Predicting adherence to eye patching in children with amblyopia: An application of protection motivation theory

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Objectives. This study reports an application of protection motivation theory (PMT) to the prediction of parental adherence to eye patching recommendations for children with amblyopia over a 2-month period. The study also considered the role of past behaviour in PMT.

Design and methods. A total of 151 parents of children with amblyopia who were attending follow-up appointments for orthoptic treatment participated. They completed questionnaires based on PMT to assess their beliefs about amblyopia and eye patching. Of the parents, 105 were contacted again at 2-month follow-up to obtain a measure of adherence to the recommended treatment for their child.

Results. PMT was found to be predictive of adherence intentions and behaviour at 2-month follow-up. Regression analyses revealed perceived vulnerability, response efficacy and self-efficacy to be significant predictors of protection motivation, whereas perceived vulnerability and response costs were significant predictors of adherence behaviour. Past adherence behaviour was found to have a direct effect on future adherence behaviour over and above the influence of PMT.

Conclusions. The results are discussed in relation to the sufficiency of PMT as a model of adherence behaviour. The practical implications for attempts to increase adherence to eye patching among children with amblyopia are outlined.

It has been estimated that approximately 3%–4% of preschool children have amblyopia (Lithander & Sjöstrand, 1991), making it the most common visual defect of childhood.

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Amblyopia is characterized by a unilateral or bilateral visual deficit for which no cause can be found on examination of the eye (Burian & von Noorden, 1980). The condition is usually associated with poor stereoscopic function and, as a result, compromises performance on visually demanding tasks. It has been suggested that amblyopia may therefore interfere with a child’s educational, social and recreational development, and restrict occupational choices in adulthood (Packwood, Cruz, Rychwalski, & Keech, 1999; Satterfield, Keltner, & Morrison, 1993; Snowdon & Stewart-Brown, 1997; Stewart-Brown, Haslam, & Butler, 1985). In addition, people with amblyopia are at increased risk of blindness as a result of injury or disease in the non-amblyopic eye. It is recognized that there is a ‘sensitive period’ up to about 8 years of age when the treatment of amblyopia may be successful (Friendly, 1987). Above this age the effectiveness of treatment is reduced as the nervous system loses its plasticity (Campos, 1995). It is therefore essential that treatment starts as early as possible, and this has led to the provision of preschool vision screening programmes in the UK (Snowdon & Stewart-Brown, 1997).

Amblyopia is usually treated by the part-time occlusion of the non-amblyopic eye with a patch, thereby depriving the child of vision in the ‘good’ eye and encouraging the use of the amblyopic, or ‘lazy’, eye in order to restore vision. However, a systematic review of the use of eye patching for the treatment of amblyopia concluded that there was little evidence that eye patching is an effective treatment for amblyopia (Snowdon & Stewart-Brown, 1997). This lack of evidence may not, however, reflect the clinical efficacy of eye patching as a treatment for amblyopia. Instead, it is possible the lack of evidence is, in part, owing to poor adherence to the recommended treatment. In fact, Simons and Preslan (1999), in a re-analysis of previous findings in the area, concluded that those who adhered to the recommended treatment had better visual acuity outcomes than those who failed to adhere. To date, there have been relatively few studies addressing the issue of non-adherence in relation to treatment for amblyopia, although research suggests that non-adherence rates may be high. For example, Newsham (2000) reported that 54% were unable to adhere to the recommended treatment over a 4-week period. Similarly, non-attendance rates at orthoptic appointments have been reported to range from 12% to 53% during the first year of treatment (Nucci, Alfrano, Piantanida, & Brancato, 1992; Oliver, Neumann, Chaimovitch, Gotesman, & Shimshoni, 1986). Low levels of adherence have been found across a range of treatment regimens for children, with Dunbar (1983) noting adherence rates of between 18% and 58% for acute illnesses and 11% and 89% for chronic conditions in a review of research on pediatric adherence. Parrish (1986) has concluded that non-adherence is one of the most persuasive barriers to the delivery of effective health care to children.

