A TEST OF PROTECTION-MOTIVATION THEORY
FOR PROMOTING INJURY CONTROL

by

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(ABSTRACT)

The present study evaluated the relationship between parental attitudes and their injury preventive efforts related to bicycle-related head injuries. Specifically, the present study assessed the contribution of components of Protection Motivation Theory (PMT; severity, vulnerability, response-efficacy, self-efficacy, response-cost) in persuading parents to engage in the preventive action of purchasing a bicycle helmet. Participants were 69 parents of elementary school-aged children. Parents were randomly assigned to one of the four conditions: a PMT/low RC group (n = 18), a PMT/high RC group (n = 18), a No Information/low RC group (n = 17), and a No Information/high RC group (n = 16). As such, parents either received a PMT-based informational message regarding bicycling head injuries or they received no information. Similarly, parents in both of these conditions either received a discount coupon for a bicycle helmet or they received no coupon. Parents' intentions to purchase a bike helmet for their child as well as their actual purchases were assessed. Overall, regardless of experimental group, parents reported similar perceptions of severity, vulnerability, response-efficacy, self-efficacy and response-costs associated with bicycle head injuries and helmets. Neither the receipt of PMT-based information nor the availability of discount coupons resulted in parents' increased intentions to purchase or actual purchases of bicycle helmets for their

child. Rather, parents generally reported that they were fairly likely to purchase a bicycle helmet for their child, yet few had done so at the time of the home visit. The most notable finding involved the failure of parents' intentions to purchase a bicycle helmet for their child to predict their actual purchasing behavior. Limitations of the present study and directions for future research are discussed.

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A Test of Protection-Motivation Theory for Promoting Injury Control

Injuries are the leading cause of death and account for more than 30,000 permanent disabilities among children in this country (CDC, 1990). As such, unintentional injuries have now surpassed infectious diseases as the cause of greatest concern for children. Not only do unintentional injuries account for the most deaths but they are also the most preventable. As such, the prevention of children's injuries is increasingly being recognized as a crucial element in the maintenance of children's health. Bicycles, usually considered toys, represent a major source of injuries for children, especially head injuries. Specifically, bicycle injuries to children account for approximately 300,000 emergency department visits and 500 to 600 deaths each year in the United States (CDC, 1987). Children between the ages of 5 to 14 account for the greatest proportion of bicycle-related injuries (McFarlane, Jones, & Lawson, 1982; Selbst, Alexander, & Ruddy, 1987), and particularly head injuries (Fife et al., 1983; Kraus, Fife, & Conroy, 1987). Up to 30% of injuries sustained from bicycle accidents involve the head, neck or face (Cushman, Down, MacMillan, & Waclawik, 1990; Selbst et al., 1987) and 70-80% of bicycle-related fatalities involve head trauma (Brown & Farley, 1989; Fife et al., 1983; Thompson, Rivara, & Thompson, 1989). In addition, most bicycle-related hospital admissions are the result of injuries to the head and skull (Cushman et al., 1990; McKenna, Welsh, & Martin, 1991). The importance of reducing the incidence of bicycle-related injuries, especially head injuries, in children is evidenced by recommendations put forth by the American Academy of Pediatrics (1990) which include increasing awareness of the importance of wearing bicycle helmets and the dangers of riding without one, increasing the availability of inexpensive helmets, the development of mandatory, uniform safety standards, the development of programs to

promote bicycle safety and helmet usage, and media representation of helmeted bicycle riders. Similarly, the reduction of unintentional injuries and increases in the use of bicycle helmets are included in the publication, "Healthy People 2000," as specific objectives to be met by the year 2000 (ODPHP, 1990).

Bicycle Helmets

Effectiveness. Unlike many other injuries, bicycling-related head injuries have a feasible and effective solution, bicycle safety helmets (CDC, 1990). The helmets are designed to perform two functions: (a) to protect the brain from compression by slowly decelerating it, and (b) to protect the skull from fracture (Friede, Azzara, Gallagher, & Guyer, 1985). Until 1986 there was a paucity of research demonstrating the effectiveness of bicycle safety helmets. Since that time, however, a number of studies employing several approaches have demonstrated the effectiveness of bicycle safety helmets for reducing the risk of head injury. Significant increases in bicycle helmet usage were observed following a helmet wearing promotional campaign in Victoria, Australia (Wood & Milne, 1988). The fact that the increase in helmet use was accompanied by significant decreases in the rate of head injuries among bicycle accident victims offers support for the efficacy of bicycle safety helmets. Based on interviews with bicyclists, Wasserman and colleagues (1988) found that of the riders who had suffered an injury in the recent past, those who had been wearing a helmet at the time of their injury were less likely to have sustained a head injury. Similarly, a recent case-control study of injuries among bicycle riders in the Seattle, Washington area indicated that bicycle helmets reduce the risk of head injury by 85% and brain injury by 88% (Thompson et al., 1989). Consistent with these results, another study noted a decrease of approximately 78% in head injuries associated with the use of bicycle helmets (Thompson, Rivara, & Thompson, 1988). Sacks et al. (1991) estimated that 2500 deaths and 757,000 head injuries, i.e., one death everyday and one head injury every minute, could be prevented by universal use of

helmets by all bicyclists. Further, Kraus et al. (1987) note that while good hard helmets could prevent 90% of bicycle-related deaths, even poor hard helmets could be expected to prevent 70% of deaths, which seems to suggest that wearing any helmet is better that not wearing one at all. Moreover, since bicyclists who die with serious head injuries generally do not have other life-threatening or potentially disabling injuries, helmets would likely prevent many fatalities and serious head injuries (Fife et al., 1983).

