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Intentions of 18-26 year old British females towards potential HPV vaccination: Application of an extended Theory of Planned Behaviour

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ABSTRACT

An extended Theory of Planned Behaviour (Ajzen, 1991:2002; Ajzen and Fishbein, 1980) was employed to examine intentions of 18-26 year old British females towards potential HPV vaccination. Cross-sectional questionnaires based around this TPB extension were completed by British females ($N = 149$). Three intervention groups were formed by supplying participants with positive, negative or neutral HPV vaccination information prior to questionnaire completion. Hierarchical multiple linear regression analysis revealed that the extended TPB was better at predicting HPV vaccination intention, accounting for 60.3% of variation, compared to 58.5% accounted for by the standard TPB. A one-way ANOVA found intentions and attitudes following a publicised news item on a death after HPV vaccination were significantly lower than those recorded before. However, a one-way ANOVA found no intervention group difference effect on intention. These results strongly suggest that women currently excluded from NHS HPV vaccination would intend to accept the vaccine if offered.

KEY WORDS:	THEORY OF PLANNED BEHAVIOUR	HPV VACCINATION	ATTITUDE	MEDIA EFFECTS	UK
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1.0 Introduction

1.1 Cervical Cancer, HPV and HPV Vaccination

The United Kingdom has the second largest incidence rate of cervical cancer in Europe (Esteve et al. 1993 cited in Bish et al. 2000). Recent figures indicate that there are around 2700 newly diagnosed cases of cervical cancer each year in the UK (Cancer Research UK, 2009): accounting for 1% of all cancers (Quinn and Bobb, 2000 cited in Marlow et al. 2008). The disease additionally accounts for around 1000 deaths per year in the UK (Cancer Research UK, 2009). Most commonly developing from flat cells covering the surface of the cervix at the top of the vagina; cervical cancer is usually symptomatic in abnormal vaginal bleeding, abnormal discharge and sexual discomfort (Macmillan Cancer Support, 2009c). Multiple sexual partners, Sexually Transmitted Infections (STIs), prolonged contraceptive use and smoking have all been identified as potential risk factors of cervical cancer (Duffen-Leger et. al. 2008; McPherson & Austoker, 1993). Exploratory examination into the causes of cervical cancer in the 1970s and 1980s identified Human Papillomavirus (HPV) as the chief contributing cause. HPV can be found in both males and females (Kubba, 2008), and accounts for up to 99% of all cervical cancers and 5% of cancers worldwide (Bosch et al. 2002; Moscicki, 2008; NHS, 2009b; Zur Hausen, 2009). Arising in around 100 forms, HPV infects cells via wounds or easily accessible areas, such as the cervix (Devereaux Walsh et al. 2008; Macmillan Cancer Support, 2009a; Moscicki, 2008). Divided into two main groups, HPV can take the shape of both low and high risk diseases (Macmillan Cancer Support, 2009a). Low risk HPV strands commonly manifest themselves as harmless skin warts (papilloma). Examples of such forms include HPVs 6 and 11, accounting for 90% of genital warts (Kubba, 2008; Jones & Cook, 2008). High risk HPV strands are attributed to more serious complications. The most severe of these strands are HPV 16 and 18: found to account for around 70% of all cervical cancers (Lenselink et al. 2008). Around 80-90% of HPV cases resolve themselves spontaneously without treatment (Forster & Waller, 2008; Teitelman et al. 2009). However, persistent exposure to HPV can result in cervical carcinoma (cancer), typically forming 10 to 20 years after first infection (Cancer Help, 2009; Schiffman et al. 2007). This large timeframe for cancer development led to the introduction of cervical screening in 1988 to women aged 25-65 (Armstrong & Murphy, 2008; NHS, 2009b). Such regular examination has greatly reduced the incident rates of associated diseases, preventing up to 5000 deaths a year in Britain (Cancer Research UK, 2004).

In addition, two newly approved HPV vaccinations are now distributed worldwide. Both vaccinations consist of three separate doses, the second one month after the first and the final one six months after the first (GlaxoSmithKline; Gardasil, 2009). Firstly Gardasil, a quadrivalent vaccination protects against HPV strains 6, 11, 16 and 18 providing 99%

efficacy across these strains (Jones & Cook, 2008; Kubba, 2008). This vaccine is currently used across America and Australia and is licensed for 9-26 year olds (Macmillan Cancer Support, 2009b). Secondly Cervarix, a bivalent HPV vaccination licensed for 10-25 year olds, protects only against HPV 16 and 18, with 99% efficacy (GlaxoSmithKline; Jones & Cook, 2008; Macmillan Cancer Support, 2009b). A less comprehensive vaccine; Cervarix is supplied at a cost of around £13-£21 less than the Gardasil alternative (Kubba, 2008). This vaccine is currently used in a nationwide UK NHS programme. As of September 2008, all 12-13 year old females (year 8) are vaccinated in a £100 million a year scheme (Brabi et al. 2008; NHS, 2009a). The NHS is also initiating a 'catch-up' programme. As of autumn 2009, all 16-18 year old females (years 12-13) have been vaccinated. Additionally; all 15-17 year old females (years 11-12) will be vaccinated from autumn 2010. There are no current plans to extend this programme to older ages in the UK (NHS, 2009a). Human trials and animal models have suggested long term immunity of up to five or six years after vaccination (Bayas et al. 2008; GlaxoSmithKline). It is not yet known if the vaccinations have a lifetime effect (Harper & Paavonen, 2008). Both vaccines have a prophylactic effect: preventing only against future HPV infection and not treating current disease (Adams et al. 2009; Teitelman et al. 2009), meaning regular cervical screening is still needed. Combining both the new HPV vaccination and the existing cervical screening programmes will ultimately obtain the optimal level of cervical cancer reduction (Cancer Help, 2009; Macmillan Cancer Support, 2009b).

1.2 Theoretical Background: Theory of Planned Behaviour

Several theories have been developed to explain variation in intentions and behaviours related to health choices. Most commonly implemented are those known as Social Cognition Models. These describe an individual's social behaviour as the result of their attitude towards the behaviour in a particular social context. In addition; social expectations and perceptions are also described as influential towards the performance of behaviours (Morrison & Bennett, 2006). Arguably the most frequently applied social cognition theory is The Theory of Planned Behaviour (TPB) (Ajzen, 1991; Ajzen and Fishbein, 1980), which will be the theoretical basis for this study. TPB is an extension of the two-factor Theory of Reasoned Action (TRA) (Fishbein and Azjen, 1975), which described overt behaviours as determined by an individual's intentions to perform them (Bish et al. 2000; Fishbein and Azjen, 1975). Humans are seen by TRA as goal-directed, rational thinkers; making decisions based on the information available to them (Fishbein and Azjen, 1975). This theory was criticised as only effectively describing 'volitional' behaviour: behaviour under the individual's direct control. This made it irrelevant to behaviours seen as outside the control of individuals: including addictive behaviours such as drug use, smoking and drinking (Connor & Sparks, 2005; Morrison & Bennett, 2006; Van der Pligt & de Vries, 1998).

To combat this weakness and construct a more inclusive model, a third additional component of 'Perceived Behavioural Control' (PBC) was

added, creating the new TPB (Ajzen, 1991; Ajzen and Fishbein, 1980; Van der Pligt & de Vries, 1998). PBC refers to a person's belief that they have control over their own behaviour in certain situations, even when facing barriers (Ajzen, 1991; Ajzen and Fishbein, 1980). An example of this would be a person believing that it will be easy for them not to drink heavily in a pub with heavy-drinker friends. PBC is here shown to directly influence a person's behavioural intention, whilst simultaneously indirectly influencing behaviour. It is additionally argued that PBC can affect behaviour directly, if a person's perceptions about the ability of them performing behaviour are correct (Ajzen, 1991; Ajzen and Fishbein, 1980). This hereby reflects the strength of TPB over the TRA. The addition of PBC reflects that behaviour not directly under a person's volitional control *can* directly influence behaviour. Following research demonstrating low PBC internal consistency; Ajzen (2002) has more recently suggested a hierarchical model of PBC, with the factor divided into two subordinate dimensions. Firstly; the construct of 'self efficacy', identified by Bandura (1977); describes both a person's perceived confidence and the perceived difficulty of performing the behaviour. A person highly confident in achieving an easily attainable behaviour is hereby more likely to be more successful than someone not confident at performing the same behaviour. Secondly, the construct of 'perceived control' refers to the specific belief a person has over their ability to control the behaviour in question (Ajzen, 2002). For example, a person with perceived full control over their decision to quit smoking will be more successful than a person with perceived barriers to control. Such barriers may include lack of willpower and influence of social norms (Connor & Sparks, 2005). This extended version of PBC using both self efficacy and perceived control has demonstrated higher predictive capability than perceived control alone (Armitage and Connor, 2001), supporting the additional predictive power of self-efficacy. Contrary to Ajzen's (2002) suggestion of self-efficacy as a subordinate factor to PBC; a meta-analysis study by Trafimow et al. (2002) found self-efficacy to in-fact be a better predictor of behaviour than the original PBC. Moreover; Povey et al. (2000) found self-efficacy to be the best predictor of '5 a day' fruit intake behaviour out of all TPB factors. This high predictive power of self-efficacy seems to support the idea of self-efficacy as a factor of similar importance to PBC, rather than a subordinate factor as suggested by Ajzen (2002).

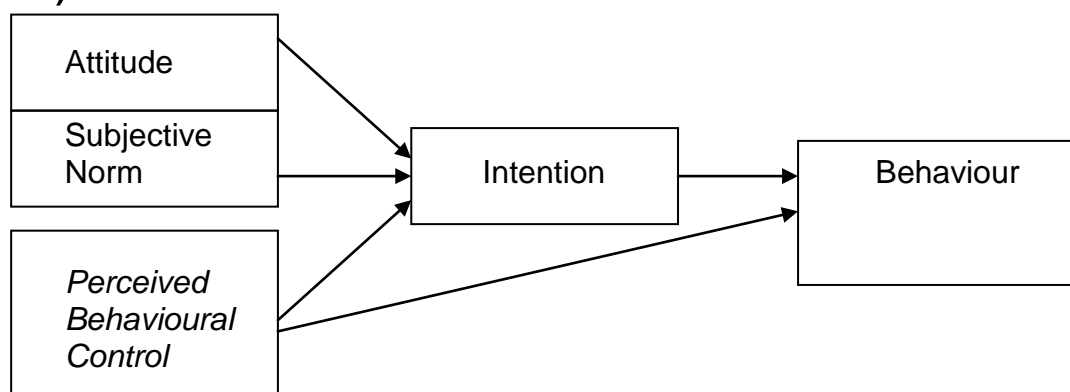
PBC is presumed to be the sole predictor of behaviours not directly under a person's volitional control (Ajzen, 1991; Ajzen and Fishbein, 1980). This is in contrast to the other two components of TPB, Attitudes and Subjective Norm (Figure 1). Also featuring in the original TRA; these constructs affect behaviours under volitional control. By first affecting intention, these components indirectly affect the likelihood of performing the behaviour in question (Ajzen, 1991; Ajzen and Fishbein, 1980).

