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Review

Q1 An appraisal of theoretical approaches to examining behaviours in relation to Human Papillomavirus (HPV) vaccination of young women

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ABSTRACT

Background. Interventions to increase uptake of Human Papillomavirus (HPV) vaccination by young women may be more effective if they are underpinned by an appropriate theoretical model or framework. The aims of this review were: to describe the theoretical models or frameworks used to explain behaviours in relation to HPV vaccination of young women, and; to consider the appropriateness of the theoretical models or frameworks used for informing the development of interventions to increase uptake.

Methods. Primary studies were identified through a comprehensive search of databases from inception to December 2013.

Results. Thirty-four relevant studies were identified, of which 31 incorporated psychological health behaviour models or frameworks and three used socio-cultural models or theories. The primary studies used a variety of approaches to measure a diverse range of outcomes in relation to behaviours of professionals, parents, and young women. The majority appeared to use theory appropriately throughout. About half of the quantitative studies presented data in relation to goodness of fit tests and the proportion of the variability in the data.

Conclusion. Due to diverse approaches and inconsistent findings across studies, the current contribution of theory to understanding and promoting HPV vaccination uptake is difficult to assess. Ecological frameworks encourage the integration of individual and social approaches by encouraging exploration of the intrapersonal, interpersonal, organisational, community and policy levels when examining public health issues. Given the small number of studies using such approach, combined with the importance of these factors in predicting behaviour, more research in this area is warranted.

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Abbreviations: HPV, Human Papillomavirus; UK, United Kingdom; USA, United States of America.

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66

67 **Introduction**

68 Globally, inequalities in the incidence of cervical cancer exist by
69 geographic area (Arbyn et al., 2011; Shack et al., 2008), socioeco-
70 nomic status (Shack et al., 2008; Parikh et al., 2003; Singh et al.,
71 2004) and ethnicity (National Cancer Intelligence Network, 2009;
72 Watson et al., 2008). Since licensure in 2006, many countries have in-
73 troduced the Human Papillomavirus (HPV) vaccine into their national
74 immunisation programmes for the primary prevention of cervical
75 cancer. High coverage has the potential to reduce substantially cervical
76 cancer incidence and mortality (Harper et al., 2004, 2006; Garland et al.,
77 2007, 2009).

78 However, there is the potential to increase health inequalities if
79 vaccine uptake is lower amongst less affluent and marginalised
80 populations that may also have greater risk of developing cervical
81 cancer. Evidence for differences in uptake has been shown. Globally,
82 evidence from a systematic review and meta-analysis did not indi-
83 cate strong evidence for associations by socioeconomic variables,
84 but young women belonging to minority ethnic groups were less
85 likely to receive the HPV vaccine (Fisher et al., 2013). Further in the
86 United States of America (USA), which delivers the HPV vaccination
87 programme in the healthcare setting, young women without
88 healthcare insurance coverage were less likely to be vaccinated (Fisher
89 et al., 2013).

90 In relation to the United Kingdom (UK) routine school-based pro-
91 gramme, studies have indicated a lack of association between initiation
92 of the HPV vaccination course and area-level measures of deprivation
93 (Sinka et al., 2013; Spencer et al., 2014; Fisher et al., 2014). However,
94 lower uptake by minority ethnic young women has been reported
95 (Spencer et al., 2014; Fisher et al., 2014; Bowyer et al., 2014). In the
96 catch-up programme, a higher level of deprivation is associated
97 with a lower odd of initiation and completion of the HPV vaccination
98 course (Sinka et al., 2013; Spencer et al., 2014; Beer et al., 2014).
99 Despite free access within the Danish healthcare-based programme,
100 inequality by ethnicity and socioeconomic factors has been shown
101 (Slattellid Schreiber et al., 2015). Further, in the Norwegian school based
102 programme, lower rates of initiation were reported for young women
103 with mothers belonging to the lowest income group (Hansen et al.,
104 2015).