Given that the effectiveness of eye patching as a treatment for amblyopia may be related to the extent of adherence to the recommended treatment (Lithander & Sjöstrand, 1991), it is imperative to identify the proximal determinants of adherence. Studies in this area to date have only addressed more distal factors, such as the child’s age (Nucci et al., 1992; Oliver et al., 1986). However, it is likely that there is a range of psychosocial factors that may be important in understanding non-adherence to the recommended treatment for amblyopia. One model that may be usefully employed in the present context is protection motivation theory (PMT; Rogers, 1983).

Rogers argues that individuals engage in two cognitive appraisal processes when faced with a health threat. The first is threat appraisal, in which the individual focuses on the source of the threat. In this appraisal process there are a number of variables that serve to increase or decrease the probability of maladaptive responses (e.g., non-adherence to treatment). The individual’s perception of the severity of, and vulnerability
to, the threat are both seen to inhibit maladaptive responses. In contrast, there may be a range of rewards associated with maladaptive responses which may increase the likelihood of their performance. The second process is coping appraisal, which focuses on the individual’s ability to cope with the health threat. In this appraisal process, the perception that the recommended action is likely to reduce the health threat (i.e., response efficacy) and the confidence in one’s ability to perform the recommended action (i.e., self-efficacy) serve to increase the probability of adaptive responses. In contrast, the perception of barriers, or response costs, decreases the likelihood of adaptive responses. Protection motivation results from these two appraisal processes and is a positive function of perceptions of severity, vulnerability, response efficacy and self-efficacy, and a negative function of beliefs about the rewards associated with maladaptive responses and the barriers, or response costs, associated with the recommended action. Protection motivation, which is usually measured by behavioural intention, is seen to arouse, direct and sustain protective behaviour.

PMT has been applied to the prediction of a range of health protective behaviours (for reviews see Boer & Seydel, 1996; Conner & Norman, 1998), including AIDS risk-reduction behaviour (Abraham, Sheeran, Abrams, & Spears, 1994; van der Velde & van der Pligt, 1991), dietary behaviour (Plotnikoff & Higginbottom, 1995), exercise (Wurtele & Maddux, 1987), attendance at cervical cancer screening (Orbell & Sheeran, 1998; Seydel, Taal, & Weigman, 1990) and breast self-examination (Hodgkins & Orbell, 1998; Seydel, et al., 1990). In addition, there are a number of studies that have applied PMT to the prediction of medication adherence. For example, Bennett, Rowe, and Katz (1998), using a stepwise regression analysis, found that the perceived chronicity and perceived severity of asthma explained 22% of the variance in self-reported adherence to corticosteroid medication among a general practice sample of asthma patients. Palardy, Greening, Ott, Holderby, and Archison (1998) reported that PMT explained 23% of the variance in self-report adherence to self-care activities, over and above the influence of the quality of the child–parent relationship and disease severity, among a sample of adolescents with insulin-dependent diabetes mellitus. Of the PMT variables, perceived severity and response costs emerged as significant independent predictors of adherence. Rudman, Gonzales, and Borgida (1999) examined renal transplant patients’ adherence to a self-monitoring regimen and found that perceived threat, self-efficacy and response costs were predictive of protection motivation and that self-efficacy and perceived threat were predictive of adherence behaviour. Interestingly, protection motivation was unrelated to adherence behaviour. Of particular relevance to the focus of the present study is a study by Flynn, Lyman, and Prentice-Dunn (1995) that examined parental adherence to physical therapy recommendations for children with muscular dystrophy. Their study is noteworthy because it used PMT as a framework for explaining actions taken by an individual (i.e., a parent) to protect another person’s health (i.e., their child). Self-efficacy and response efficacy were found to be predictive of protection motivation, while self-efficacy was the sole predictor of adherence.