Attitudes are described by TPB to impact on behaviour performance via intentions (Ajzen, 1991; Ajzen and Fishbein, 1980). Attitudes can be broadly described as a person's evaluation of the behaviour in question (Bish et al. 2000). Evaluations towards the attitude-object can be positive or negative and are generally seen to have three

related elements: cognitive, emotional and behavioural (Ajzen, 1991; Ajzen and Fishbein, 1980). In addition; attitudes are viewed to motivate intention to behave through 'outcome expectancies'. Specifically; if a person has a positive outcome expectancy of a particular behaviour, they are more likely to behave accordingly. This is also applicable to negative outcome expectancies, which reduce the likelihood of performing behaviour (Ajzen and Fishbein, 1980).

Subjective norms, the third component of TPB: reflect the effects of socially important others on behaviour performance (Ajzen, 1991; Ajzen and Fishbein, 1980). This term refers to an individual's perceptions of social approval for performing the behaviour in question (Cooke & French, 2008). This element of TPB has been found by various studies to be a weak predictor of intentions, explaining little variability (Armitage and Conner, 2001; Sheppard et. al, 1998, cited in Connor & Sparks, 2005). To combat this, Cialdini et al. (1991) suggested that subjective norms should be divided into two sub-components. The first of these: 'Injunctive Subjective Norm' (ISN) represents the original TRA and TPB component (Ajzen, 1991; Ajzen and Fishbein, 1980). It involves perceptions of how other people think the individual should perform in relation to the behaviour in question (Bish et al. 2000; Cialdini et al. 1991). Secondly; 'Descriptive Subjective Norm' (DSN) refers to an individual's perception of how others themselves behave. This factor can be seen as less relevant for more private events where the behaviour of others is less visible, such as smear testing (Bish et. al. 2000; Cialdini et al. 1991). The effect of subjective norm varies across individuals: with people more motivated to act in accordance to others being more likely to perform the behaviour than those less motivated (Morrison & Bennett, 2006). The inclusion of Cialdini's descriptive social norms has been found to explain significantly more variability in intentions and behaviour than original injunctive social norms alone (Rivis and Sheeran, 2003).

Figure 1
Theory of Planned Behaviour (Ajzen, 1991; Ajzen and Fishbein, 1980)



The purpose of extending the TRA to the TPB through addition of PBC was an attempt to enable the model to explain variability of non-

volitional behaviour. Successful explanations of such behaviours would increase the applicability of the theory beyond simple, volitional behaviours to more complex goals and behaviours important in terms of health outcomes (Connor & Sparks, 2005). Research has shown that the TPB is a better predictor of behavioural intention than the TRA. For example, Sutton's (1998) meta-analysis study found an explanation rate of 50% intention variation for the three TPB components: a large effect size (Cohen, 1988, 1992 cited in Sutton, 1998). In addition; TPB was found to account for 19% and 38% of variation in actual health behaviour: a medium effect size. In a meta-analysis of sixteen studies employing the TPB; Ajzen (1991) found a multiple correlation between intentions, attitude, subjective norms and PBC reported to be 0.71. This is in comparison to subjective norm and attitude components of TRA correlating to intention at 0.67 (Shephard et al. 1988 cited in Morrison & Bennett, 2006). These results demonstrate the usefulness of the additional component of PBC in explaining variability of intentions.

In addition to the evident superior predicting power of intentions by the TPB, vast amounts of data has also found TPB to be superior at predicting health behaviour outcomes. For example, Gatt and Sammut (2008) found PBC to be the most significant predictor of diabetes self care behaviour across all TPB and TRA variables. In addition, Myers and Horswill (2006) found that the TPB variables explained both sun protection intention and behaviour significantly better than TRA variables alone.

As the previously discussed studies show, research has suggested great explanation potential of TPB. However, others have found a substantial amount of variance unexplained. For example, Armitage and Connor's (2001) meta-analysis of 154 studies applying TPB found the three variables to explain only 39% variation in intention. This fell to just 27% where just intention and PBC were examined. This leads to the question; could a greater proportion of variation be explained by TPB if additional variables were added?

1.3 Anticipated Regret as an additional factor of the Theory of Planned Behaviour

TPB has been argued to ignore the impact of affective considerations related to health behaviour choices (Connor and Armitage, 1998 cited in Sandberg & Connor, 2008). To address this complaint and provide greater predictive power of related behaviours and intentions; the factor of Anticipated Regret (AR) has been suggested as a potential TPB addition. This term was coined to describe negative feelings that may arise after behaviour performance (Janis and Mann, 1977 cited in Van der Pligt & de Vries, 1998). These feelings are said to be experienced when we realise or imagine that the present situation could have been better if we acted differently (Connor & Sparks, 2005; Ziarnowski et al. 2009). AR is described to be more commonly experienced when the event is likely to receive feedback, when the person performing the behaviour is personally responsible, and when behaviour is consistent

with orientation (e.g. personality) (Connor & Sparks, 2005). AR is more likely in these circumstances as the behaviour performed is more likely to have personal and social consequences. AR is described to be less common when the event in question is reversible and mutable, as there is less risk of potential negative outcomes being permanent (Anderson, 2003). Richard et al. (1995) argued that the addition of anticipatory affective reactions in TPB is especially beneficial when a discrepancy is found between evaluation towards behaviour and anticipated affective reaction after. For example, a person may see the calming effect of smoking as positive, but worry about the side effects.

Several studies have found anticipated regret to be a vital descriptive factor of health related intentions and behaviours. For example, Richard et al. (1996) applied anticipatory regret in relation to unsafe sex. In a 2x2 longitudinal design; participants were asked either how they would 'feel' about having sex with someone new, or how they would 'feel after' sex with someone new; the latter implying that sex had actually occurred. Participants were questioned in relation to either safe or unsafe sexual behaviour. Significantly more negative feelings were recorded for participants regarding unsafe sexual behaviour. These participants expressed stronger desires to reduce their risk in future sexual encounters than participants in the safe sex conditions. In addition, these participants reported less risky behavior in the five months following the experiment than the 'safe sex' respondents. These results indicate anticipated regret as helpful in explaining variation in both sex related intention and behaviour. Successful effects of anticipated regret have also been found for various other health behaviours, including binge-drinking and exercise (Abraham & Sheeron, 2003; Cooke et al. 2007).

1.4 Effects of Health Interventions

Various forms of knowledge and support have frequently been provided by health services as a means of public 'intervention': an attempt to increase the uptake of good health behaviours or reduce 'risk' health behaviours (Pitts, 1996; Rutter and Quine, 2002). Interventions can be developed to address health intentions and behaviour either on a population- based scale: through media, or work and community schemes (Chomitz et al. 2010; Leeks et al. 2010, Vu et al. 2009), or on a more individual level, through individual consultations, videos and self-help leaflets (Bennett and Murphy, 1997; Kolkata et al. 1994 in Bennett & Murphy, 1997). A range of interventions have been employed, including treatment interventions, such as nicotine replacement: designed to increase the chances of quitting negative health behaviour: motivational interventions, such as media campaigns: designed to encourage or prevent specific behaviours (Myers & Frost, 2002): and knowledge interventions: designed to promote behaviour choice through the provision of information (Bennett & Murphy, 1997; Ogden, 2007). Knowledge interventions assume that providing either atheoretical information or information addressing a social-cognition model; will lead to a related change in attitudes and behaviour. (Ogden, 2007; Rutter and

Quine, 2002). Such interventions have been successfully applied across a range of health behaviours, including cycle helmet use (Quine et al. 2002), hand sanitising (Evans et al. 2009), drinking (Murgradd et al. 2007) and speeding (Elliot & Armitage, 2009).

Vaccination interventions have typically addressed negative perceptions surrounding their effectiveness, with vaccines often commonly viewed as causing fever and illness rather than protecting against this (Keane et al. 1993 in Pitts, 1996). Raising information on the true positive effects of vaccines is likely to raise intention (Dunn et al. 1998; Pitts, 1996).

1.5 HPV Vaccination Research

To date; research concerning the new phenomenon of HPV vaccination has typically examined intentions of both parents and young women eligible for vaccine in the country in question. As the vaccine is typically targeted at under 16's who require consent to be vaccinated; caregivers have often been questioned about their daughter's vaccination to combat ethical concerns (Marlow et al. 2009). Vaccination intention rates appear to vary greatly between parents and young women. Studies have found between 57% (Rosenthal et al. 2008) and 74% of caregivers intend to vaccinate their daughter, compared to intentions of 87.8% (Marlow et al. 2009) and 88.1% (Devereaux Walsh et al. 2008) for women over the age of 16. Intentions of both caregivers and young women have been shown to be significantly predicted by factors such as sexually activity, past STI infection, family cancer history and less perceived safety issues (Black et al. 2009; Jones & Cook, 2008; Kahn et al. 2008; Marlow et al. 2007). Studies examining HPV knowledge of young women have provided worrying results. Dutch research found that only 17.7% of students questioned had heard of HPV, with 87.7% of these studying medicine (Lenselink et al. 2008). Similarly, a British study found 81% of 16-54 year old men and women to have no knowledge of HPV, with most of these participants being non-white or members of the manual class (Devereaux Walsh et al. 2008). Selected studies have provided participants with information prior to intention measurement as a form of intervention, to combat this lack of HPV awareness. For example; Gerend and colleagues (2007) provided American participants with one of two types of information. 'Loss framed messages' containing information on the potential risks of not vaccinating, produced significantly greater vaccination intention than 'gain framed messages' that provided information on the health benefits of HPV. However, the framing effect was only found in participants who reported risky sexual behaviour, suggesting that these women wanted to avoid negative consequences of their unsafe behaviour. Another American study found that information framed to show the vaccination as only preventing cervical cancer promoted more intention than information promoting STI prevention. This suggests that preventing cervical cancer is more salient to young women, and that this fact should be focused on rather than genital warts prevention (Leader et al. 2009).

1.6 An extended Theory of Planned Behaviour in relation to HPV Vaccination

TPB has been successfully implemented in various studies examining intentions and behaviours related to the regulation of cervical cancer. Arguably the most studied of these behaviours is that of cervical screening. Bish et al. (2000) compared the effectiveness of TPB and another popular social cognition theory, the Health Belief Model (HBM) at explaining intentions to accept a routine cervical smear test. TPB was found to explain 51% of intention variation, in comparison to 4% by HBM: a highly significant result. The TPB factors of attitude and injunctive subjective norm were found to be most salient at $p < 0.001$ level. TPB factors were found to be more specific than HBM components. Research has also found the TPB component of PBC to be highly significant in explaining women's cervical screening intentions (Cooke & French, 2008; Duffen-Leger et al. 2008).