Not only do bicycle safety helmets offer a feasible and effective strategy for reducing bicycle-related head injuries, they are also very cost effective (Bader, 1990). Head injuries are very expensive to deal with. By preventing a significant number of head injuries, it follows that the significant costs which typically accompany head injuries will also be avoided. Thus, in addition to reducing the physical consequences, many financial burdens may also be prevented. Overall, the evidence suggests that helmets are an effective intervention for the prevention of bicycle-related head traumas. Since head injuries represent an area of particular concern for children, the use of bicycle safety helmets seems especially important for their safety.

Usage. Despite the risk of serious head injury and the evidence demonstrating the effectiveness of bicycle safety helmets in reducing the risk of head injury, helmet usage among children is very low. In one of the initial studies investigating the prevalence of helmet use, Weiss (1986) observed helmet use among children and young adults who commuted to and from school by bicycle in Tucson, Arizona. He discovered that an alarmingly low percentage (less than 2%) of school-age children wore helmets, compared with 10% of college-age bicyclists. Additional findings since Weiss' initial study, confirm his finding of low rates of helmet use among children. For example, of 372 parents of primary and secondary school-age children who were interviewed in a telephone survey, only 2.4% reported that their children wore bicycle helmets most of the time (Brown & Farley, 1989). Selbst et al. (1987) found that while 8% of children who

were being treated at the hospital for bicycle injuries reported owning protective equipment (e.g., helmet, gloves, knee pads, reflective clothing), only 3% of them were wearing any protective equipment at the time they were injured. Kimmel and Nagel (1990) found that while 6% of children indicated that they owned a bicycle helmet, at least half of these children reported not wearing it or only wearing it half of the time so that only 2.6% reported frequent use of a bicycle helmet. Taken together these two studies suggest that helmet ownership is not necessarily predictive of helmet use among children. In addition, another study found that of the 4.1% of children who reported owning a helmet in their sample, only 1.1% of those helmets were likely to meet the standards of the American National Standard Institute (Otis et al., 1992). Thus, not only is it important to wear a helmet, but it is also important to wear the right kind of helmet. Roadside interviews conducted with bicyclists in Burlington, Vermont revealed helmet usage among 11 to 19 year-olds as being 3.7% while helmet use among those older than 30 was 16.2% (Wasserman, Waller, Monty, Emery, & Robinson, 1988). DiGuiseppi and associates (1988) found that, of the children who owned bicycles in their sample, 77.1% of them did not own bicycle helmets.

Even after sustaining a bicycle-related injury, the subsequent bicycle-riding behavior and safety practices of children remain poor. Nakayama, Pasieka and Gardner (1990) found that although there were slight increases in reported helmet use after injury, three quarters of the children still rode without protective head gear. The authors concluded that injury alone seems to have a limited effect on the adoption of safe bicycling practices among children. In an attempt to determine any change in rates of helmet use over a five year period, Weiss (1992) conducted observations of helmet use among children and young adults at the same schools used in his initial study (Weiss, 1986). (Observations were obtained in an area where no formal programs designed to increase the use of helmets had been implemented.) No significant increases in the

percentage of students who used helmets at the middle school, the high schools, or the university were revealed. However, observations from the elementary schools showed an increase in helmet use from 4.4% to 21.4%. The preponderance of evidence indicates that helmet use is uncommon at any age, but is dramatically less common among children. Thus, because children suffer the majority of serious head injuries from bicycling accidents, the group at greatest risk for bicycle-related head injury is also the least protected.

Children's Beliefs & Attitudes

While these studies demonstrate that children rarely wear bicycling helmets, they provide little information as to why this is so. Others studies have attempted to identify the variables related to use and nonuse among children. In an exploratory study, which used a focus group approach, researchers attempted to identify and better understand barriers to helmet use among children age 10-14 (Howland et al., 1989). Twelve percent of the children in this sample reported helmet ownership. Children's responses with regard to the severity of bicycle-related injuries indicated little awareness of the possibility of a very serious injury. The most frequent responses included cuts and scrapes, and injury to arms and legs, while injuries to the head and neck were offered less often; even fewer children associated bicycle crashes with dying. A rather striking difference between children's expressed beliefs about others wearing helmets and about how they themselves would feel wearing a helmet was revealed. While children's responses to others wearing helmets was quite positive (e.g., smart, safe, good), responses with regard to their own use frequently included being embarrassed, stupid, not cool, not tough and being teased or laughed at by friends. The reasons for the difference between children's respect for others wearing helmets as compared to their concerns that helmet use would lead to ridicule from peers were unclear.