While providing some support for PMT in relation to medication adherence, the above studies have a number of important shortcomings. In particular, all of them were cross-sectional in design. As a consequence, they fail to provide a full test of PMT as, without a prospective measure of adherence behaviour, it is not possible to assess the mediating role of protection motivation. Furthermore, the studies reported by Bennett et al. (1998) and Palardy et al. (1998) did not include a measure of protection motivation, and the study reported by Flynn et al. (1995) considered the relationships between PMT and protection motivation and between PMT and adherence, but not the
relationship between protection motivation and adherence. Only Rudman et al. (1999) examined the mediating role of protection motivation in PMT, but found no evidence for a relationship between protection motivation and adherence behaviour. However, this study is limited by the lack of a prospective measure of behaviour. Overall, there have been relatively few prospective tests of PMT reported in the literature (although notable exceptions are Aspinwall, Kemeny, Taylor, Schneider, & Dudley, 1991; Flynn et al., 1995; Hodgkins & Orbell, 1998; Orbell & Sheeran, 1998; Seydel et al., 1990; Wurtele & Maddux, 1987).

Moreover, only a handful of studies have considered the influence of past behaviour in PMT (Abraham et al., 1994; Hodgkins & Orbell, 1998; van der Velde & van der Pligt, 1991). This is surprising given that past behaviour is typically found to be the strongest predictor of future behaviour when it is included in other models of health behaviour, such as the theory of planned behaviour (TPB; Ajzen, 1988), and is often seen to have a direct effect on future behaviour over and above the influence of social cognitive variables (see Ajzen, 1991; Ouellette & Wood, 1998; Yzer, Siero, & Buunk, 2001). Such findings have led to the suggestion that past behaviour should be included as a predictor variable in models of health behaviour (e.g., Bentler & Speckart, 1979). However, Ajzen (1987) argues that past behaviour has no explanatory value in its own right; one is unlikely to perform a behaviour tomorrow because one performed it yesterday. Instead, Ajzen (1988) argues that past behaviour shapes individuals’ beliefs about the behaviour and that it is these beliefs that determine subsequent behaviour. When past behaviour is found to have a direct effect on future behaviour, it is because important variables have not been considered. Ajzen (1991) therefore argues that it may be more appropriate to view the inclusion of past behaviour as a means for testing the sufficiency of a model. Assuming that the determinants of behaviour are stable, the correlation between past and future behaviour can be taken as an indication of the ceiling of a model’s predictive validity. Therefore, if a model is sufficient (i.e., it contains all the important determinants of a behaviour), the addition of past behaviour in a regression analysis should not increase the amount of variance explained.

Evidence to date suggests that PMT is not sufficient as it is unable to account for the influence of past behaviour. For example, past behaviour has been found to have a direct effect on intentions to engage in AIDS risk-reduction behaviour (Abraham et al., 1994; van der Velde & van der Pligt, 1991) and breast self-examination (Hodgkins & Orbell, 1998). In relation to the prediction of future behaviour, Hodgkins and Orbell (1998) found that while PMT was able to predict performance of breast self-examination at 1-month follow-up, when past behaviour was added to the regression equation the previously significant beta weights for protection motivation and response efficacy became non-significant and past behaviour emerged as the sole significant predictor of future behaviour. Clearly, further tests of the sufficiency of PMT are required, particularly in relation to the prediction of future behaviour, to confirm these initial findings.

The present study reports a prospective investigation of PMT in relation to the prediction of parental adherence to eye patching recommendations for children with amblyopia over a 2-month period. The study therefore extended the work of Flynn et al. (1995), who suggested that PMT may be used as a framework to predict the behaviour of one person (i.e., the parent) to protect another person’s health (i.e., their child), and also provided an opportunity to test the sufficiency of the model. On the basis of previous research, it was predicted that PMT would be predictive of both protection motivation and subsequent adherence to eye-patching recommendations. However, it was also predicted that the addition of past behaviour would increase the amounts of
variance explained in both protection motivation and future behaviour over and above the influence of the PMT variables.

**Method**

**Sample recruitment and procedure**
Parents of children waiting for follow-up appointments for orthoptic treatment at five orthoptic clinics in Bristol were identified through the clinic administration records. A total of 238 families whose children met the inclusion criteria were identified during the 7-month data collection period (October 1999 to May 2000). The inclusion criteria were that they were currently prescribed an eye patch for the treatment of amblyopia that was the result of strabismus (squint) or high refractive error and that they were 8 years old or younger. Prior to their clinic appointments, each family was sent an introductory letter and an information sheet outlining the background and aims of the study.