Selected studies have explored the usefulness of TPB in explaining HPV vaccine uptake. For example, Juraskova et al. (2008) examined the effectiveness of TPB in Australia, where women under 26 are routinely given the HPV vaccine. TPB was found to account for a significant proportion of variation in both intention ($p < 0.001$) and behaviour ($p < 0.05$). This implies that the three components of TPB are well suited to the study of HPV uptake investigation. AR as an additional factor of TPB can theoretically be seen as applicable to benefit HPV vaccination intention explanation. Anderson's previously explored suggestions for high levels of AR seem applicable to HPV vaccination (Anderson, 2003). The behaviour is irreversible, likely to get feedback from peers and would be consistent with orientation for sexually active or cancer conscious women. In addition; Simonson (1992 cited in Sandberg & Connor, 2008) suggested that AR can occur pre-behaviourally. This indicates that AR would be applicable to HPV vaccination, as regret at potential non vaccination may be experienced by women.

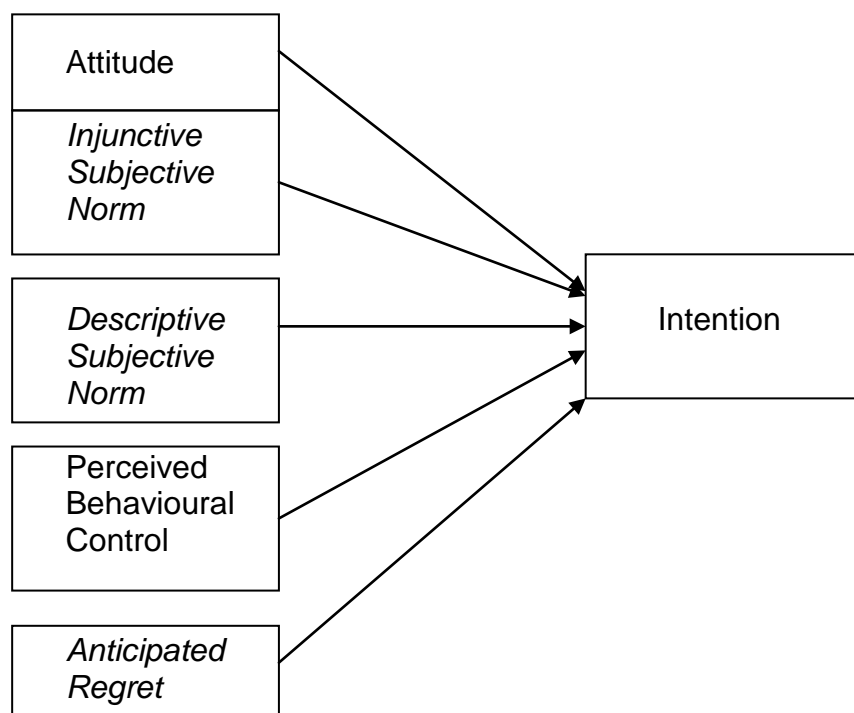
TPB with anticipated regret as an additional variable has so far been used to examine parent's intentions towards their children being vaccinated. For example, Ziarnowski et al. (2008) studied potential regret in caregivers of American female adolescents by asking them how they would feel if not vaccinating their daughter led to her contracting cervical cancer. Caregivers reporting greater anticipated regret were more likely to later have their daughter vaccinated ($p < 0.05$). Similarly; it was found that American caregivers with greater anticipated regret at potential HPV vaccine inaction reported greater vaccination intention ($p < 0.001$). In addition; they found that caregivers experiencing greater anticipated regret at the potential side effects of vaccination, reported less vaccination intention ($p < 0.01$) (Ziarnowski et. al, 2009) These results suggest that two forms of AR can affect vaccination intention. Firstly, AR at not vaccinating (anticipated inaction regret) is found to lead to greater intention to vaccinate due to potential negative consequences. Secondly, AR at vaccinating (anticipated vaccination regret) is found to lead to less intention to vaccinate.

To date; research into HPV vaccination has been cross-sectional, examining intentions only. A recent literature search (Web of Knowledge,

2009) indicated a lack of studies actually measuring HPV vaccination behaviour. It is hence impossible to examine if intention to vaccinate actually leads to the behaviour. In addition, existing studies have measured AR of caregivers only. Perceived regret of females accepting the vaccine may be much different. Most significantly in relation to this study; research investigating AR effects in HPV vaccination choices, has been carried out in countries other than the UK (Forster & Waller, 2008). As the countries studied have starkly different programmes compared to the UK, it is impossible to generalise results to this population.

Unlike previous research; this study examined HPV intention in Britain using TPB. To allow for maximum intention predictability, an extended version was employed. This included the discussed updated versions of PBC (Ajzen, 2002) and subjective norm (Cialdini et al. 1991), and the additional factor of AR (Figure 2).

Figure 2
The extended TPB framework, incorporating a revised Subjective Norm and Anticipated Regret



1.7 Aims and Hypotheses

This study aimed to examine the intentions of British 18-26 year old females towards potential HPV vaccination using both an extended TPB and an additional exploratory qualitative section. Additionally; an atheoretical knowledge intervention was administered. Participants were supplied with either positive information on the vaccine's effectiveness, negative information on its potential side effects or neutral information on the current British scheme.

On the basis of the above research, it was hypothesised that:

1. The TPB will predict intention to vaccinate.
2. The extended TPB will be a better predictor of intention than the original TPB.
3. Participants supplied with positive knowledge will have greater intention to vaccinate than participants supplied with neutral and negative knowledge.

2.0 Method

2.1 Ethical Approval

This study received ethical approval from the Brunel University School of Social Sciences ethics board on 16/04/2009. This board assessed the study according to the guidelines of the British Psychological Society (Appendix VI).

2.2 Participants

The sample of this study consisted of 149 British females aged 18-26, with a mean age of 20.93 years ($SD = 1.68$). 102 of these participants described themselves as British university students, and 47 did not. Table 1 shows the ethnicity of all participants studied. A low number of participants in some categories led to ethnic groups being collapsed into smaller groups and used for further analysis (Table 2). During data collection, a young girl's death following HPV vaccination was widely publicised in the British media (BBC News). 107 of the total 149 participants (71.8%) completed the questionnaire prior to this news item, and 42 (28.2%) completed it afterwards. Participants completed the questionnaire in either a hard copy format ($N = 63$, 42.3%) or via an online version on Survey Gizmo: a survey hosting website ($N = 86$, 57.7%). Participants completed one of 3 questionnaire types to form 3 experimental groups: neutral, positive or negative (Table 3).

Table 1
Ethnicity of Participants

Ethnicity	N	%
White British	68	45.6
White Irish	1	0.7
White Other	3	2.0
Asian or Asian British Indian	27	18.1
Asian or Asian British Pakistan	5	3.4
Asian or Asian British Bangladeshi	3	2.0
Asian or Asian British Other	1	0.7
Mixed White Asian	2	1.3
Black or Black British Caribbean	17	11.4
Black or Black British African	8	5.4
Mixed White and Black Caribbean	3	2.0
Mixed White and Black African	2	1.3
Mixed Other	2	1.3
Chinese	3	2.0
Chinese British	1	0.7
Other	3	2.0
Total	149	100

Table 2**Ethnicity collapsed group**

Ethnicity	N	%
White	72	50
Asian	42	29.2
Black	30	13.8
Total	144	
Missing	5	7

Table 3**Frequency of experimental groups**

Group	N	%
Neutral	50	33.6
Positive	48	32.2
Negative	51	34.2
Total	149	

2.3 Design

This study employed a cross-sectional survey design to examine female student's intentions towards potential HPV vaccination. The independent variables were attitudes, PBC, self efficacy, injunctive subjective norm, descriptive subjective norm, knowledge and anticipated regret. Knowledge specifically examined participant's awareness and familiarity of cervical cancer, HPV and the UK vaccination and cervical screening programmes. Prior to the supplied questionnaire: one of 3 information

sets was provided (Appendix II). Firstly; a 'neutral' information set gave a general description of HPV vaccination and the current UK HPV vaccination scheme. Secondly, a 'positive' information set described the vaccination in the same way as the control, with additional information on the vaccination's high prevention rates. Finally, a 'negative' information set described the vaccination in the same way as the control, with additional information on the vaccination's side effects. Intention was an independent as well as a dependent variable.

2.4 Measures

Demographic information consisted of age, ethnicity, university and course, drinking and smoking behaviours, personal family history of cancer and sexual activity.

Questions followed the relevant information section and were displayed in the order set below. Using Cronbach's Alpha (Cronbach, 1951), the TPB components were calculated for internal reliabilities.

2.41 Behavioural Intention: was measured with one item on a 5-point Likert scale, ranging from 1 (*definitely not*) to 5 (*definitely*). This item read: "If it became available free for 18-26 year olds, would you intend to have the HPV vaccination?" A low score indicated little intention to have the HPV vaccination if offered, and a high score indicated a large intention to accept the vaccination.

2.42 Attitude: Direct measurement of attitudes towards potential HPV vaccination was utilized through four semantic differentials on a 5-point Likert scale. This read "Accepting a HPV vaccination would be:" (*harmful-beneficial, unsafe-safe, extremely unimportant, extremely important, wise silly*). Low scores in the first 3 of these differentials indicated negative attitudes towards vaccination. Conversely, low scores in the final differential indicated positive attitudes towards vaccination. This counterbalancing was employed to reduce possible effects of acquiescent responses.

Cronbach's alpha value showed a reliability of 0.85 for the 4 items on this scale

2.43 Self Efficacy: was measured with three items, each on a 5-point Likert scale. An example is "If I wanted to and was offered, I could easily have the HPV vaccination". Low scores indicated high self-efficacy scores and high scores indicated low self-efficacy scores.

Cronbach's alpha value showed a reliability of 0.64 for the 3 items on this scale. As self efficacy is a form of PBC; principal component analysis was performed on all six items from both these scales to assess loadings for each item as a potential single factor. Eigen value over 1 and Varimax rotation were employed. Following this, one self efficacy item with a low

loading was removed, leaving the remaining two items of “If I wanted to and was offered, I would easily have the full course of 3 HPV vaccination doses”, and “How difficult would it be for you to have the HPV vaccination if it was offered”. These two remaining self efficacy items were merged with the PBC item with the highest loading - “I alone would make the decision to have the HPV vaccination”. These three items were assembled to make a new scale labeled as PBC to reflect the TPB. Cronbach’s alpha value showed a reliability of 0.72 for the 3 items on this new scale.

2.44 Perceived Behavioural Control: was measured with three items, each on a 5-point Likert scale. The first of these items read: “How much control do you think you have over whether or not you would have the HPV vaccination if it was offered?” Low scores for this item indicated less perceived control, and high scores indicated greater perceived control. The two remaining items were statements describing control over HPV vaccination choice. Low scores represented agreement with the statements and large perceived control, whereas high scores indicated less perceived control.