Otis et al. (1992) conducted a study to identify the factors that are most likely to influence children's expressed intentions to use bicycle helmets. Children completed a questionnaire regarding their beliefs about helmet use. Specifically, the questions were designed to assess intentions to wear a bicycle helmet, behavioral (advantages and disadvantages to bicycle helmet use) and normative (persons believed to agree or disagree with the behavior) beliefs regarding helmet use, perceptions of risk, perceptions of severity, frequency of bicycle use during the summer, and habitual safety related behaviors. While the intention to wear a bicycle helmet was significantly associated with behavioral beliefs, normative beliefs, habitual safety-related behavior, and perception of risk, behavioral and normative beliefs were found to be the most predictive of use, together accounting for 51% of the variance. Behavioral beliefs, such as would be fun, would be a bother, would be ugly, would look ridiculous, and would make user safe, were found to differentiate between children reporting high versus low intentions of use. Of the normative beliefs, the degree of support from friends was found to be the most discriminant belief between groups, with support from the mother coming in second. All children in the study, whether they were motivated to wear a helmet or not, indicated a strong feeling of safety linked to helmet use. This finding points to the question of why, if children recognize the efficacy of helmet use, they still do not use helmets. For example, even if children are aware of the increased safety provided by helmets, they may not wear helmets because they are more worried about what their friends will think or say. The other findings of this study offer some clues as to this question and could prove useful in developing components of promotional campaigns directed towards children (i.e., messages should emphasize that helmet use is synonymous with having fun, is attractive and pleasurable, and makes the wearer look sporty; Otis et al., 1992).

Diguiseppi and colleagues (1990) also looked at factors related to children's nonuse. The most frequently cited reasons for not wearing helmets were that friends do

not wear helmets (28%), don't think about it, uncomfortable, don't see a need, forget, and unattractive. Similar answers were given by both children who owned and did not own helmets, with the exception of forgot and helmets being judged as uncomfortable which were reported more frequently by children who owned helmets. As indicated in all of these studies and others (Cushman et al., 1990), peer pressure seems to be the overall most dominant response given by children for not wearing bicycle helmets. Consistent with this finding are Diguiseppi et al.'s (1989) observations of children's helmet use. Specifically, they noted that children riding with other children who were not wearing helmets were only one-fifth as likely to wear helmets as children riding alone. In contrast, children riding with other children wearing helmets were about 22 times as likely to wear helmets as children riding alone. Similarly, Parkin et al. (1993) found that children were more likely to wear helmets when riding with helmeted peers and adults. Both sets of observations provide strong support for the influence of peer pressure on helmet use among children (Diguiseppi et al., 1989).

Bicycle Helmet Use Promotion

In response to such a low rate of helmet use as well as the finding that a large proportion of children have received little or no instruction on bicycle safety (Cushman et al., 1990; Kimmel & Nagel, 1990; Selbst et al, 1987), several programs have been designed and implemented to increase the rate of helmet use among children. DiGuiseppi et al. (1989) put forth an extensive three-year community-wide campaign in Seattle, Washington promoting the use of bicycle helmets. The campaign was characterized by a multi-dimensional approach which involved a broad-based community coalition, combining individual health education with mass media health promotion, commercial advertising, and financial incentives. The three major objectives for the program entailed increasing parental awareness of the need for helmets, promoting use among children, and reducing financial barriers to their purchase. Helmet use increased from 5.5% to

15.7% in Seattle as compared to 1.0% to 2.9% in Portland, the control community. Even after controlling for possible confounding variables, an increase from 4.6% to 14.0% was still noted. Based on their results, the authors concluded that community-wide bicycle helmet campaigns addressing the issues of lack of awareness, peer pressure, and cost can be effective for increasing helmet use among children. While the effect of the campaign did result in significant increases in bicycle helmet use (4.6% to 14.0% in the target community, Seattle), Bader (1990) suggested that the post-intervention level of use still fell far short of the level needed to make much of an effect on bicycle-related head injuries among children. Later, Bergman and associates (1990) noted that a fifth survey of helmet usage among Seattle-area school children indicated a rise in bicycle helmet usage to 23% since the first post-intervention assessment.

In addition to community interventions for promoting the use of bicycle helmets, other studies have examined the effect of alternative intervention strategies on bicycle safety and helmet use. Cushman et al. (1991) investigated the effectiveness of a bicycle helmet intervention subsequent to an emergency room visit for a bicycle-related injury. The intervention took place in the hospital and consisted of health promotion counseling from a physician and take home pamphlets intended to encourage the purchase and use of bicycle safety helmets. Bicycle helmet purchase rates for the intervention and control groups at follow-up were 9.3% and 8.1% respectively. Further, the lack of a significant difference between the purchase rates of the intervention and control groups suggests that the intervention made little additional impact on the motivation to purchase a bicycle helmet. The injury itself and the self-administered questionnaires were offered as possible motivators for purchasing a helmet in order to explain the similar purchase rate in the control group (Cushman et al., 1991).

Morris and Trimble (1991) compared the impact of a comprehensive awareness program to the impact of the same program plus a bicycle helmet subsidy on bicycle

helmet use among schoolchildren. The awareness program consisted of classroom-based instruction and discussion, educational videotape, schoolwide activities (e.g., bicycle helmet poster contest), weekly booster activities by teacher, and pamphlet disbursement. The subsidized condition consisted of the same components as the awareness program alone in addition to an opportunity to buy a bicycle helmet at a substantially lower price (i.e., the subsidy). Helmet use rates monitored before and after the intervention were based on observations of children arriving by bicycle at one of three schools (an awareness school v. an awareness + subsidy school v. a control school). No helmet use was observed at any of the schools prior to the program. Post-program observations of helmet use at the control and awareness schools remained zero while helmet use at the subsidized school showed a significant increase (0-22%). It seems then that efforts to prevent head injury by encouraging the use of helmet use cannot rely on education alone (Morris & Trimble, 1991), but must take into account other variables (e.g., cost) when trying to influence helmet use.