At their clinic appointment, parents were approached by a researcher (AS) who outlined the nature of the study and obtained consent from the parents to participate in the research. Participants were given a questionnaire to complete at the clinic. Participants were then followed up at 2 months (coinciding with their next orthoptic appointment) by post or telephone in order to assess the extent to which they were adhering to the recommended treatment.

**Participants**

**Parents**
Of the 238 families who were eligible to participate in the research, 77 failed to keep their clinic appointment; of these, 41 cancelled by telephone and 36 did not notify the clinic. Of the remaining 161 families, 10 declined to take part in the research. Thus, completed questionnaires were obtained from 151 families (63.4% of families who met the eligibility criteria and 93.8% of families who attended their clinic appointment). The occupational status of both parents was ascertained, and this information was used to assess the participants’ socioeconomic status. Of the 151 families, 38 were employed in occupations deemed to have a professional status (e.g., teacher, doctor), 43 were in semi-skilled occupations (e.g., electrician, mechanic), 47 were in unskilled occupations (e.g., warehouse worker, labourer), eight were unemployed and three were students (12 missing data). The majority of the questionnaires were completed by the child’s mother (N= 129). Subsequent analyses revealed no significant differences between questionnaires completed by mothers and fathers on any of the Time 1 measures. It was possible to follow up 105 of the respondents at Time 2 (69.5% response rate). In order to test for potential attrition biases, participants who were followed up (N= 105) were compared with those who were not (N= 46). No significant differences were found between the two groups on any of the Time 1 measures.

**Children**
The children ranged in age from 1 to 8 years old (M= 4.45), and included 79 males and 72 females. The length of time since occlusion therapy was first prescribed ranged from 0 to 60 months (M= 13.99). The amount of recommended eye patching per day ranged from 30 min to 24 hours per day (M= 3.60). The majority of the children (88.74%) had
siblings living at home with them. Of the children, 42 were attending nursery facilities, 99 were attending primary school and 10 were too young to attend such facilities.

**Measures**

The Time 1 questionnaire contained measures of the main PMT constructs. These were developed on the basis of pilot interviews with 20 parents of children who had been prescribed an eye patch for the treatment of amblyopia (Searle, Vedhara, Norman, Frost, & Harrad, 2000), and constructed in line with guidelines detailed by Boer and Seydel (1996). Unless otherwise indicated, all PMT items were measured on 5-point (strongly disagree/strongly agree) response scales. Reliable measures were identified through factor analyses and internal reliability analyses. Measures of the PMT variables were constructed by averaging responses to individual items such that high scores indicated high levels on the variable of interest. In addition to the PMT items, information was collected on the child and patching behaviour.

Protection motivation was assessed using three items (e.g., ‘I plan to patch my child as recommended by the orthoptist’) ($\alpha = .91$). Perceived severity was assessed using six items focusing on the seriousness of amblyopia (e.g., ‘I believe that my child’s visual impairment is a serious condition’) ($\alpha = .78$). Six items were used to assess perceived vulnerability ($\alpha = .89$). These items focused on the potential future negative consequences of the condition if left untreated (e.g., ‘If left untreated, what are the chances that your child’s visual impairment will affect his/her reading ability? Very low-very high’). Response efficacy was assessed using five items (‘Eye patching is an effective treatment for my child’s condition’) ($\alpha = .85$). Respondents were also presented with a list of items focusing on various aspects of the treatment that they may find difficult and from these items three scales were constructed to cover the perceived barriers to, or response costs of, patching. First, the perceived distress experienced by parents when patching their child was assessed using eight items (e.g., ‘Patching causes distress for me’) ($\alpha = .87$). Second, the extent to which patching may interfere with, or prohibit, the child from engaging in everyday activities was assessed with five items (e.g., ‘Wearing a patch prohibits my child from playing . . . never-almost always’) ($\alpha = .90$). Third, the stigma attached to wearing a patch was assessed by five items (e.g., ‘Negative comments from others about the patch upset me’) ($\alpha = .72$). Self-efficacy in relation to patching their child was assessed using four items (e.g., ‘I feel confident in my ability to patch my child’) ($\alpha = .89$).