Cronbach’s alpha value showed a poor reliability of 0.54 for the 3 items on this scale. Following the previously described principal component analysis factor analysis, one PBC item - “I alone would make the decision to have the HPV vaccination” was merged with the remaining two self efficacy items to create a new PBC scale. Cronbach’s alpha value showed a reliability of 0.72 for the 3 items on this new scale.

2.45 Injunctive Subjective Norm: was measured with three items, each on a 5-point Likert scale ranging from 1 (*approve*) to 5 (*disapprove*). Low scores indicated the perception of positive opinions from significant others towards the participant obtaining the vaccination. High scores indicated the perception of negative opinions from significant others. An example would be, “My friends would approve/disapprove of me having the HPV vaccination if I was offered it”.

Cronbach’s alpha value showed a reliability of 0.86 for the 3 items on this scale.

2.46 Descriptive Subjective Norm: was measured with one item on a 5-point Likert scale. This item read: “Most people who are important to me would have the HPV vaccination if it was offered to them”. Low scores indicated strongly agreeing with this statement, with the participant perceiving significant others as likely to obtain the vaccine if available. High scores indicated strongly disagreeing with this statement.

2.47 Anticipated Regret: was measured with two sets of three semantic differentials: each on a 5-point Likert scale. The first of these sets read: “How would you feel if you were offered the HPV vaccination but did not take it?” (*worried-calm, negative-positive, untroubled-troubled*). Low scores in the first two of these differentials indicated high anticipated regret from declining vaccination, with high scores here indicating little anticipated regret. The third differential was counterbalanced to remove possible effects of acquiescent responses. Hence for this item; low scores indicated low anticipated regret from declining vaccination, and high scores indicated high anticipated regret. The second of the semantic differential sets read: “If you chose to have the HPV vaccination when offered to you, how would you feel afterwards?” (*relaxed-tense, confused-reassured, negative-positive*). Counterbalancing was again used here. Low scores for the first differential indicated little anticipated regret from not vaccinating, and high scores indicated high anticipated regret. Conversely; low scores for the other two differentials indicated high anticipated regret, and high scores indicated low anticipated regret.

Cronbach's alpha value showed a reliability of 0.42 for the 6 items on this scale. This was a poor reliability; therefore one item was removed – “If you chose to have the HPV vaccination when offered to you, how would you feel afterwards? (*relaxed-tense*)”. This slightly increased the reliability to 0.48. Following this a further item was removed – “If you chose to have the HPV vaccination when offered to you, how would you feel afterwards?” (*negative/positive*)”. This resulted in an increased reliability of 0.61. A final item was then removed – “If you chose to have the HPV vaccination when offered to you, how would you feel afterwards? (*confused/reassured*)”, resulting in the scale's final reliability value of 0.87.

2.48 Factual Knowledge about Cervical Cancer, Cervical Screening, HPV and HPV vaccination: Participants were told to describe their knowledge of these topics by answering basic questions. Factual knowledge was measured through seven items. Four items consisted of participants marking ‘Yes’ or ‘No’ to indicate whether or not they had heard of cervical cancer, HPV, the English HPV vaccination scheme and cervical screening. For the remaining three items; participants who indicated holding knowledge on these topics were asked to describe the knowledge in an open ended format. An example would be, “Have you heard of the English scheme of HPV vaccination?”, followed by “If yes, what did you know about it?”.

2.49 Qualitative Opinion: was examined with an opportunity for participants to comment on the current HPV vaccination scheme and the study's proposal for an extension to vaccination age. The item was phrased – “We would like to know whether you have any thoughts about HPV vaccination. If so, please comment below”. Please see Appendix III for all responses.

2.5 Procedure

Hard copy questionnaires (Appendix I) were distributed to participants from May to July 2009. Questionnaires were administered in the busy university cafeteria and in the outside quad area. Both areas tended to attract high numbers of students, enabling greater data collection yields than other areas. An online version of the questionnaire was set up to enable data collection to continue throughout the university summer holidays. This survey was available online from July to October 2009. Participants were found through personal contacts and responses to a self-developed Facebook group on the topic of 18-26 year old HPV vaccination. Participants gave their consent on the supplied form (Appendix IV) and were given a debriefing form (Appendix V) after questionnaire completion. Hard copy questionnaires were collected directly following completion. Online questionnaire data was collected via the survey hosting website after completion.

3.0 Results

3.1 Descriptive Statistics

95.9% of participants recorded an intention score of 4 or 5, indicating high vaccination intention. 98% of participants indicated that they had heard of cervical cancer, indicating a ceiling effect for this item. 56.4% said that had heard of HPV, and 60.4% said they had heard of the English scheme of HPV vaccination. 96% indicated that they had heard of cervical screening, with 82.2% of these correctly identifying the age of commencement of the English screening scheme as 25 (Appendix VII).

Table 4 indicates a mean intention score of 4.62 out of a possible 5.00, showing the majority of participants would intend to be vaccinated if vaccination age was increased. For the attitude construct, a mean score of 4.32 out of a maximum of 5.00 indicates that the majority of participants had positive attitudes toward the proposed vaccination scheme. PBC received a mean score of 4.28 out of a possible 5.00, indicating the majority of participants believed they would be able to accept the vaccination if offered. ISN received a mean score of 4.46 out of a possible 5.00, indicating the majority of participants felt valued others would accept them accepting the vaccination if offered. Similarly; DSN received a mean score of 4.18, indicating the majority of participants felt that valued others would accept the vaccination if offered to them. Anticipated regret received a mean of 2.25 out of a possible 5.00, suggesting the majority of participants would experience partial regret at not accepting vaccination.

Table 4

One-Way ANOVA to show differences between experimental intervention groups

Variables	Group	Mean	SD	F (df)	Sig.
Intention	Neutral	4.70	0.61		
	Positive	4.57	0.77		
	Negative	4.59	0.54		
	Total	4.62	0.64	.56 (2, 147)	.57
Attitude	Neutral	4.43	0.58		
	Positive	4.36	0.79		
	Negative	4.17	0.56		
	Total	4.32	0.65	2.11 (2, 147)	.12

PBC	Neutral	4.26	0.68		
	Positive	4.38	0.71		
	Negative	4.19	0.72		
	Total	4.28	0.70	.86 (2, 148)	.42
ISN	Neutral	4.52	0.71		
	Positive	4.42	0.81		
	Negative	4.44	0.64		
	Total	4.46	0.72	.28 (2, 148)	.75
DSN	Neutral	4.08	0.85		
	Positive	4.35	0.81		
	Negative	4.12	0.84		
	Total	4.18	0.84	1.54 (2, 148)	.22
AR	Neutral	2.13	0.90		
	Positive	2.46	1.02		
	Negative	2.19	0.61		
	Total	2.25	0.86	2.10 (2, 147)	.13

Note: PBC (Perceived Behavioural Control), ISN (Injunctive Subjective Norm), DSN (Descriptive Social Norm), AR (Anticipated Regret)

Correlation Matrix

All participants' scores on all TPB variables and the continuous demographic variable of age were included on a correlation matrix, where scores on each measure are correlated against each other (Table 5). Significant correlations were found across all TPB variables but not age. Those variables found to significantly correlate to intention were then examined in a hierarchical regression analysis.

Table 5
Correlations between variables and intention of participants (N= 149)

	Intention	Attitude	PBC	ISN	DSN	AR	Age
Intention	-	.70**	.32**	.61**	.31**	-.35**	.11
Attitude	.70**	-	.45**	.70**	.49**	-.40**	.10
PBC	.32**	.45**	-	.46**	.34**	-.17**	.01
ISN	.61**	.70**	.48**	-	.51**	-.36**	.04
DSN	.31**	.49**	.34**	.51**	-	-.27**	.07
AR	-.35**	-.40**	-.17**	-.36**	-.27**	-	-.03
Age	.11	.10	.01	0.4	.07	-.03	-

** Correlation significant at the 0.01 level (2-tailed).

3.2 –Hierarchical Multiple Regression analysis

A hierarchical multiple regression was performed to test the effects of both the information intervention and the extended TPB on intention to accept HPV vaccination (Table 6). The previously observed high ceiling effect of cervical cancer knowledge (see section 3.1) led to this item being removed.

The hierarchical multiple regression tested the following hypotheses:

Hypothesis One - The TPB will predict intention to vaccinate.

Hypothesis Two – The extended TPB will be a better predictor of intention than the original TPB.

Hypothesis Three - Participants supplied with positive knowledge will have greater intentions to vaccinate than participants supplied with neutral and negative knowledge.

Block 3 of this hierarchical regression shows attitude and ISN as significant predictors of intention to vaccinate against HPV. An Adjusted R Square of .60 for the extended TPB (Block 4) shows that it accounted for 60% of variance in intention. This is two percent more than the standard TPB, which accounted for 58% of intention variance (Adjusted R Square = .58). This therefore supports hypotheses one and two.

A lack of information intervention effect on intention is evident here from its Adjusted R Square of -.01. This led to the rejection of hypothesis 3. A full version of the regression analyses can be seen in appendix VII.

Table 6
Hierarchical Multiple Regression Analysis, with HPV Vaccination Intention as the Dependent Variable

Variable	Adjusted R ²	β	t
Block 1: Experimental Group	-.01	-.03	-.33
Block 2: Demographic Information	.04		
Age		.185	1.84
Ethnicity		.00	.03
Family History of Cancer		.00	-.03
Sexually Active 1.64		-.17	-
Before/After News		-.209	-2.00*

Block 3: TPB	.58		
Attitude		.56	5.47 ***
PBC		-.12	-1.44
ISN		.40	4.05 ***
DSN		-.100	-1.14
Block 4: Extended TPB	.60		
AR		-.08	-.10
UK HPV Vacc. Knowledge		-.19	-2.45*
HPV Knowledge		.13	1.61
Age of CS Knowledge		-.07	-1.02

* $p < 0.05$; *** $p < 0.001$

Note: PBC (Perceived Behavioural Control), ISN (Injunctive Subjective Norm), DSN (Descriptive Social Norm), AR (Anticipated Regret)

3.3 Intervention Effects

3.31 Effects of Intervention on Intention

Hypothesis Three - Participants supplied with positive knowledge will have greater intention to vaccinate than participants supplied with neutral and negative knowledge.

Hierarchical multiple regression analysis found no effect of intervention on intention (Table 6). This lack of effect was also evident in a one-way ANOVA examining information intervention effects across all components of the proposed extended TPB (Table 4). Post-hoc Student Newman-Keuls analysis also revealed no intervention group difference effect on Intention or TPB variables (Appendix VII).

This full analysis led to the rejection of hypothesis 3.

3.32 Effects of Intervention on Knowledge

Differences between the 3 intervention groups in correct knowledge item responses were measured using Chi-Square tests (Table 7). No effect of intervention was found in any of the knowledge items.