In response to the bicycle-related deaths of two children in Howard County, Maryland, a more extreme intervention was implemented in 1990. Specifically, the county enacted the first mandatory regulation in the United States requiring school-age children to wear helmets while cycling (Cote et al., 1992). In order to evaluate the effectiveness of such a strategy (i.e., legislation approach), helmet use in Howard County was compared to helmet use in two other Maryland counties marked by two other approaches for increasing helmet use, education and no special community-wide efforts, before and after the law was passed in Howard County. Prelaw usage rates were 4% for legislation, 8% for education, and 19% for no-special efforts. Postlaw helmet use rates were 47%, 19%, and 4% respectively. At the time of the study, the rate of helmet use in Howard County was the highest reported rate among children in the U.S. Based on these findings, the passage of similar laws could increase helmet usage nationwide and prevent

a substantial number of deaths and injuries associated with bicycling (Cote et al., 1992). Until this is done, however, other methods must be relied upon to increase the use of bicycle helmets among children.

Given that bicycle helmets seem to be an essential component of the bicycle injury prevention effort, one must consider the availability of these helmets to children. Children cannot wear helmets if they do not have access to them. It has been suggested that the ultimate responsibility for the purchase and use of bicycle helmets for children lies with parents (Cushman et al., 1990; Eichelberger, Gotschall, Feely, Harstad, & Bowman, 1990; Tanz & Christoffel, 1991). Parents must be informed about the dangers bicycling can pose for young children and encouraged to take efforts to ensure that basic safety requirements are met. The most practical and immediate of which related to bicycle safety is the use of protective helmets. Thus, one avenue for decreasing children's bicycle-related head injuries is to focus on increasing the parents' awareness of the problem and to emphasize their role in prevention. Investigating parent's beliefs about injury prevention, in this case bicycle helmet use, may yield important information for planning preventive interventions. Further, given that support from parents, especially mothers, was found to be predictive of children's intentions to use bicycle helmets (Otis et al., 1992), efforts should be directed towards parents so that they can clearly understand their role in adoption and maintenance of bicycle helmet use by their children. An important step in understanding why the level of helmet use among children remains so low is understanding the parental factors related to use and nonuse.

Parental Beliefs & Attitudes

A telephone survey was conducted to investigate parental attitudes and knowledge of child safety in general (Eichelberger et al., 1990). Parents were found to have a poor understanding of many issues concerning childhood injury. Rather than an awareness of the fact that injuries are now the leading cause of death and a great number

of disabilities among children, parents were shown to worry more about such things as abduction (47%) and involvement with drugs (43%) and less so about injuries. Although parents were cognizant of the risk of motor vehicle accidents and strategies for controlling automobile-related injuries, they consistently underestimated the risk of other types of injuries to children, including bicycle injuries. Further, most parents regarded serious injuries as preventable. Specifically, 87% of parents agreed with the statement that "Most accidents are avoidable," and 70% believed that more than half of serious injuries are preventable. Despite the fact that parents demonstrated a belief in the effectiveness of injury control, injury seems to rank low among salient concerns of parents regarding their children (Eichelberger et al., 1990). Parents indicated confidence in their knowledge of prevention for childhood injury with the greatest degree of confidence in the areas of household accidents (69%) and rules for safety (66%). Most parents (68%) reported having taken some action in the past year in an effort to reduce the risk of injury to their child (affirmative responses directly related to SES). The use of automobile safety belts (85%) was the most common action taken, offered four times more than any other response. Over half of the parents mentioned actions based on care and watchfulness, such as "being careful," telling children to be careful, and driving safely. Eichelberger et al. (1990) noted that parents seem to hold the erroneous belief that caution and vigilance are an effective method for controlling childhood injury. With regard to bicycle safety, only 12% of parents reported that they had discussed pedestrian or bicycle safety with their children as a way of reducing their risk of a bicycle-related injury. These findings are consistent with the notion that parental awareness and knowledge is a necessary, but insufficient component in the prevention of unintentional injuries to children (Pless & Arsenault, 1987). Based on the above findings, there is a need to increase parental awareness and understanding of childhood injury and safety and

to redirect parents efforts towards injury control methods of proven efficacy (Eichelberger et al., 1990). Bicycle safety is included among those.