Respondents were asked to indicate how many hours per day the orthoptist recommended that they patch their child and how many hours per day they were actually able to patch their child. Time 1 patching was taken as a measure of past behaviour and was computed as the proportion of time that they reported patching in relation to the recommended time (i.e., actual patching time divided by recommended patching time, multiplied by 100). Respondents were also asked to indicate their child’s age and gender and when their child was first prescribed a patch. The time since prescription was computed in months.

Time 2 patching (i.e., at 2-month follow-up) was taken as a measure of future behaviour and was assessed by asking the same questions as for the Time 1 patching measure.
Results

Descriptive findings
The means, standard deviations and intercorrelations between the main measures are presented in Table 1. On average, the parents reported that they managed to patch their children 73.37% of the time recommended by the orthoptist at Time 1 and 71.79% of the time recommended by the orthoptist at Time 2. Levels of protection motivation were high (\(M=4.50\)), indicating that most parents were motivated to patch their child as recommended by the orthoptist. Significant correlations were found between protection motivation (i.e., intention to patch the child as recommended by the orthoptist) and all of the PMT constructs with the exception of perceived severity. Thus, increasing levels of protection motivation were associated with increasing perceptions of vulnerability, response efficacy and self-efficacy, and decreasing perceptions of distress, prohibition of activities and stigma as barriers to patching. Time 1 patching was also significantly correlated with protection motivation. The child’s age and gender, and time since the original prescription were all unrelated to protection motivation. Considering the correlates of Time 2 patching, significant positive correlations were found between Time 2 patching and perceptions of vulnerability, response efficacy and self-efficacy, and significant negative correlations were found between Time 2 patching and perceptions of distress and prohibition of activities as barriers to patching. In addition, Time 1 patching was also correlated with Time 2 patching. Protection motivation was unrelated to Time 2 patching, as were perceptions of severity, perceptions of stigma as a barrier to patching, the child’s age and gender, and time since the original prescription.

Predicting protection motivation
A hierarchical linear regression analysis was used to predict protection motivation (see Table 2). The independent variables were entered in three blocks:

1. child’s age and gender, and time since original prescription;
2. severity, vulnerability, response efficacy, distress barrier, prohibition barrier, stigma barrier, and self-efficacy; and
3. Time 1 patching.

In this way it was possible to assess the predictive utility of the PMT constructs over and above the influence of features of the child. By adding past behaviour to the regression equation at a third, and final, step, it was also possible to assess the sufficiency of PMT (see Ajzen, 1991; Hodgkins & Orbell, 1998). Features of the child explained a non-significant 1% of the variance in protection motivation (\(R^2 = .01\), adj. \(R^2 = .00\), \(F(3,145) = .25\), n.s.). The PMT variables were able to explain an additional 29% of the variance in protection motivation (\(\Delta R^2 = .29\), \(\Delta F = 8.30\), \(p < .001\)), with perceived vulnerability, response efficacy and self-efficacy emerging as significant independent predictors. The addition of Time 1 patching failed to increase the amount of variance explained in protection motivation (\(\Delta R^2 = .00\), \(\Delta F = .38\), n.s.). The variables under consideration in this final regression equation were able to explain 30% of the variance in protection motivation (\(R^2 = .30\), adj. \(R^2 = .24\), \(F(11,137) = 5.33\), \(p < .001\)), with perceived vulnerability, response efficacy and self-efficacy emerging as significant independent predictors.
Table 1. Descriptive statistics and intercorrelations between the main measures (N = 151)

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<th>VUL</th>
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<sup>a</sup> M = 105<sup>b</sup> N = 105<sup>c</sup> (%) of males.

* p<.05; ** p<.01; *** p<.001
In order to predict Time 2 patching (at 2-month follow-up), a hierarchical linear regression analysis was used (see Table 3) in which the independent variables were entered in four blocks:

1. child’s age and gender, and time since original prescription;
2. protection motivation;
3. severity, vulnerability, response efficacy, distress barrier, prohibition barrier, stigma barrier, and self-efficacy; and
4. Time 1 patching.