105 The UK Medical Research Council Framework argues that complex
106 interventions, such as an intervention to increase HPV vaccination
107 uptake, should be developed and underpinned by appropriate theory
108 which captures the likely process of behaviour change (Craig et al.,
109 2008; Campbell et al., 2000). There is growing evidence that inter-
110 ventions developed with an explicit theoretical foundation are
111 more effective and more likely to induce positive behaviour change
112 (Glanz et al., 1990; Michie et al., 2008). Therefore, the aims of this lit-
113 erature review are: to provide an overview of theoretical models and
114 frameworks that have been used in published research to explain be-
115 haviours in relation to HPV vaccination of young women, and: to
116 consider the appropriateness of the theoretical models or frame-
117 works for informing the development of interventions to increase
118 uptake.

119 **Materials and methods**

120 Methods to identify relevant primary studies were based on those previously
121 used by the study authors for systematic reviews in the field of HPV vaccination
122 (Fisher et al., 2013; Batista Ferrer et al., 2014). There are differences between
123 'models', 'frameworks', and 'theories'. Theories tend to be specific, with concepts
124 which are amenable to hypothesis testing whereas models tend to be more pre-
125 scriptive, specific and with a narrower scope. Conceptual frameworks are usually
126 descriptive, showing relevant concepts and how they relate to each other (Iltott
127 et al., n.a). Throughout the manuscript, we use the terminology 'models', 'frame-
128 works' and 'theories' consistent with their use by the authors of included studies.

129 **Search strategy**

130 To identify the relevant literature in relation to the HPV vaccine and theoret-
131 ical models and frameworks, a search strategy previously used elsewhere
132 (Fisher et al., 2013; Batista Ferrer et al., 2014) was adapted which comprised
133 the following combination of text words (searching the title and abstract) and
134 Medical Subject Heading (MeSH) terms: ['papillomavirus' or 'wart virus'],
135 ['vaccination' or 'immunisation' or 'immunisation programmes' or 'wart
136 virus vaccines'] and ['theory' or 'theoretical model']. The following data-
137 bases were searched from inception to 5th December 2013: CINAHL;
138 Embase; Medline; PsycINFO; and ISI Web of Science & ISI Proceedings. All
139 abstracts were saved using Endnote X3 reference manager software.

140 After duplicates were removed, all titles and abstracts of identified studies
141 were assessed by one author (HB-F) to consider their relevance for inclusion.
142 Two reviewers independently reviewed potentially relevant full texts (HB-F,
143 JC). Disagreements were resolved by discussion.

144 **Eligibility criteria**

145 Studies were eligible for inclusion if a theoretical model or framework was
146 explicitly used in the study design and the study reported findings to explain
147 behaviours in relation to the HPV vaccination of young women aged nine to
148 18 years old. Any study design, including qualitative and quantitative ap-
149 proaches, was eligible. No restrictions were imposed on the basis of publication
150 date or language. Potentially relevant conference abstracts or dissertations were
151 checked to see if a full paper had been published in a journal. Reference lists and
152 citation lists of primary studies and relevant systematic reviews were hand
153 searched for additional references.

154 **Data extraction**

155 Study characteristics (authors, year of publication, study aims, study design,
156 participants) and details related to use of theoretical model of framework
157 (theoretical model, analytical approach, overall study findings, data to evaluate
158 the use of theory) were extracted and entered into an excel spread sheet by one
159 study author (HB-F) and doubled checked by another (SA).

160 **Assessment of use of theoretical model or framework in primary studies**

161 Presently, there is no standardised method or consensus for assessing use of
162 theory within studies which can vary within different research disciplines. To
163 assess the level of use of theory by the primary studies, the study was assessed
164 as either: (i) partially applied: authors locate their study within a particular the-
165 ory but then appear to abandon efforts to link, apply, or interpret their findings
166 in relation to that context, or; (ii) consistently applied: the theory guides and di-
167 rects the various phases of the research process and can be tracked throughout

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