Similar to the studies investigating factors related to children's use and nonuse, parental beliefs and attitudes regarding bicycle safety and helmet use have also been examined. Diguiseppi et al. (1990) administered questionnaires to parents of randomly selected third-graders in the Seattle-area. Specifically, the questionnaires inquired about bicycle helmet ownership and use, reasons for not buying a helmet, attitudes concerning helmet effectiveness, the likelihood of bicycle-related injuries, other health and safety related behaviors and demographic data. Parental level of education was found to be strongly correlated with bicycle helmet ownership such that less than 10% of children whose parents had a high school education or lower owned a helmet while greater than 40% of children whose parents had an education beyond college owned a bicycle helmet. After controlling for covariates (i.e., parental education), helmet ownership was positively correlated with health and safety-related attitudes and knowledge. For example, the probability of helmet ownership was 7.6 times greater for parents who reportedly usually or always wore their seatbelts than for other parents. In addition, helmet ownership was also found to be more likely if parents believed that a bicycle-related injury was likely, believed in the effectiveness of helmets for preventing head injury, or if a child in the respondent's household had suffered a bicycle injury in the preceding year or they had knowledge of anyone else suffering a serious bicycle injury. The most common reason for not purchasing a bicycle helmet for their child was that parents had never thought about purchasing a helmet (51%). This response was more common among those parents who did not have a college education. Other common reasons given by parents for nonownership included the belief that the child would not wear a helmet (20%) and that a helmet was not needed (12%). Parents offering these responses were more likely to have been a college graduate. On the other hand, the belief

that helmets cost too much (29%) as an explanation for nonownership was not associated with differences in parental education. According to these findings, parents who have provided their children with helmets seem to be aware of the potential risks associated with bicycling, while those who have not indicate several factors which have inhibited the purchase.

Parental attitudes and beliefs were also assessed in a study investigating the effects of bicycle-related injuries on the subsequent bicycle-riding behavior and safety practices of children and their families (Nakayama, Pasieka, & Gardner, 1990). Results indicated that 31.7% of the parents reported implementing more stringent rules following injury, but that children reportedly soon ignored new restrictions regarding bicycling, and particularly the wearing of helmets. In addition, it was noted that some parents were unaware of the efficacy of helmets or believed that it was pointless to even try to make their children wear them.

Similarly, Cushman et al. (1990) noted the most common reason for parents' reservations about buying a bicycle helmet was the belief that their child would not wear it. Few parents in this particular sample questioned the effectiveness of bicycle safety helmets. In contrast to other findings, however, few parents objected to the price of helmets. The authors indicated some uncertainty as to whether all parents were aware of the relatively high price of helmets and suggested that this could account for the finding.

Missing from these studies, however, is a systematic investigation guided by a theoretical model of the variables involved in parents' beliefs and behaviors. Peterson, Farmer, and Kashani (1990) note that while there has been some research investigating the relationship between parental attitudes concerning injury and preventive efforts, a clear demonstration of the link between parental attitudes and preventive behavior has yet to be established. When attempting to identify such a relationship, the use of a conceptual model would be helpful to guide hypothesis building and subsequent research.

While bicycle helmet use and safety was not directly assessed, Peterson et al. (1990) utilized a variation of the health belief model to investigate the influence of parents' attitudes on their efforts toward injury prevention. Parents of 198 children (33 8 year-old males; 37 8 year-old females; 32 12 year-old males; 29 12 year-old females; 29 17 year-old males; and 26 17 year-old females) were solicited from a systematic sample of a Midwestern school system and were offered $50 to participate. The data indicated that parents' reported actions in teaching safe behavior can indeed be predicted from their attitudes and beliefs. The more parents felt that they knew about safety, the more competent a parent felt to intervene, and the more efficacious the parent believed the intervention to be, the more teaching efforts were reported. In general, feelings of susceptibility and responsibility were not found to add to the prediction of intervention. The cost or effort involved in teaching also influenced teaching, but not as predicted. It was believed that the higher the perceived cost, the lower the predicted intervention. However, a positive relationship was demonstrated. Peterson et al. (1990) suggested that the significant positive relationship may be explained by the fact that those parents who have actively engaged in teaching have a more realistic concept of the efforts and costs involved. Although combined teaching and injury beliefs predicted the use of any environmental interventions, parental beliefs concerning specific injury types failed to predict specific individual environmental interventions (e.g., putting poisons in special containers, using safety plugs in electrical outlets, using safety belts in car for child). Peterson et al. (1990) accounted for this finding by stating that summary scores offer increased reliability and thus, better prediction. These findings are somewhat limited in that the data are all obtained from parental reports. As such, behavioral data on actual injuries experienced, the amount and/or level of teaching actually carried out, or the actual environmental interventions carried out are lacking.

Webb and associates (1988) also used the health belief model (HBM) as the basis for an investigation of parents' attitudinal and belief characteristics related to child restraint use. Safety restraint use was assessed by direct observation at preschool sites and information regarding attitudinal factors was obtained by questionnaire administration. Significant differences related to the HBM dimensions of costs and benefits and health locus of control were found between parents of restrained and unrestrained children. With regard to the costs of restraint usage, parents who restrained were more likely to state that they could afford to buy a restraint device and were less likely to believe that using restraints was a nuisance, to expect difficulties in fitting restraints to vehicle, and that is too much bother to restrain children. It seems that parents who do not restrain their children give considerably more weight to the costs of using safety restraints for their children than parents whose children are restrained. In contrast, parents who restrained children were more likely to note the benefits of restraining their children (i.e., to believe that the use of restraints provides safety for children in the case of an accident). In terms of health locus of control, parents of restrained children were also more likely than other parents to believe that they can prevent their children from being injured in vehicle accidents. HBM attitudinal variables that were not found to differentiate between parents who restrained and did not restrain their children included perceptions of children's susceptibility to involvement in traffic accident, likely severity of injury to children in the event of an accident, the importance of using safety restraints and the efficacy of restraints. The authors concluded that even though most parents recognize the risk of their child being in traffic accidents and the possible consequences, they do not take action to restrain their children because the risk is not perceived to be worth the time and nuisance. The notion of parents of unrestrained children giving more weight to costs associated with the use of restraints has been found by others as well (Gielen, Erikson, Daltroy, & Rust, 1984; Ringwalt, Devellis, Runyan, Devellis, &

Wittenbraker, 1986). Further, Ringwalt et al. (1986) also found that parents' perceptions of the likelihood of their child being in a crash and the probability of sustaining injuries of varying severity if they were involved in a crash failed to predicts parental report of restraint usage.