In this way it was possible to examine the predictive utility of protection motivation and the PMT constructs over and above the influence of features of the child. In addition, by adding past behaviour to the regression equation at a fourth, and final, step, it was possible to assess the sufficiency of PMT (see Ajzen, 1991; Hodgkins & Orbell, 1998). Features of the child explained a nonsignificant 5% of the variance in Time 2 patching ($R^2 = .05$, adj. $R^2 = .02$, $F(3,101) = 1.67$, n.s.) and the addition of protection motivation failed to increase the amount of variance explained ($\Delta R^2 = .00$, $\Delta F = .70$, n.s.). The addition of the PMT variables produced a large and significant increment in the amount of variance explained in Time 2 patching ($\Delta R^2 = .23$, $\Delta F = 4.28, p < .001$). At this step, the variables under consideration were able to explain 28% of the variance in Time 2 patching ($R^2 = .28$, adj. $R^2 = .20$, $F(11,93) = 3.36, p < .001$), with perceived vulnerability and the perception of prohibition of activities as a barrier to patching emerging as significant independent predictors. Protection motivation also emerged as a significant independent predictor in the regression equation. However, note that the beta weight was negative in contrast with the non-significant positive bivariate correlation found between protection motivation and Time 2 patching. This suggests that the significant negative beta weight may be due to a suppressor effect whereby an independent variable becomes significant as a consequence of its correlations with other independent variables. A suppressor effect is identified if the size of the correlation between an independent variable and the dependent variable is smaller than the beta weight and/or if the correlation and beta weight have opposite signs, as was the case in the present
study (Tabachnik & Fidell, 1996). Finally, the addition of Time 1 patching explained an additional 21\% of the variance in Time 2 patching ($\Delta R^2 = .21, \Delta F= 38.11, p < .001$). The variables under consideration in this final regression equation were able to explain 49\% of the variance in Time 2 patching ($R^2 = .49, \text{adj. } R^2 = .43, F(12, 92) = 7.48, p < .001$), with protection motivation (supressor effect), the perception of prohibition of activities as a barrier to patching and Time 1 patching emerging as significant independent predictors.

### Table 3. Predicting Time 2 patching: hierarchical linear regression analysis ($N = 105$)

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<td>3. Severity</td>
<td>-.01</td>
<td>.20*</td>
<td>.14</td>
<td></td>
</tr>
<tr>
<td>Vulnerability</td>
<td></td>
<td>.17</td>
<td>.15</td>
<td></td>
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<tr>
<td>Response efficacy</td>
<td>-.10</td>
<td>-.06</td>
<td></td>
<td></td>
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<tr>
<td>Distress barrier</td>
<td>-.30**</td>
<td>-.24*</td>
<td></td>
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<tr>
<td>Prohibit barrier</td>
<td>.03</td>
<td>-.01</td>
<td></td>
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<tr>
<td>Stigma barrier</td>
<td>.16</td>
<td>-.10</td>
<td></td>
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<tr>
<td>Self-efficacy</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>4. Time 1 patching</td>
<td>.55***</td>
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$R^2$ = .05 .05 .28*** .49***

*p < .05; ** p < .01; *** p < .001.

### Discussion

The present study sought to apply protection motivation theory (PMT) to the prediction of parental adherence to eye-patching recommendations for children with amblyopia over a 2-month period. PMT was found successfully to predict parents’ intentions to patch their child in line with the recommended treatment. After controlling for features of the child, PMT was able to explain an additional 29\% of the variance in protection motivation, with perceptions of vulnerability, response efficacy and self-efficacy emerging as significant independent predictors. Thus, those parents who were highly motivated to patch their child in line with recommendations were more likely to believe that failing to patch their child would lead to a range of negative consequences, such as poor reading ability, more likely to believe in the efficacy of patching, and more likely to feel confident in their ability to patch their child. Similar findings have been reported in previous applications of PMT in relation to medication adherence. For example, Flynn et al. (1995) reported that PMT was predictive of parents’ intentions to adhere to physical therapy recommendations for children with muscular dystrophy, with response efficacy and self-efficacy emerging as significant independent predictors. Rudman et al. (1999) also found PMT to be predictive of renal transplant patients’ intentions to adhere to a self-monitoring regimen, with self-efficacy and response costs emerging as significant independent predictors.