Table 7
Chi Square analysis of intervention effects on knowledge item responses

Knowledge Item	χ^2 (df)	Sig.
Cervical Cancer	.00 (2, 149)	>0.99
HPV	.51 (2, 149)	.77
UK HPV Vaccination Scheme	2.07 (2, 149)	.35
Cervical Screening	4.06 (2, 149)	.13

3.4 Effect of Ethnicity on Intention

A second one-way ANOVA was conducted to test for intention differences across the three collapsed ethnic groups. HPV vaccination intention differed significantly across the three ethnic groups, $F(2, 140) = 3.61$, $p < 0.05$. A full version of the ANOVA can be seen in appendix VII.

However, a post-hoc Student Newman Keuls test found no group difference effect of ethnicity on intention (Appendix VII).

3.5 Effect of Method Questionnaire Taken on Intention

A one-way ANOVA was used to test for intention differences between paper and online responses. Vaccination intention did not differ significantly across these participation methods, $F(1, 147) = .31$, $p = .58$. A full version of this ANOVA can be found in appendix VII.

3.6 Effect of News item on Intention

Following the hierarchical multiple regression, it was apparent that whether participants completed the questionnaire before or after the identified news item (BBC News) had a significant effect on intention. A one-way ANOVA was carried out to explore this factors effect on intention in more detail (Table 8). A full version of this ANOVA can be seen in appendix VII.

It is apparent from this ANOVA that intention ($F(1, 147) = 8.64$, $p < 0.01$) and attitude ($F(1, 147) = 7.37$, $p < 0.01$) were significantly lower after

media coverage of the news item ($p < 0.01$). This suggests that the negative implications of HPV vaccination suggested by the news item led intention and attitudes to be reduced.

Table 8

One-Way ANOVA to show effects of time questionnaire taken on differences in intention and extended TPB variables

	Time	N	Mean	SD	F (df)	Sig.
Intention	Before	106	4.71	0.55		
	After	42	4.38	0.79		
	Total	148	4.62	0.64	8.64 (1, 147)	.01**
Attitude	Before	107	4.41	0.57		
	After	41	4.09	0.80		
	Total	148	4.32	0.65	7.37. (1, 147)	.01**
PBC	Before	107	4.27	0.69		
	After	42	4.30	0.74		
	Total	149	4.28	0.70	.04 (1, 148)	.84
ISN	Before	107	4.48	0.68		
	After	42	4.41	0.81		
	Total	149	4.46	0.72	2.4 (1, 148)	.63
DSN	Before	107	4.21	0.84		
	After	42	4.12	0.83		
	Total	149	4.18	0.84	.32 (1, 148)	.57
AR	Before	106	2.33	0.86		
	After	42	2.06	0.87		
	Total	148	2.25	0.86	2.84 (1, 147)	.09

**

$p < 0.01$

level

3.7 Content Analysis

A content analysis was performed on the qualitative responses to the current and proposed vaccination schemes. There were 67 additional responses. Many described the proposed scheme positively, with a strong focus on women's freedom of choice around vaccination and associated cervical screening. There was also strong emphasis on the need for more available information on HPV and the effects of vaccination. Below is a summary of the arising key themes (Table 9). (Please see appendix II for a full version of the responses).

Table 9

Summary showing a count of the main themes of the comments made regarding HPV vaccination.

“Do you have any additional comments on HPV vaccination?”	
Responses/ Key themes	Count
Support for proposed scheme	23
Freedom of choice	10
Revision of cervical screening scheme	14
Need for more vaccination information	11
Recent increase in media coverage	9
Need for free/ reduced cost vaccination	6
Unknown safety/ Long-term effects	7

Themes and Sub-Themes

1. Support for proposed scheme (N=23)

The themes here reflect participants' support for the proposed 18-26 female HPV vaccination scheme. Participants described how vaccination should be provided to as large an age range as possible to stop this preventable disease.

- Should be available for women of all ages
- Beneficial in terms of cost for government to treat cause rather than symptoms
- Women can develop cervical cancer under age of 26
- Why not vaccinate against a preventable disease?

- Cover those awaiting cervical screening
- “Irresponsible not to offer it to those between the ages of 18-26”

2. Freedom of choice (N=10)

The themes here reflect participant’s desire for women of all ages to be given the choice to be vaccinated.

- Should be given to women who want it
- Should be given option to vaccinate
- Choice should be available from age of sexual consent
- Should also give option to males if found to be effective

3. Revision of cervical screening scheme (N=14)

The themes here reflect participant’s desire for a reduction to the current English cervical screening age of 25, and a need for more regular screening for eligible women. Participants also state a desire for either vaccination or screening to be routinely provided for women aged 18-25 to help prevent unnecessary deaths.

- Ignoring ages 18-25 by not offering vaccination or screening
- Screening as well as vaccination in ideal world
- Screening before current age would prevent deaths
- Unfair women are vaccinated from age of 20 in other parts of UK
- “Ridiculous that women have to wait so long in this country to get tested”
- Screening should be yearly rather than three yearly

4. Need for more vaccination information (N=11)

The themes here reflect participant’s desire for more public information about HPV and its vaccination. Participants also state a need for more own independent research to discover the implications of the vaccination.

- HPV vaccine should be made more publicly aware
- Lack of familiarity with HPV specifically
- More information about safety needed to reassure
- More information about risks of not vaccinating needed
- Desire to do own research to understand options

5. Recent increase in media coverage (N=9)

The themes here reflect participant’s identification of a recent increase in negative media coverage of the vaccination. Specifically; participants identify the deaths of celebrity Jade Goody from lately- diagnosed cervical cancer, and schoolgirl Natalie Morton who died after receiving the vaccination.

- Media coverage increased awareness

- Vaccination safety worry increased dramatically after news
- Took someone famous to die for government to introduce vaccine
- Bad press on vaccine following death of Natalie
- Bad press caused mass confusion
- “Safety issue was blown out of all proportion”

6. Need for free or reduced cost vaccination (N=6)

The themes here reflect participant’s desire for a free or reduced cost vaccination scheme in place of the current vaccination option for over 18s: currently costing around £400.

- Current price is extortionate
- Should be on NHS or free
- “Price shouldn’t be a barrier for protection”
- Have health service for this precise reason

7. Unknown safety and long-term effects of vaccination (N=7)

The themes here reflect participant’s unsure attitudes towards the effects and safety of this new vaccination. They describe how further research into these effects would encourage give them greater reason to pursue vaccination.

- Hard to know effects of new vaccine
- Should be more widely available once safety proven
- Nervous of how body would react

Categories of agenda

- For the proposed new system
- Worry of vaccine
- Need for more options

Table 10
Summary showing the themes that fall into each agenda.

Agenda	Themes
<p>'For' the proposed new system</p>	<ul style="list-style-type: none"> ▪ Support <ul style="list-style-type: none"> ○ Should be available for women of all ages ○ Why not vaccinate against a preventable disease? ○ Cover those awaiting cervical screening ▪ Freedom of Choice <ul style="list-style-type: none"> ○ Should be given to those who want it
<p>Worry of vaccine</p>	<ul style="list-style-type: none"> ▪ Unknown safety and long-term effects of vaccination ▪ Recent increase in media coverage <ul style="list-style-type: none"> ○ Vaccination safety worry increased dramatically after news ○ Bad press caused mass confusion ▪ Need for more vaccination information <ul style="list-style-type: none"> ○ More information about safety needed to reassure
<p>Need for more options</p>	<ul style="list-style-type: none"> ▪ Need for free or reduced cost vaccination ▪ Freedom of choice * ▪ Revision of cervical screening scheme <ul style="list-style-type: none"> ○ Ignoring ages 18-25 by not offering vaccination or screening

* Freedom of choice falls into two categories

4.0 Discussion

This study aimed to examine the intentions of British 18-26 year old females towards potential HPV vaccination using an extended TPB. The extended TPB variables accounted for 60.3% of the variance in vaccination intention, compared to 58.5% of the variance accounted for by the standard TPB. This means the extended TPB with its additional factors of anticipated regret, knowledge of the UK HPV vaccination and cervical screening schemes and HPV knowledge in general, was far superior to the standard TPB. The standard TPB variables of attitude and ISN were found to significantly predict intention to vaccinate. PBC and DSN did not significantly predict intention to vaccinate (see section 4.1). To the author's knowledge; no previous study has researched HPV vaccination and individual TPB variables in this manner. However; related cervical screening research has found attitudes in particular to similarly affect intention to a great degree (Bish et al. 2000; Cooke and French, 2008). Although ISN has not been specifically examined with regards to HPV vaccination, the identical factor of 'approval of significant others' towards behaviour was found to significantly effect intention when examining American females (Kahn et al. 2008). In addition to the extended TPB; the variable of time questionnaire taken (before or after news item) had a significant effect on intention (see section 4.2). Intervention group, AR, ethnicity, time test taken and the knowledge factors of HPV and cervical screening had no effect on intention. Intervention group findings are in contrast to previous research which found information focusing on costs of not vaccinating supplied prior to questionnaires to be associated with larger HPV vaccination intention (Gerend et al. 2007) (see section 4.2). Non-significant findings of AR alone contrast to research showing a strong AR-HPV vaccination intention relationship (Sandberg and Connor, 2008). The lack of ethnicity effect on intention evident from hierarchical multiple regression analysis contrasts with previous research, demonstrating ethnic minority women and teenagers to demonstrate significantly lower uptake and intentions (Brabin et al. 2008; Marlow, Wardle et al. 2009). However; it must be noted that the study of ethnicity on intention was not a major element of this study. The fairly limited range of collected participant's ethnicities led to specific groups being collapsed. This more limited view on ethnic intention does not allow full enough description to draw any full conclusions. The finding that both HPV and cervical screening knowledge are not related to vaccination intention is in contrast with research that found such related knowledge to in-fact lead to greater acceptability (Black et al. 2009).

4.1 The Effect of an Extended TPB on Intention

The lack of PBC effect observed in this study has also been mirrored by selected cervical screening research (Bish et al. 2000). However; others have found it very effective (Cooke and French, 2008; Duffen-Leger et al. 2008). The lack of PBC effect observed here may be due to the speculative nature of questioning. As vaccination was unavailable on the NHS to participants at the time of questioning, they were not actually able to control whether or not they could have the vaccination. This lack of control on the

situation would not have given participants much reason to consider performing the behaviour (Trafimow et al. 2002). This is in contrast to cervical screening research employing PBC, as this behaviour is an option for participants, and hence under their immediate control. A lack of PBC can not be attributed to a lack of self-efficacy and PBC factor separation here, as is common in many other TPB studies (Ajzen, 2002). Items from both these factors were combined into a three-item PBC scale following principal component analysis. With this in mind it seems appropriate to state that although appropriately measured, PBC still had no effect on vaccination intention.

DSN's evident lack of predictive effect on intention may be explained by the nature of the behaviour in question. DSN has been described as less relevant for more private events where the behaviour of others is less visible, such as cervical smear testing (Bish et al, 2000; Cialdini et al. 1991). HPV vaccination behaviour can be seen to be a private behaviour: involving only patient-doctor interaction. Additionally; research has found DSN to be more predictive of health-risk behaviours than health-promoting behaviours (Rivis & Sheeran, 2003). As health-risk behaviours such as smoking are typically viewed as exciting and enjoyable, they are more likely to be imitated if perceived as common in the behaviour of significant others (Rivis & Sheeran, 2003). A lack of perception of how significant others would behave towards the currently unavailable, health-promotion behaviour of HPV vaccination, may have led to the observed lack of DSN effect on intention.

