 = *strongly agree*).

### ***Statistical Methods***

Our main analyses determined the factors that predicted testicular self-examination intention and behaviour. Linear regression was used to assess the factors that predicted the continuous self-examination intention and binary logistic regression to assess the variables that predicted the categorical self-examination behaviour outcome variable. In both analyses the social-cognitive variables (attitude, subjective norm and perceived control) were entered into the model in Step 1 and the emotions (anxiety, shame, and anticipated regret and relief) were entered into the model in Step 2.

### **Results**

To correct for moderate skew, a logarithmic transformation was performed on the subjective norm, perceived control, anxiety, and intention variables prior to further analysis. An inverse transformation was performed on the attitude and shame variables to correct for a substantial skew.

### ***Perceptions of Testicular Cancer***

Most people ( $N = 61, 53.04\%$ ) believe that it was ‘equally as unlikely as likely’ that if they found a lump on their testicles it would be cancerous. However, this was not associated with self-examination intention ( $r = -.02, p = .842$ ) or behaviour ( $r = -.01, p = .902$ ).

Participants also believed their likelihood ( $M = 2.46, SD = 0.82$ ) was lower than the average man’s likelihood of developing testicular cancer ( $M = 2.58, SD = 0.84$ ),  $F(1, 113) = 3.86, p = .052, \eta_p^2 = .03$ . However, these factors did not significantly predict self-examination intention ( $r = .11, p = .231$  for average and  $r = .14, p = .129$  for self) or behaviour ( $r = .09, p = .365$  for average and  $r = .16, p = .099$  for self).

There were 56 participants (48.70%) who correctly suggest that it is recommended they perform-testicular self-examination every month. However, whether or not the participant correctly identified this or whether they over-estimated (i.e., suggested should test every day or week,  $N = 28, 24.35\%$ ) or underestimated (i.e., suggested should test every 3 months, 6 months or never,  $N = 29, 25.22\%$ ), was not associated with self-examination intention,  $F(2, 110) = 0.22, p = .807, \eta_p^2 < .01$ , or behaviour,  $\chi^2(2) = 2.79, p = .248$ .

### ***Self-Examination Intention***

Correlation analyses indicated that testicular self-examination intentions was predicted by attitude, subjective norm, perceived control, anticipated regret and anticipated relief (Table 1). A regression analysis was conducted to determine the unique role of the social-cognitive and emotional factors on self-examination intentions. In this analysis, the social-cognitive predictors (attitude, subjective norm and perceived control) were entered into the model in the first step and the emotions (anxiety, shame, anticipated regret, and anticipated relief) added in the second step (for additional analyses, see Supplementary file).

Step 1 accounted for 30% of the variance in self-examination intentions ( $p < .001$ ). In this step attitude and perceived control were significant positive predictors of self-

examination intentions (Table 2 column 2 Step 1). Subjective norm did not predict intention. Step 2 accounted for 41% of the variance ( $p < .001$ ). Importantly, this step significantly increased the predictive power of the model ( $\Delta R^2 = .11, p = .001$ ). Attitude and perceived control remained significant predictors of self-examination intentions (Table 2 column 2 Step 2). Anticipated relief was also a significant positive predictor of self-examination intentions. Shame was a significant negative predictor of self-examination intentions. Moreover, the tolerance values were above 0.20, indicating that multicollinearity did not bias the data [33]. These results reflect the fact that attitude, perceived control and anticipated relief motivate people to perform testicular self-examination in the future, while shame acts as a barrier against self-examination<sup>1</sup>.

### ***Self-Examination Behaviour***

Most participants ( $N = 65, 56.52\%$ ) had not performed a testicular self-examination within the last month and were thus not up to date with their self-examination. Correlation analyses indicated that whether or not the participant had self-examined in the last month (0 = no, 1 = yes) was positively associated with attitude, subjective norm, perceived control, anticipated regret, and anticipated relief (Table 1).

A binary logistic regression analysis was conducted to determine the factors that uniquely predict testicular self-examination behaviour. In line with the intention analysis, the theory of planned behaviour constructs were entered into the model in Step 1 and the emotions were entered in Step 2. The outcome variable was self-examination behaviour (0 = no, 1 = yes; for additional analyses, see Supplementary file).