In the present study, PMT was found to be predictive of adherence to eye patching at
2-month follow-up. Somewhat surprisingly, protection motivation was found to be unrelated to adherence at follow-up; however, when all the PMT variables were considered, PMT was able to explain an additional 23% of the variance in adherence at follow-up, after controlling for features of the child. Perceived vulnerability and the prohibition barrier emerged as significant independent predictors. Thus, those parents reporting high levels of adherence at follow-up were more likely to believe that failing to patch their child would lead to a range of negative consequences and were less likely to perceive the prohibition or restriction of everyday activities, such as playing, as a potential barrier to patching. Rudman et al. (1999) also found that protection motivation was unrelated to adherence to a self-monitoring regimen among renal transplant patients. One reason for this failure of protection motivation may be that adherence to treatment recommendations, particularly for parents having to adhere to treatment regimens for their children, may be difficult when they involve a potentially long-term commitment to a regimen that may be psychologically or socially punitive (Leventhal & Cameron, 1994). As a result, high levels of protection motivation may not be sufficient to produce high levels of adherence. Instead, coping appraisal cognitions focusing on the response costs of the treatment (as found in the present study and by Palardy et al., 1998) and feelings of self-efficacy (as found by Hynyn et al., 1995; Rudman et al., 1999) may be more important determinants of adherence behaviour.

The present study also assessed the role of past behaviour in PMT. Considering the prediction of protection motivation, the addition of past behaviour failed to increase the amount of variance explained in protection motivation over and above the influence of the PMT variables. This suggests that the model is sufficient to predict protection motivation. Previous tests of PMT have found a direct effect for past behaviour in relation to protection motivation for AIDS risk-reduction behaviour (Abraham et al., 1994; van der Velde & van der Pligt, 1991) and breast self-examination (Hodgkins & Orbell, 1998). Further research is needed to clarify the ability of PMT to account for the influence of past behaviour on protection motivation. Considering the prediction of Time 2 patching, the addition of past behaviour was found to produce a substantial increment in the amount of variance explained in reported adherence at 2-month follow-up. Similar findings have been reported by Hodgkins and Orbell (1998), who found that past behaviour was the sole independent predictor of breast self-examination at 1-month follow-up. However, in the present study the prohibition barrier remained as a significant independent predictor after the addition of past behaviour, suggesting that the effect of past behaviour is partially mediated by perceptions of the response costs associated with the behaviour. Moreover, Ajzen (1991) has noted that the commonly observed direct effect of past behaviour on future behaviour may, in part, be explained by shared method variance in measures of past and future behaviour. This may be relevant to the present study in which Time 1 and Time 2 adherence were assessed using the same measure. Hodgkins and Orbell (1998), though, found a direct effect for past behaviour despite the fact that they used different measures of breast self-examination at Time 1 and Time 2.

The present results suggest that PMT is not sufficient to predict adherence behaviour and that it would benefit from the inclusion of additional variables. Given the difficulty of adhering to potentially psychologically and socially punitive treatment regimens, it is likely that a range of volitional skills is necessary to ensure that individuals’ intentions, or motivations, to adhere to treatment regimens are successfully translated into action. Recent health behaviour models have made the distinction between various stages, or phases, in the adoption of health behaviour (Prochaska & DiClemente, 1984; Schwarzer,
Importantly, these models propose that different cognitions are important at different stages (Armitage & Conner, 2000). Thus, the social cognitive variables that predict protection motivation may be different from those that predict protective behaviour. For example, Heckhausen (1991) proposes that, in the post-decisional and action phases, plans of action need to be developed in order to initiate and maintain performance of a behaviour. Similarly, Schwarzer (1992) has argued that various action control and self-regulatory processes are required to ensure that intentions are successfully translated into action. In particular, when an intention is formed it is subject to various internal and external influences that may encourage alternative behavioural responses. For an intention to be translated into action, it must be strengthened and protected from these alternative responses and this may be achieved through the employment of a number of action control processes, as outlined by Kuhl (1985) (i.e., active attentional selectivity, encoding control, emotion control, motivation control, environment control, parsimony of information processing).