Based on the above findings, the variables which seem to be of particular importance in determining parental efforts regarding injury prevention are parents' confidence in being able to perform preventive measures (i.e., self-efficacy), their beliefs regarding the effectiveness of the intervention strategy (i.e., response efficacy), and the costs associated with those efforts (i.e., response-costs). One theoretical framework which incorporates these variables and may help elucidate the role of cognitive mechanisms that influence parents' decisions to provide their children with bicycle helmets as a means of protecting their child from a bicycle-related head injury is the protection motivation theory (PMT) (Prentice-Dunn & Rogers, 1986; Rogers, 1983).

Protection Motivation Theory

The model is based on the assumption that people are motivated to protect themselves from danger. When an individual is confronted with information about a health threat, two cognitive processes are initiated: threat appraisal and coping appraisal (See Figure 1). The threat appraisal process evaluates factors that influence the probability of making a maladaptive response to the threat. Included in this process are the variables of perceived severity and perceived vulnerability which are thought to decrease the probability of making a maladaptive respone. Rewards increase the probability of the occurence of the maladapative response. In addition to evaluating the threat, the individual also makes a coping appraisal. Variables in this process are thought to increase the probability of making an adaptive response including evaluations of the effectiveness of the adaptive behavior (i.e., response-efficacy), and self-efficacy. Also included in the coping appraisal process are response costs, such as inconvenience,

expense, and complexity, which are thought to decrease the likelihood of performing the adaptive behavior. In sum, PMT assumes that protection motivation is maximized when (a) the threat to health is perceived to be severe, (b) the individual feels vulnerable to the threat, (c) the individual believes that the adaptive response is an effective means for avoiding the threat, (d) the individual is confident that he/she can successfully complete the adaptive response, (e) the rewards associated with the maladaptive behavior are small, and (f) the costs associated with the adaptive response are small. Such factors are thought to produce protection motivation and subsequently, the enactment of the adaptive, or coping, response. This model has been used to examine the intentions of adolescents and adults to engage in preventive health behaviors, such as exercise (Fruin, Pratt, & Owen, 1991; Wurtele & Maddux, 1987), as well as adults' responses to the threat of breast cancer (Rippetoe & Rogers, 1987) or smoking (Maddux & Rogers, 1983).

PMT variables have also been assessed for their effect on parents' intentions to inform their children about sexual abuse (Campis, Prentice-Dunn, & Lyman, 1989), which can also be conceptualized as an injury prevention effort. Mothers of elementary school-age children read questionnaires containing one of five coping appraisal conditions: response-efficacy information, self-efficacy information, combined condition (RE and SE), threat only, and no information. The level of response cost was also varied between high and low across conditions. The three dependent measures consisted of parents' intentions (1) to obtain a booklet with information about child sexual abuse, (2) to present the information, and (3) to educate their children about sexual abuse. Response cost was found to produce a significant effect such that parents in the low-RC condition reported greater intentions to obtain the booklet and present the information than did parents in the high-RC condition. In addition, parents in the threat-only, no-information, and response-efficacy (RE) conditions were found to have greater intentions to present the information under conditions of low RC than high RC. Coping was also found to

differentially effect parents' intentions. Parents in the combined condition (RE and SE) reported greater intentions on all three measures than parents in either the threat-only or no-information condition. While parents in the combined condition reported significantly greater intentions than those in the RE condition, no significant difference was revealed between the combined condition and the SE condition on two of the dependent measures (intentions to obtain the booklet and intentions to educate). The RE condition also did not produce significantly greater intention scores on the two dependent measures when compared to the threat-only and no-information conditions. In contrast, significantly greater intentions were reported by parents in the SE condition as compared to intentions reported by parents in the threat-only and no-information groups on all dependent measures. Overall, the absence of a significant difference between self-efficacy and combined-message group scores on two measures of intention and consistently greater beliefs indicated in SE condition over RE condition suggest that self-efficacy had the strongest effect on parental intentions. Given this finding, the authors suggested that parents may not be likely to act in an educative role regarding sexual abuse regardless of the effectiveness of such a preventive measure, if they do not feel capable of doing so. As such, these findings regarding the prevention of sexual abuse are consistent with previous research which has shown self-efficacy (Peterson et al., 1990; Webb et al., 1988) and response cost (Webb et al., 1988) to be important factors related to parental efforts aimed at injury control/prevention.

The purpose of the present study was to extend the efforts of prior research to examine the relationship between parental attitudes and their preventive efforts concerning bicycle helmets. Specifically, the present study assessed the contribution of components of PMT in persuading parents to engage in the preventive action of purchasing a bicycle helmet, operationalized for the purposes of this study as an injury control behavior. The ultimate goal of this type of research is to identify aspects of

caregivers' attitudes and opinions that might guide the choice of appropriate targets for intervention, resulting in enhanced effectiveness of behavioral and educational interventions for reducing children's injuries. A secondary goal of the proposed study was to examine children's attitudes and opinions regarding bicycle helmets through the framework provided by PMT.