The lack of predictive effect of AR is evident in its adjusted R square of -.08. This contrasts with previous research which found parental AR to be significantly associated with increased child vaccination intention (Ziarnowski et al, 2009). Additionally; a meta-analysis into the effects of AR across many health behaviours found it to account for an additional 7% when added to standard TPB factors (Sandberg & Connor, 2008). This is far greater an effect than observed in this study. As previously suggested when examining PBC; this lack of explanatory value may be due to the hypothetical nature of vaccination. Previous studies examining AR have been largely performed in America, examining vaccination intentions under a health insurance context. Although HPV vaccination is now available for a fee in Britain (Boots Pharmacy, 2009; Lloyds Pharmacy, 2009), vaccinations are typically free as provided by the NHS. Stronger effects of AR on intention may become evident if the vaccination is introduced for this age-group on the NHS.

The significant effect of knowledge of the UK HPV vaccination system may be due to participant's disagreement with their current exclusion from the scheme. Participants aware of the scheme may have demonstrated higher intentions as a means of promoting the need for vaccination for their age-group. Dissatisfaction with the current scheme was also highly evident from additional qualitative responses, with the government strongly being labeled as 'irresponsible' for not offering vaccination to this age-group.

4.2 The Effect of Intervention and Media on Intention

The observed lack of intervention group effect suggests that additional information did not lead to significant changes in intention. Similar results are evident in the work of Juraskova et al. in Australia (2008); who also found no

information framing effect, but a significant effect of TPB in explaining intention and behaviour. The lack of intervention group effect in this study may be explained in multiple ways. Firstly; a moderate rate of participants knew about HPV (56.4%) and the UK scheme of HPV vaccination (60.4%), and hence may have been unaffected by the additional information. These findings greatly contrast with the lower knowledge rates found by Lenselink (et al. 2008), where only 17.7% of Dutch students had heard of HPV. The start of a national HPV vaccination promotion around the time of study, and reports surrounding both the death of celebrity Jade Goody to Cervical Cancer (e.g. Sky News, 2009) and the previously described news item, may have contributed to this high HPV awareness. This reasoning can also be seen to explain the results of Juraskova (et al. 2008). As the Australian vaccination scheme covering women up to the age of 26 was fully operational at the time of the study, women questioned may have already held knowledge about HPV, leading to a lack of intervention effect. Secondly; an intervention effect may have been observed if the information sets had been framed, as first suggested by Kahneman and Tversky's Prospect Theory (1979; Tversky and Kahneman, 1981). Framing knowledge interventions to either focus on the potential gain of performing the behaviour, or the potential loss at not performing the behaviour, has been found to lead to intention increases across many health behaviours (O'Keefe & Jensen, 2009; Tversky & Kahneman, 1981; Williams & Clarke, 2001). With regard to HPV vaccination; loss framed messages have been found to have the greatest effect on intentions in women demonstrating risky sexual behaviour (Gerend et al. 2007). Perhaps a focus on the potential 'loss' consequences of not vaccinating rather than the potential side effects of vaccinating would have led to a significant intention difference in this study. Finally; the observed lack of intervention effect may have been due to the atheoretical nature of the information provided. TPB itself does not give clear guidelines of how its principles can be translated into intervention practice, making intervention construction difficult (Eagly and Chaiken, 1993 in Sutton, 2002; Ogden, 2007). However; studies attempting to integrate TPB into knowledge interventions have been successful across a variety of behaviours including cycle helmet use (Quine et al. 2002), speeding (Elliot and Armitage, 2009) and drinking (Murgraad et al. 2007). Development of knowledge sets based around TPB factors with full piloting to ascertain their validity may have led to an intervention intention effect.

The unexpected additional finding of the effect the described news item had on intention sheds important light on the media's impact on health-related behaviours. Intentions following this news item were significantly lower than intentions recorded prior to the event. These reports typically mentioned the potential risks of the vaccine (e.g. BBC News, 2009). This is in contrast to a study which found a significant majority of online YouTube clips to focus on the positive aspects on HPV vaccination (Ache and Wallace, 2008). The media's reiteration of the potential negative effects of vaccination at the time of this study appears to have led women to question their attitudes towards this relatively new health behaviour, resulting in lower intentions. These

findings indicate the strong effect of health-related media coverage on intentions.

4.3 Limitations, Strengths and Future Research

As is the case with any methodology, the self-report technique applied here is liable for criticism. Firstly; social desirability bias effects may have been present. Participants may have adapted their responses to appear positively to the experimenter, recording greater intention than actually perceived (Shaughnessy et al. 2000). This potential bias was tackled by administering the questionnaire in an unobtrusive manner (Hewstone et al. 1999), with participants reassured their involvement was anonymous and voluntary.

Secondly; although providing insightful additional information into attitudes towards HPV vaccination; the qualitative responses received were often fairly vague, especially those recorded online. This may be a common problem for internet-based methods of data collection, as a lack of present experimenter may mean there is less pressure on participants to complete items fully (Shaughnessy et al. 2000). Online participants may also not have truly demonstrated their true knowledge of HPV prior to the questionnaire, as was requested. The easy accessibility of online search engines may have led respondents to explore relevant topics, stating this additional information as their own knowledge. This would inevitably lead to inaccurate findings of the true knowledge of this sample. Additionally; more lengthy and knowledgeable responses were often from medicine or nursing students, demonstrating strong views both for and against the proposed scheme. Their increased knowledge in comparison to other respondents appears similar to that of Lenselink (et al. 2008), who found only 17.7% of questioned students had heard of HPV, with 87.7% of these participants studying medicine. However; Lenselink's (et al. 2008) study did not provide participants with prior information about HPV or the vaccine. In this study; supplying information prior to questioning may have led the proceeding knowledge questions to be relatively useless. Participants may have confused what they knew prior to the experiment with what they had actually read in the given information. This may have contributed towards the high amount of knowledge demonstrated. Additionally; Lenselink's (et al. 2008) study involved a full questionnaire on HPV and related knowledge, whereas knowledge in this study was simply judged by stating whether participants knew about the disease or scheme. This basic approach to knowledge measurement may have also contributed to the higher recorded awareness.

Development of the knowledge intervention items can also be criticised. The 3 information sets were scrutinised by a small sample of 3 independent researchers to assess their ability to convey positive, neutral and negative interventions. Although this sample may have assessed the information as conveying its intended reaction, other potential participants may not have felt the same. Larger scale independent rating in the form of a pilot study would have provided greater assessment of the true validity of these knowledge interventions (Shaughnessy et al. 2000).

The lack of sample focus of this study can also be criticised. Although students were the sample of the paper questionnaires as these were collected

on campus, some non-students were collected online. Previous research has found student intentions to be around 87.8% (Marlow et al. 2009) compared to 50.2% for women over the age of 25 (Ferris et al. 2007). A specific focus on students or non students would have been more appropriate as these two groups may hold different intentions.

Also; the unexpected variable of news item effect could have been explored in more detail. Longitudinal research could have examined whether intention scores later returned to a state similar to before the news item, or remained lower. News after the first worrying report stated that Natalie Morton's death was actually due to unrelated health problems (e.g. The Guardian, 2009). Confirmation of this may have reduced fears in the target group, leading intentions to rise to their original state.

Construction of the questionnaire itself can also be criticised. Firstly; intention and DSN were each only represented by one item. Previous research into the effects of TPB has included multiple intention items (Bish et al. 2000; Sandberg and Connor, 2009). The inclusion of additional items may have led to different results in both intention and TPB prediction. Secondly; additional demographic information could have been requested. Previous research has found lower education and income to be associated with greater HPV vaccination intention (Brewer & Fazekas, 2007; Gerend et al. 2009). Although such information may have been uninformative in a largely student sample where income and education levels are all fairly equal: such information would have been valuable from non-student participants. Religious demographic information may also have been beneficial. Previous research has found religion to be related to significantly different intentions, with Christian women demonstrating more HPV vaccination acceptance (Marlow et al. 2007), and Muslim, Hindu and Sikh women showing less intention (Marlow et al. 2009). Although no effect of ethnicity was found in this study, religion may have been related to intention as the action of HPV vaccination can be seen to have religious sexual consequences. Additionally; requesting STI history may have provided additional intention detail, as previous research has suggested (Black et al, 2009; Jones and Cook, 2008; Rosenthal et al. 2008). Although this information is obviously highly personal, examination of a possible association between STI history, AR and intention could have provided additional insight.

This study can be viewed as strong in both its employed methodology and its implications for future HPV vaccination programmes. Combat of acquiescent response bias through item counterbalancing allowed for greater internal validity (Shaughnessy et al. 2000). Moreover; triangulation through the addition of a qualitative component, enabled a greater understanding of reasons for intention, and problems with the current scheme (Yardley, 2008). To the author's knowledge; this study is the first of its kind to examine the intentions of women currently aged outside the UK HPV vaccination scheme. 95.9% of women questioned indicated high intention towards potential vaccination, suggesting extension to the current scheme would be welcome. This was also reflected in the study's unique qualitative incorporation component, with women strongly stating a need for their age group to be covered by either vaccination or screening. This qualitative element also indicated high concern over worry of the vaccine. These issues must be

publicly tackled in order to increase intention and uptake in both women and teenagers.

Research can only currently study intentions of British women in this age-group, as an NHS vaccination campaign is not yet in progress. There are no current plans for an extension to the current scheme (NHS (2009a)); hence actual HPV vaccination behaviour cannot be measured at present. However; the strong predictive power demonstrated by the extended TPB used in this study, suggests it would be suitable to measure actual vaccination behaviour. Such longitudinal study could ascertain whether women with high intentions actually obtain the vaccine. Australian research has already measured both HPV vaccination intention and behaviour using an extended TPB, with highly significant results (Juraskova et al. 2008). Results from the current study's TPB and qualitative components suggest that British women in this age-group would be highly likely to vaccinate under an increased scheme.

4.4 Conclusions

This study found an extended TPB to be a better predictor of vaccination intention (60.3%) than the standard model (58.5%). The additional component of UK HPV Vaccination scheme knowledge contributed to this increased extended TPB performance, suggesting that participants familiar with the current scheme disagreed with their exclusion. The unexpected additional factor of news item produced surprising results, with intention scores significantly lower after its mass publication. The additional extended TPB component of anticipated regret and the added knowledge intervention did not increase intention to vaccinate. Findings indicate that women currently excluded from NHS HPV vaccination would intend to accept the vaccine if offered.