The Nagelkerke pseudo  $R^2$  for Step 1 was .16 ( $p = .003$ ). In this step perceived control positively predicted self-examination behaviour (Table 2 column 3 Step 1). Attitude and subjective norm did not predict self-examination. For Step 2 the Nagelkerke pseudo  $R^2$  was .27 ( $p = .001$ ). Moreover, including the emotions significantly increased the predictive

power of the model ( $p = .022$ ). In this step, perceived control remained a significant predictor of self-examination (Table 2 column 3 Step 2). Moreover, anticipated relief was a significant positive predictor of self-examination. All other predictors were non-significant. These results reflect the fact that perceived control and anticipated relief increased the likelihood of the participant having performed a testicular self-examination within the last month.

### **Discussion**

This research assessed the role of social-cognitive and emotional factors in promoting and deterring testicular self-examination. Adding the emotional factors to the theory of planned behaviour constructs significantly increased the predictive power of the model for both testicular self-examination intentions and behaviour. Perceived control and anticipated relief positively predicted testicular self-examination intentions and behaviour. The fact that perceived control and anticipated relief predicted both intention *and* behaviour demonstrates the robustness of these findings. Moreover, attitude positively and shame negatively predicted self-examination intention. These results suggest it is important to consider the role of both social-cognitive and emotional factors on cancer screening.

Previous research has suggested that anticipated regret is likely to promote testicular self-examination [7,8]. However, the current study found that although anticipated regret was positively correlated with self-examination intention and behaviour, it did not uniquely predict either of these factors in the regression models. Instead, anticipated relief positively predicted both self-examination intentions and behaviour. In line with previous research [29,30], we argue that it is important to consider the role of positive emotions on health behaviours, such as screening. This is especially important considering that the cancer screening literature has predominantly focused on the role of anticipated regret [7,8,16]. By measuring both positive and negative emotions researchers can enhance their understanding of the role of emotions on cancer screening.

Although this research has enhanced the screening literature, it is important to discuss its limitations. First, the vast majority of the sample was White. Testicular cancer is higher in White men than other ethnicities [1]. However, it is still important to determine the factors that promote testicular self-examination in more diverse samples. Second, the majority of our sample was well-educated. It is important to determine whether these findings would be replicated in less well-educated samples. Third, it is important to consider the role of masculinity. Although we found that the toughness subscale did not predict self-examination (see Footnote 1), masculinity is a complex construct with multiple factors [34]. Therefore, it is important for future research to assess the role of different masculinity subscales on testicular self-examination. This may be especially important given the possible removal of testicles and potential use of prosthesis. Finally, this study assessed the effects of the social-cognitive and emotional factors on whether people were up-to-date with testicular self-examination and their future self-examination intentions. Although theories suggest that intentions are likely to predict future behaviour [6], there is a well-known intention-behaviour gap [35]. Moreover, the use of this correlational design makes it difficult to determine a cause and effect relationship. Therefore, it is also important to test whether these factors also predict future behaviour and to conduct experimental research [16]. Future research should enhance this work by experimentally assessing the effect of perceived control and anticipated relief on future cancer screening behaviours.

Despite these limitations, these robust findings have strong implications for cancer screening research. These findings are particularly important due to the fact that men may be unwilling to engage with healthcare professionals [36]. Given that perceived control and anticipated relief predicted both self-examination intentions and behaviour, we argue these factors should form the basis for intervention. For example, leaflets could be created that directly target these key factors [37]. Moreover, such leaflets could discuss the fact that this is

an incredibly curable condition, increasing the perceived control over the effectiveness of treatment and anticipated relief. Alternatively, researchers have also demonstrated that it may be effective to simply ask people to think about and rate the key predictors [16]. Further research is needed to determine the most effective strategy for promoting testicular self-examination and other forms of cancer screening.

### **Conclusions**

This study assessed the role of social-cognitive and emotional factors on testicular self-examination. Perceived control and anticipated relief positively predicted testicular self-examination intentions and behaviour. In contrast to previous research, anticipated regret did not predict self-examination intention or behaviour. We argue that it is important for future screening research to assess the role of anticipated relief. Moreover, further research is needed to determine effective interventions for promoting testicular self-examination and other forms of cancer screening. Such interventions are important for promoting regular screening that could detect cancer early and thus improve the effectiveness of treatment.

### Footnotes

<sup>1</sup> We also assessed what motivated men to check with their doctor if they were to find a lump. Moreover, given that masculinity prevents healthcare use [36], conformity to masculine norms was measured using eight items adapted from the toughness subscale [38]. In the regression analysis the only variable to predict visiting a doctor was shame ( $\beta = -.29, p = .011$ ). However, inspection of the Normal P-Plot suggested that the standardized residuals were skewed. Therefore, this finding should be interpreted with caution. Moreover, masculinity did not predict self-examination intention ( $r = -.10, p = .308$ ) or behaviour ( $r = -.07, p = .476$ ).