Hypotheses:

1) Manipulation checks were expected to reveal significant effects in the predicted directions. As such, the PMT-based intervention condition was expected to produce greater beliefs on respective dependent measures than was the no-information condition. In other words, parents in the PMT-based intervention condition were predicted to demonstrate greater beliefs of vulnerability, severity, response-efficacy, and self-efficacy than will parents in the no-information condition. The response-cost variable was also expected to be effectively manipulated, such that subjects in the low response-cost condition would report greater beliefs about the ease of obtaining a bicycle helmet and getting their child to wear it than would parents in the high response-cost condition.

2) A main effect for experimental conditions was expected. Parent's intentions to purchase and the actual purchase of a bicycle helmet were predicted to be greater in the PMT-based intervention condition than the no-information intervention condition. However, the predicted main effect was expected to be qualified by the response-cost manipulation, such that parents receiving low response-cost information were expected to have significantly greater intentions to purchase and actual purchases of a bicycle helmet than parents receiving high response-cost information.

3) It was also hypothesized that the effect of the low response-cost information on parents' intentions to purchase and the actual purchases would be greater in the PMT-based intervention than in the no-information condition.

4.) Finally, based on the rationale of the behavioral intention model, parents' rated intentions for purchasing their child a bicycle helmet were expected to be predictive of their actual purchases of a bicycle helmet although the strength of the relationship was not hypothesized.

Method

Participants

Participants were recruited through three public school systems and three Christian schools in southwestern Virginia. Response rates from the schools ranged from 8.24 to 26.47%. Because the present study was an intervention aimed at increasing parents purchases of bicycle helmets for their children, oversampling was necessary initially to exclude those parents whose children already owned bicycle helmets. Parents were screened according to their responses to an item on the post-experimental questionnaire which asked whether their child owned a bicycle helmet. Participants answered "yes" or "no". The response from parents whose children did not already own a bicycle helmet ranged from 20 to 100% of all parents who responded from each school. Several responses from parents whose children did not already own bicycle helmets (total = 26) were unable to be included in the final analyses due to incomplete data for a number of reasons such as lack of demographic data, refusal to participate in the follow-up home visit, and relocations away from the area. In the end, complete information was obtained from 69 parents and children, ages 8 - 11 ($\underline{M}$ = 9.174; males = 29; females = 40).

Design

A 2 (intervention condition: PMT-based v. no-information control) x 2 (response-cost: low v. high) factorial design was used to determine the effects of PMT-based information (S+V+RE+SE), and response-cost (RC) components on parents' intended and actual purchases of bicycle safety helmets for their child. With the exception of

response-cost, parents received the information in essay form. The essays were randomly distributed within each group of parents obtained from each school. Approximately half of the parents received the PMT-based information and half did not. Similarly, approximately half of the parents of each of these groups received the low response cost manipulation while the other half of each of these groups received the high response cost manipulation. In total, there were four groups; a PMT/low RC group (n = 18), a PMT/high RC group (n = 18), a No Information/low RC group (n = 17), and a No Information/high RC group (n = 16). A post-experimental questionnaire was used to assess the effectiveness of the manipulations.

Materials

Parents received a packet divided into 7 sections. In addition to parent and child consent forms (see Appendixes B & C), Section 1 consisted of an introductory letter (see Appendix A) with instructions and described the purpose as a research project to learn more about parents' and children's beliefs about children's unintentional injuries. For parents in the PMT-based intervention condition, section 2 consisted of an essay, presenting information regarding bicycle-helmets based on the variables of the PMT (see Appendix D). Section 2 was not included in the packets distributed to parents in the no-information condition.

The essay presented in Section 2 consisted of information obtained from Harborview Injury Prevention and Research Center which was used in the Seattle, Washington bicycle helmet campaign (DiGuiseppi et al., 1989).

The ***PMT-Based Intervention*** condition included information based on the four factors of PMT, including severity, vulnerability, response-efficacy, and self-efficacy. Specific information concerning the severity of and children's vulnerability to head injuries resulting from bicycle accidents was presented. Severity was presented in terms of (a) the short- and long-term physical and/or psychological consequences, and (b) the

financial burden associated with head injury. Vulnerability information emphasized the (a) high incidence of bicycle injuries among children, (b) the frequency of bicycle-related head injuries among children, and (c) the currently low rate of helmet use among children. Response-efficacy information demonstrated the effectiveness of bicycle safety helmets in reducing the risk of head injury in children. Self-efficacy information (a) reinforced parents' ability to obtain and increase their child's use of a bicycle safety helmet, and (b) promoted their role as the most appropriate and effective source of information to their child regarding the importance of bicycle helmets. Parents in the ***No-Information*** condition did not receive the essay regarding bicycle safety. Parents in this condition served as the control group.