References

- Abraham, C. & Sheeron, P. (2003). Acting on intentions: The role of anticipated regret. *British Journal of Social Psychology*, 42 (4), 495-511.
- Ache, K.A. & Wallace, L.S. (2008). Human Papillomavirus Coverage on YouTube. *American Journal of Preventive Medicine*. 35 (4), 389-392.
- Adams, M., Jasani, B & Fiander, A. (2009). Prophylactic HPV vaccination for women over 18 years of age. *Vaccine*, 27 (25-26), 3391-3394.
- Ajzen, I. (1991). The Theory of Planned Behaviour. *Organizational Behavior and Human Decision Processes*, 50, 179-211.
- Ajzen, I. (2002). Perceived Behavioral Control, Self-Efficacy, Locus of Control, and the Theory of Planned Behavior. *Journal of Applied Social Psychology*. 32 (4). 665-683.
- Ajzen, I. and Fishbein, M. (1980). *Understanding Attitudes and Predicting Social Behaviour*. Englewood Cliffs: Prentice-Hall
- Anderson, C. J. (2003). The Psychology of Doing Nothing: Forms of Decision Avoidance Result from Reason and Emotion. *Psychological Bulletin*, 129 (1), 139-167.
- Armitage, C.J. & Connor, M. (2001). Efficacy of the theory of planned behaviour: A meta-analytic review. *British Journal of Social Psychology*. 40. 471-499.
- Armstrong, N. & Murphy, E. (2008). Weaving Meaning? An exploration in the interplay between lay and professional understandings of cervical cancer risk. *Social Sciences and Medicine*, 67 (7), 1074-1082.
- Bandura, A. (1977). Self-efficacy: Towards a Unifying Theory of Behavioral Change. *Psychological Review*. 84 (2). 191-215.
- Bayas, J.M., Costes, L. & Munoz, A. (2008). Cervical Cancer vaccination indications, efficacy and side effects. *Gynecologic Oncology*, 110 (3), S11-S14.
- BBC News: *Schoolgirl dies after cancer jab* (29 September, 2009). <http://news.bbc.co.uk/1/hi/health/8279855.stm>: Retrieved 29 September 2009, 11.21pm.
- Bennett, P. & Murphy, S. (1997). *Psychology and Health Promotion*. Bristol. Open University Press.

Bish, A, Sutton, S. & Golombok, S. (2000). Predicting uptake of a routine cervical smear test: A comparison of the Health Belief Model and the Theory of Planned Behaviour. *Psychology and Health*, 15 (1), 35-50.

Black, L.L., Zimet, G.D., Short, M.D., Sturm, L. & Rosenthal, S.L. (2009). Literature review of human papillomavirus vaccine acceptability among women over 26 years. *Vaccine*, 27 (11), 1668-1673.

Boots Pharmacy (2009). *Cervical Cancer Vaccine*. Retrieved 27 September 2009 from <http://www.boots.com/en/Pharmacy-Health/Health-Services/Cervical-Cancer-Vaccination-Service/>

Bosch, F.X., Lorinoz, A., Munoz, A., Meyer, C.J.L.M. & Shah, K.V. (2002). The Causal relation between human papillomavirus and cervical cancer. *Journal of Clinical Pathology*, 55 (4), 244-265.

Brabin, L., Roberts, S.A., Stretch, R., Baxter, D., Chambers, G., Kitchener, H. & McCann, R. (2008). Uptake of first two doses of human papillomavirus vaccine by adolescent schoolgirls in Manchester: prospective cohort study. *British Medical Journal*, 336 (7652), 1056-1058.

Brewer, N.T. & Fazekas, K.I. (2007). Predictors of HPV vaccine acceptability: A theory-informed systematic review. *Preventive Medicine*, 45 (2), 107-114.

Brewer, N.T. & Ziarnowski, K. (2008). Antecedents of anticipated regret related to HPV vaccine. *Psychology and Health*, 23 (S1), 72.

Cancer Help (2009). *Cervical cancer vaccine*. Retrieved 26 March 2009 from www.cancerhelp.org.uk/help/default.asp?page=16024

Cancer Research UK (2009). *Cervical Cancer*. Retrieved 14 April 2009 from <http://info.cancerresearchuk.org/cancerstats/types/cervix/?a=5441>

Cancer Research UK (2004). *Cervical Screening has saved 100,000 lives*. Retrieved 21 October 2009 from <http://info.cancerresearchuk.org/news/archive/pressreleases/2004/july/38852>

Cervical Cancer UK (n.d.). *Cervical Cancer*, Retrieved 14 April 2009 from www.cervicalcancer.uk.com

Chomitz, V.R., McGowan, R.J., Wendel, J.M., Williams, S.A., Cabral, H.G, King, S.E et al. (2010). Healthy Living Cambridge Kids: A Community-based Participatory Effort to Promote Healthy Weight and Fitness. *Obesity*, 18, (S1). S45-S53.

Cialdini, R.B., Kallgren, C.A. & Reno, R.R. (1991). A Focus Theory of Normative Conduct – A Theoretical Refinement and Reevaluation of the Role of Norms in Human- Behavior. *Advances in Experimental Social Psychology*, 24, 201- 234.

Connor, M. & Sparks, P. (2005). Theory of Planned Behaviour and Health Behaviour. In Connor, M & Sparks, P (Eds.) *Predicting Health Behaviour*. 2nd Ed. (pp. 170-222). Berkshire: Oxford University Press.

Cooke, R. & French, D. P. (2008). How well do the theory of reasoned action and theory of planned behaviour predict intentions and attendance at screening programmes? A meta-analysis. *Psychology and Health*, 23 (7), 745-765.

Cooke, R., Sniehotta, F. & Schuz, B. (2007). Predicting binge-drinking behaviour using an extended TPB: Examining the impact of anticipated regret and descriptive norms. *Alcohol and Alcoholism*, 42 (2), 84-91.

Cronbach, L.J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*. 16. 297-334.

Devereaux Walsh, C, Gera, A, Shah, M, Sharma, A, Powell, J.E & Wilson, S. (2008). Public knowledge and attitudes towards Human Papilloma Virus (HPV) vaccination. *BMC Public Health [Online]*, 8 (368).

Duffen-Leger, L.A., Letourneau, N.L. & Croll, J.C. (2008). Cervical Cancer Screening Practices among University Women. *Journal of Obstetric, Gynecologic and Neonatal Nursing*, 37 (5), 572-581.

Dunn, R.A., Shenouda, P.E., Martin, D.R. & Schultz, A.J. (1998). Videotape increases parent knowledge about poliovirus vaccines and choices of polio vaccination schedules. *Pediatrics*. 102 (2). E26.

Elliott, M.A. & Armitage, C.J. (2009). Promoting Drivers' Compliance with Speed Limits: Testing an Intervention based on the Theory of Planned Behaviour. *British Journal of Psychology*. 100. 111-132.

Evans, M.W., Ramcharan, M., Ndetan, H., Floyd, R., Globe, G., Pfefer, M., et al. (2009). Hand Hygiene and Treatment Table Sanitizing in Chiropractic Teaching Institutions: Results of an Education Intervention to Increase Compliance. *Journal of Manipulative and Physiological Therapeutics*. 32 (6). 469-476.

Ferris, D.G., Waller, J.L., Owen, A. & Smith, J. (2007). Midadult women's attitudes about receiving the prophylactic human Papillomavirus vaccine. *Journal of Lower Genital Tract Disease*. 11 (3), 166-172.

Fishbein, M., & Ajzen, I. (1975). *Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research*. Reading, MA: Addison-Wesley.

Forster, A. S. & Waller, J. (2008). The human papillomavirus vaccine for cervical cancer: Vaccination uptake and the role for health psychologists. *Health Psychology Update*, 17 (4), 18-23.

Gardasil (2009). *Human Papillomavirus Quadrivalent (Types 6, 11, 16 and 18) Vaccine, Recombinant*. Retrieved 14 April from <http://www.gardasil.com/gardasil-information/index.html>

Gatt, S. & Sammut, R. (2008). An exploratory study of predictors of self-care behaviour in persons with type 2 diabetes. *International Journal of Nursing Studies*, 45 (10), 1525-1533.

Gerend, M.A. & Shepherd, J.E. (2007). Using Message Framing to Promote Acceptance of the Human Papillomavirus Vaccine. *Health Psychology*, 26 (6), 745-752.

Gerend, M.A., Weibley, E. & Bland, H. (2009). Parental Response to Human Papillomavirus Vaccine Availability: Uptake and Intentions. *Journal of Adolescent Health*. 45 (5), 528-531.

GlaxoSmithKline (n.d). *Cervarix Patient Packet Insert*.

Harper, D.M. & Paavonen, J. (2008). Age for HPV vaccination. *Vaccine*, 26 (S1), A7-A11.

Hewstone, M., Stroebe, W. & Stephenson, G.M. (1999). *Introduction to Social Psychology*. 2nd Ed. Oxford: Blackwell.

Institute of Cancer Research (2009). *Cervical Cancer Studies*. Retrieved 26 March 2009 from http://www.icr.ac.uk/research/research_sections/epidemiology/epidemiology_teams/epidemiology_and_genetics/cervical_cancer_studies/

Jones, M. & Cook, R. (2008). Intent to receive a HPV vaccination among University Men and Women and Implications for Vaccine Administration. *Journal of American College Health*, 57 (1), 23-31.

Juraskova, I., O'Brien, M., Bart, R. & McCaffery, K. (2008). HPV vaccination and the Effect of Stigmatised Versus Non-Stigmatised Information Framing on Behavioural Intentions: an Implication of the Theory of Planned Behaviour and Moral Norm. *Psycho-Oncology*, 17 (S2), S16.

Kahn, J.A., Rosenthal, S.A., Jin, Y, Huang, B., Namakydoust, A. & Zimet, G.D. (2008). Rates of human papillomavirus vaccination, attitudes about vaccination and human papillomavirus prevalence in young women. *Obstetrics and Gynecology*, 111 (5), 1103-1110.

Kahneman, D. & Tversky, A. (1979). Prospect Theory: An Analysis of Decision Under Risk. *Econometrica*. 47 (2). 263-291.

Kelly, B.J., Leader, A.E., Mittermaier, D.J., Hornik, R.C. & Cappella, J.N. (2009). The HPV vaccine and the media: How the topic has been covered and what are the effects on knowledge about the virus and cervical cancer? *Patient Education and Counseling*. 77 (2), 308-313.

Kubba, T. (2008). Human Papillomavirus vaccination in the United Kingdom: What about boys? *Reproductive Health Matters*, 16 (32), 97-103.

Leader, A.E., Weiner, J.L., Kelly, B.J., Hornik, R. & Coppella, J.N. (2009). Effects of information framing on Human Papillomavirus Vaccination. *Journal of Women's Health*, 18 (2), 225-233.

Leeks, K.D., Hopkins, D.P., Soler, R.E., Aten, A. & Chattopadhyay, S.K. (2010). Worksite-Based Incentives and Competitions to Reduce Tobacco Use: A Systematic Review. *American Journal of Preventive Medicine*. 38 (2). S263-S274.