**Conflict of Interest**

Authors declare no conflict of interests.



### **Ethical Approval**

Approval was obtained from Northumbria University's Faculty of Health and Life Sciences Ethics Committee prior to conducting this research.

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**Table 1. Descriptive statistics and correlation coefficients.**

	<i>M (SD)</i>	1	2	3	4	5	6	7	8	9
1) Attitude	0.72 (0.26)	-								
2) Subjective norm	1.42 (0.19)	.64***	-							
3) Perceived control	1.46 (0.21)	.45***	.53***	-						
4) Anxiety	0.28 (0.16)	.02	-.04	-.04	-					
5) Shame	1.34 (0.25)	-.02	-.08	-.09	.55***	-				
6) Anticipated regret	3.14 (1.23)	.28**	.22*	.21*	.25**	.15	-			
7) Anticipated relief	3.21 (1.14)	.24*	.18 <sup>†</sup>	.05	.15	.04	.53***	-		
8) Self-examination intention	1.40 (0.20)	.46***	.39***	.47***	.04	-.15	.32**	.37***	-	
9) Self-examination behaviour	-	.23*	.16 <sup>†</sup>	.32**	-.02	-.09	.21*	.30**	.63***	-

*Notes.* <sup>†</sup> =  $p < .10$ , \* =  $p < .05$ , \*\* =  $p < .01$ , and \*\*\* =  $p < .001$ . The table contains the transformed variables, hence the low means and standard deviations. Prior to the transformations the mean and standard deviations were higher for attitude ( $M = 4.38$ ,  $SD = 0.73$ ), subjective norm ( $M = 3.93$ ,  $SD = 0.91$ ), perceived control ( $M = 4.04$ ,  $SD = 1.00$ ), anxiety ( $M = 2.06$ ,  $SD = 0.78$ ), shame ( $M = 1.80$ ,  $SD = 0.86$ ), and intention to perform self-examination ( $M = 3.79$ ,  $SD = 0.99$ ). The self-examination behaviour was a binary variable (0 = no and 1 = yes). Therefore, the analysis with this variable were point-biserial correlations.

**Table 2. Regression analysis assessing the role of social-cognitive and emotional factors on testicular self-examination.**

	Self-examination intention				Self-examination behaviour			
	Step 1		Step 2		Step 1		Step 2	
	B (SE)	$\beta$	B (SE)	$\beta$	B (SE)	Odds ratio (95% CI)	B (SE)	Odds ratio (95% CI)
Attitude	0.23 (0.08)	.29**	0.18 (0.08)	.22*	1.38 (1.01)	3.97 (0.55, 28.82)	1.00 (1.06)	2.72 (0.34, 21.87)
Subjective norm	0.03 (0.12)	.03	< -0.01 (0.11)	.00	-1.22 (1.46)	0.30 (0.02, 5.19)	-1.89 (1.54)	0.15 (0.01, 3.11)
Perceived control	0.32 (0.09)	.33**	0.33 (0.09)	.34***	3.29 (1.22)	26.94** (2.46, 295.73)	3.97 (1.36)	53.19** (3.71, 761.76)
Anxiety			0.15 (0.12)	.12			-0.54 (1.60)	0.58 (0.03, 13.50)
Shame			-0.17 (0.07)	-.21*			-0.77 (1.03)	0.46 (0.06, 3.50)
Anticipated regret			0.01 (0.02)	.05			0.02 (0.21)	1.02 (0.67, 1.54)
Anticipated relief			0.05 (0.02)	.26**			0.65 (0.24)	1.92** (1.19, 3.09)
R <sup>2</sup>	.30***		.41***					
$\Delta R^2$			.11**					
pseudo R <sup>2</sup>					.16		.27	
Step $\chi^2$					14.14**		11.46*	
Model $\chi^2$							25.60**	

Notes. † =  $p < .10$ , \* =  $p < .05$ , \*\* =  $p < .01$ , and \*\*\* =  $p < .001$ . Analysis contained transformed variables (attitude, subjective norm, perceived control, anxiety, and shame). This resulted in high odds ratios for some variables (e.g., perceived control). However, the results remain significant when non-transformed variables were in the analysis.