The present study has a number of methodological limitations and, as a result, any conclusions are made with caution. First, the response rate to the Time 1 questionnaire was low, with only 63.4% of eligible participants completing the questionnaire. This was mainly owing to 32.4% of the eligible participants failing to attend their clinic appointment. Such a non-attendance rate is typical of many orthoptic clinics for children with amblyopia (Nucci et al., 1992; Oliver et al., 1986). Nevertheless, it is likely that those who failed to attend their appointment may have had problems adhering to the treatment recommendations for patching and, as a result, the present sample may be biased towards more adherent families.

Second, the response rate to the follow-up questionnaire was also quite low (69.5% response rate), again suggesting that the Time 2 sample may be biased towards more adherent families. In order to assess potential attrition biases, the responses of participants who were followed up were compared with those who were not. Encouragingly, no significant differences were found between the two groups on any of the Time 1 PMT or patching measures.

Third, there was a 2-month time gap between the assessment of protection motivation and patching at Time 2. It is possible that participants’ levels of protection motivation may have changed in the intervening period when faced with unexpected difficulties. However, Randall and Wolff (1994) have shown that the strength of the intention–behaviour relationship is unaffected by the length of time between the measurement of intention and behaviour.

Fourth, Ajzen and Fishbein (1977) have highlighted the importance of matching measures of intention and behaviour with respect to the action, the target, the context and the time frame (i.e., principle of correspondence). In the present study, the measure of protection motivation failed to specify a time frame for adhering to the treatment recommendations and, as a result, violates this principle of correspondence. However, given that follow-up appointments at the orthoptic clinic were at 2-monthly intervals, it is likely that participants were aware that the patching recommendations were for the next 2 months and provided their responses accordingly. Nevertheless, the failure to specify a time frame may explain the non-significant relationship between protection motivation and Time 2 patching.

Despite the above limitations, the present study has a number of practical implications for increasing adherence to patching recommendations. In fact, PMT has been widely used as a framework for manipulating social cognitive variables that may have an impact on protection motivation (for reviews see Boer & Seydel, 1996; Conner &
Norman, 1998). PMT has its origins in early work on the persuasive impact of fear appeals (Janis, 1967; Leventhal, 1970), which emphasized the importance of combining fear appeals with specific recommendations for action. Experimental studies in which individuals are presented with persuasive communications based on PMT have shown that manipulating coping appraisal cognitions can have a significant effect on parental intentions to engage in behavior to protect their children (Campis, Prentice-Dunn, & Lyman, 1989; Peterson, Farmer, & Kashani, 1990). For example, Campis et al. (1989) found that manipulating perceptions of self-efficacy and response costs had a significant effect on mothers’ intentions to educate their children about sexual abuse.

The present findings may therefore be used to encourage parental adherence to eye patching for children with amblyopia. Both perceived vulnerability and the belief that patching would restrict everyday activities (i.e., response cost) were predictive of the extent of eye patching achieved at 2-month follow-up. This suggests that when discussing treatment recommendations with parents, clinicians should emphasize the various consequences of amblyopia if left untreated and explore ways in which the child can be encouraged to continue to wear the patch during everyday activities such as playing, watching television and reading. Such an approach would be consistent with work on volitional processes which emphasizes the importance of developing plans of action to overcome obstacles and that may hinder the translation of intentions into action (Heckhausen, 1991; Jones, Abraham, Harris, Schulz, & Chrispin, 2001; Schwarzer, 1992). In the present context, such plans of action may help parents to patch their children during everyday activities. Clinicians may therefore learn from adherent parents about the successful strategies they employ so that these can be passed on to parents who are experiencing problems adhering to the recommended treatment. Alternatively, parents exhibiting high levels of adherence could be used as ‘peer group educators’ to offer advice and support to those parents experiencing difficulties. If adherence rates can be increased, this may, in turn, improve the clinical efficacy of eye patching as a treatment for amblyopia.

Acknowledgements

The authors would like to thank Andy Frost, Liz Newcomb, Ann Starbuck, Julie Parker, Angela Hay, Rosemary Foley and the staff of the Orthoptic Department, Bristol Eye Hospital, along with the participating families, for their help with this research. This work was supported by the National Eye Research Centre and the MRC Health Services Research Collaboration. Bristol is the lead centre of the MRC Health Services Research Collaboration.

References


*Received 6 October 2000; revised version received 21 September 2001*