Lenselink, C. H., Schmeink, C.E., Melchers, W.J.G., Maauger, L.F.A.G., Hendriks, J.C.M., van Hamont, D. & Bekkers, R.L.M. (2008). Young adults and acceptance of the human papillomavirus vaccine. *Public Health*, 122 (12), 1295-1301.

Lloyds Pharmacy (2009). *Cervical cancer vaccinations*. Retrieved 27 September 2009 from http://onlinedoctor.lloydspharmacy.com/service/cervical-cancer-vaccinations/gardasil-and-cervarix?utm_source=google&utm_medium=cpc&gclid=CPeTq9X1kZ0CFcRq4wodaHx-UQ

Macmillan Cancer Support (2009a). *How cancer of the cervix develops*. Retrieved 21 October 2009 from <http://www.macmillan.org.uk/Cancerinformation/Cancertypes/Cervix/Aboutcervicalcancer/Howitdevelops.aspx>

Macmillan Cancer Support (2009b). *HPV vaccines (to prevent cervical cancer)*. Retrieved 21 October 2009 from <http://www.macmillan.org.uk/Cancerinformation/Cancertypes/Cervix/Aboutcervicalcancer/HPVvaccines.aspx>

Macmillan Cancer Support (2009c). *Symptoms of Cervical Cancer*. Retrieved 21 October 2009 from <http://www.macmillan.org.uk/Cancerinformation/Cancertypes/Cervix/Symptomsdiagnosis/Symptoms.aspx>

Marlow, L.A.V., Forster, A.S., Wardle, J. & Waller, J. (2009). Mothers' and Adolescents' Beliefs about Risk Compensation following HPV vaccination. *Journal of Adolescent Health*, 44 (5), 446-451.

Marlow, L.A., Waller, J. & Wardle, J. (2007). Parental attitudes to pre-pubertal HPV vaccination. *Vaccine*, 25 (11), 1945-1952.

Marlow, L.A.V., Waller, J., Evans, R.E.C. & Wardle, J. (2009). Predictors of interest in HPV vaccination: A study of British adolescents. *Vaccine*, 27 (18), 2483-2488

Marlow, L.A.V., Waller, J. & Wardle, J. (2008). Sociodemographic predictors of HPV testing and vaccination acceptability: results from a population – representative sample of British women. *Journal of Medical Screening*, 15 (2), 91-96.

Marlow, L.A.V., Wardle, J., Forster, A.S. & Waller, J. (2009). Ethnic differences in human papillomavirus awareness and vaccine acceptability. *Journal of Epidemiol Community Health*. 63, 1010-1015.

McPherson, A. & Austoker, J. (1993). Cervical cytology. In McPherson. A (Ed.) *Women's Problems in General Practice*. 3rd Ed. (pp227-252). New York: Oxford University Press.

MHRA. (2009). *Suspected Adverse Reaction Analysis: CERVARIX Human papillomavirus (HPV) Vaccine*.

Morrison, V. & Bennett, P. (2006). *An Introduction to Health Psychology*. London: Pearson Education Limited.

Moscicki, A.B. (2008). HPV Vaccine: Today and in the Future. *Journal of Adolescent Health*, 43 (4), S26-S40.

Murgradd, V., Abraham, C. & McDermott, M. (2007). Reducing Friday alcohol consumption among moderate, women drinkers: Evaluation of a brief evidence-based intervention. *Alcohol and Alcoholism*. 42. (1). 37-41.

Myers, L.B. & Frost, S. (2002). Smoking and Smoking Cessation: Modifying Perceptions of Risk. In Rutter, D. & Quine, L. *Changing Health Behaviour*. (pp49-65). Buckingham. Open University Press.

Myers, L.B. & Horswill, M.S. (2006). Social cognitive predictors of sun protection intention and behavior. *Behavioral Medicine*, 32 (2), 57-63.

NHS (2009a). *HPV Vaccination*. Retrieved 26 March 2009 from <http://www.nhs.uk/Conditions/HPV-vaccination/Pages/Introduction.aspx?url=Pages/What-is-it.aspx>

NHS (2009b). *NHS Cervical Screening Programme*. Retrieved 14 April 2009 from www.cancerscreening.nhs.uk/cervical/

Ogden, J. (2007). *Health Psychology: A Textbook*. 4th Ed. New York: Open University Press.

O'Keefe, D.J.O. & Jensen, J.D. (2009). The Relative Persuasiveness Gain-Framed and Loss-Framed Messages for Encouraging Disease Detection Behaviour: A Meta-Analysis. *Analytic Review Journal of Communication*. 59. 296-316.

Pitts, M. (1996). *The Psychology of Preventive Health*. Trowbridge: Routledge.

Povey, R., Conner, M., Sparks, P., et al (2000). Application of the theory of planned behaviour to two dietary behaviours: Roles of perceived control and self-efficacy. *British Journal of Health Psychology*, 5. 121-139.

Quine, L., Rutter, D. & Arnold, L. (2002) Increasing Cycle Helmet Use in School-Age Cyclists: An Intervention based on the Theory of Planned Behaviour. In Rutter, D. & Quine, L. *Changing Health Behaviour*. (pp172-192). Buckingham. Open University Press.

Richard, R., Van der Pligt, J. & deVries, N. (1995). Anticipated Affective Regret and Prevention of AIDS. *British Journal of Social Psychology*. 34. 9-21.

Richard, R., Van der Pligt, J. & deVries, N. (1996). Anticipated regret and time perspective: Changing sexual risk-taking behavior. *Journal of Behavioral Decision Making*, 9 (3), 185-199.

Rivis, A. & Sheeran, P. (2003). Descriptive norms as an additional predictor in the theory of planned behaviour: A meta-analysis. *Current Psychology*. 22 (3). 218-233.

Rosenthal, S.L., Rupp, P., Gregory, D.Z., Meza, H.M., Loza, M.L., Short, M.B. & Succop, P.A. (2008). Uptake of HPV vaccine: Demographics, Sexual History and Values, Parenting Style, and Vaccine Attitudes. *Journal of Adolescent Health*, 43 (3), 239-245.

Rutter, D. & Quine, L. (2002). Social Cognition Models and Changing Health Behaviours. In Rutter, D. & Quine, L. *Changing Health Behaviour*. (pp1-27). Buckingham. Open University Press.

Sandberg, T. & Connor, M. (2008). Anticipated regret as an additional predictor in the theory of planned behaviour: A meta-analysis. *British Journal of Social Psychology*, 47 (4), 589-606.

Sandberg, T. & Connor, M. (2009). A mere measurement effect for anticipated regret: Impacts on cervical screening attendance. *British Journal of Social Psychology*. 48 (2), 221-236.

Schiffman, M, Castle, P.E, Rodriguez, A.C & Wacholder, S. (2007). Human Papillomavirus and Cervical Cancer. *The Lancet*, 370, 890-907.

Shaughnessy, J.J., Zechmeister, E.B. & Zechmeister, J.S. (2000). *Research Methods in Psychology*. 5th Ed. New York: McGraw Hill Higher Education.

Sky News: *Jade Goody Credited with Cancer Test Rise* (22 October, 2009). http://news.sky.com/skynews/Home/UK-News/Jade-Goody-Credited-With-Large-Increase-In-Cervical-Cancer-Screening-In-Last-Year/Article/200910415411610?lid=ARTICLE_15411610_JadeGoodyCredited

WithLargeIncreaseInCervicalCancerScreeningInLastYear&pos=searchresults: Retrieved on 29 January 2010, 2.34pm.

Smith, J.S., Melendy, A., Rona, R.K. & Pimenta. J.M. (2008). Age-specific prevalence of infection with Human Papillomavirus in Females: a global review. *Journal of Adolescent Health*, 43 (4), S5-S25.

Sutton, S. (1998). Predicting and explaining intentions and behaviour: how well are we doing? *Journal of Applied Social Psychology*, 28 (15), 1317-1338.

Sutton, S. (2002). Using Social Cognition Models to develop Health Behaviour Intervention: Problems and Assumptions In Rutter, D. & Quine, L. *Changing Health Behaviour*. (pp193-208). Buckingham. Open University Press

Taylor, S.E. (2006). *Health Psychology*. 6th Ed. Singapore: McGraw Hill.

Teitelman, A.M., Stringer, M., Averbuch, T. & Witkoski, A. (2009). Human Papillomavirus, Current Vaccines, and Cervical Cancer Prevention. *Journal of Obstetric, Gynecologic and Neonatal Nursing*, 38 (1), 69-80.

Trafimow, D., Sheeran, P., Conner, M. & Finlay, K.A. (2002). Evidence that Perceived Behavioural Control is a Multidimensional Construct: Perceived Control and Perceived Difficulty. *British Journal of Social Psychology*. 41. 101-121.

The Guardian: *Girl who died after cervical cancer injection had tumour in her chest* (1 October, 2009). <http://www.guardian.co.uk/society/2009/oct/01/cervical-cancer-vaccination-tumour-natalie-morton>: Retrieved 29 January 2010, 2:31pm

Trafimow, D., Sheeran, P., Connor, M. & Finlay, M.A. (2002). Evidence that Perceived Behavioural Control is a Multidimensional Construct. *British Journal of Social Psychology*. 41. 101-121.

Tversky, A. & Kahneman, D. (1981). The Framing of Decisions and the Psychology of Choice. *Science*. 211 (4481). 453-458.

Van der Pligt, J & de Vries, N.K. (1998). Expectancy-value models of health behaviour: the role of salience and anticipated affect. *Psychology and Health*, 13 (2), 289-305.

Vu, T.T.H., Nguyen, C.K., Le, B.M., Nguyen T.L., Tuan, M. P., Bui, T.N. et al. (2009). Effect of community-based nutrition education intervention on calcium intake and bone mass in postmenopausal Vietnamese women. *Public Health Nutrition*. 12 (5). 674-679.

Waller, J. & Wardle, J. (2008). HPV vaccination in the UK. *British Medical Journal*. 336 (7652), 1028-1029.

Williams, T. & Clarke, V. (2001). Effects of Message Framing on Breast-Cancer Related Beliefs and Behaviors: The Role of Mediating Factors. *Journal of Applied Social Psychology*, 31 (5), 925-950.

Yardley, L. (2008). Demonstrating validity in qualitative psychology. In Smith, J.A. (Ed.) *Qualitative Psychology: A Practical Guide to Research Methods*. 2nd Ed. (pp.235-251). London: Sage Publishers.

Ziarnowski, K.L., Brewer, N.T., Smith, J.S. & Gottlieb, S.L. (2008). Paradoxical effects of anticipated regret on HPV vaccination. *Annals of Behavioural Medicine*, 35 (S1): p200.

Ziarnowski, K.L., Brewer, N.T. and Weber, B. (2009). Present choices, future outcomes: Anticipated regret and HPV vaccination. *Preventive Medicine*, 48 (5), 411-414.

Zur Hausen, H. (2009). Papillomavirus in the causation of human cancers: a brief historical account. *Virology*, 384 (2), 260-265.