Response-cost was manipulated such that either high or low levels of response-cost were present. Parents have been found to cite the expense of bicycle helmets as a reason for failing to purchase one (Diguiseppi et al., 1990). As such, discount coupons for bicycle safety helmets (see Appendix E) were included in the low response-cost condition. Although the receipt of the coupon was contingent upon returning the questionnaire, an invalid coupon (see Appendix F) was included in the packet to make the availability of the discount and the low response-cost manipulation salient to parents. Within the packet, the helmet coupons were placed after the intervention essay in an attempt to strengthen the response-cost manipulation by increasing the salience of the lowered response cost to parents. In contrast, discount coupons were not included in the high response-cost condition.

Section 3 consisted of a post-experimental questionnaire (See Appendix H). Parents were instructed to read the statements and rate each on a 7-point scale, where 1 indicated "strongly agree" and 7 indicated "strongly disagree." Items were scored so that lower numbers indicated stronger agreement. Four items required score reversals to adhere to this pattern. Development of the present questionnaire was based on similar

questionnaires used in previous studies investigating the effects of PMT variables (e.g., Maddux & Rogers, 1983; Stanley & Maddux, 1986). Examples of the items include "My child suffering a head injury could result in many problems for him/her" (severity), "Bicycling head injuries are very common in children" (vulnerability), "Children who wear bicycle helmets are less likely to suffer a head injury" (response-efficacy), "I feel confident that I could instruct my child on the appropriate use of a bicycle helmet" (self-efficacy), and "Making my child wear a bicycle helmet is just one more rule I would have to enforce" (response-cost) (see Appendix G). Several behavioral intention measures were also included to assess both parents' specific intentions to purchase a bicycle helmet for their child ("I plan to buy my child a bicycle helmet) as well as their intentions regarding general bicycle safety (e.g. "I plan to teach my child about bicycle safety."; "I plan to teach my child to always obey traffic signals while bicycling."). In addition, parents were asked to indicate whether their child owned a helmet (screening item) and if so, what percentage of time the helmet was worn. Parents were also asked whether their child had ever had a bicycling injury in the past. Finally, more general manipulations (i.e., "The information in the essay was easy to understand.") were also included for parents who received the informational message to assess the believability and comprehensibility of the essay.

Section 4 included a similar questionnaire for the child (See Appendix H) so that children's beliefs and attitudes, guided by PMT components, regarding bicycle helmets could also be investigated. A 5-point scale where 1 indicated "I agree/True for me" and 5 indicated "I disagree/Not true for me" was used to measure children's responses. As with the parent questionnaire, examples of the items include "It would be better for my health if I avoided hurting my head while bicycling" (severity), "I will probably get hurt from a bicycle crash" (vulnerability), "Helmets are an important part of bicycle safety" (response-efficacy). "It would be easy for me to remember to wear my helmet whenever I

ride my bike" (self-efficacy), and "Bicycle helmets are uncomfortable" (response-cost) (see Appendix G). Children were also asked about their intentions to start wearing a bicycle-helmet, to inform their parents that they want a bicycle helmet, and to engage general bicycle safety practices.

Section 5 was the 9-item Safety Consciousness Scale (Appendix I) which was adapted from the Health Self-Consciousness Scale (Gould, 1990). The Safety Consciousness Scale was intended to assess the degree to which parents were conscious of their child's safety. The inclusion of the scale in the present study was based on the premise that highly safety conscious parents may be more likely to act according to those attitudes than parents who indicate low safety consciousness (as measured by the scale). The scale was included as a purely exploratory measure since no pilot data were obtained prior to its inclusion in the present study.

Section 6 consisted of a form on which parents were asked to indicate convenient and inconvenient times during which the follow-up home-visit could be conducted (see Appendix J). Basic demographic information, including name, age address, parental education and occupation, was requested in Section 7 (see Appendix K).

Procedure

Packets were randomly distributed to children in school by their classroom teachers with the expectation that packets would then bepassed on to their parents. Parents in the PMT intervention condition were asked to read a brief informational message and then complete the post-experimental questionnaire and Safety Consciousness Scale. Parents were also instructed to underline those phrases and sentences in the essay which had the greatest impact on them when reading the essay. This was explained to parents as a way of learning which aspects of safety and injury prevention were the most meaningful to parents in order to develop more effective preventive measures. The purpose of the underlining task was to increase the likelihood

that parents did indeed read the essay rather than simply completing the questionnaire without reading the essay. In order to ensure that the procedure had been followed, parents were asked to return the essay with their markings; however, in most cases, parents did not return the essay with the rest of the packet. Parents in the no-intervention group were asked to simply complete the questionnaires. Children in both groups were instructed to complete a similar questionnaire although they were not required to read the informational message. Finally, all parents were asked to indicate likely good and bad times for the home visit and to provide basic demographic information. Parents were instructed to return this information along with the consent forms (parent and child), questionnaires, and underlined essay to their child's teacher. Returned packets were then retrieved from the schools by the primary researcher.

Given that respondents from the control condition could have been parents who already had an interest in bicycle safety or safety in general, "safety goody packages" (including such items as a toy safety coloring book, a fire safety comic book, free battery card for smoke detector) were offered to parents and children as an incentive to participate as well as in an attempt to obtain a more representative sample in the control condition.

Return of the packets was requested within five school days from the initial distribution. However, on the fifth day after the initial distribution of the packets, a memo (Appendix L) was sent home to all parents reminding them about the study. The memo served as both a thank you for those parents who had responded and as a friendly and courteous reminder for those who had not. Originally, a letter and replacement packet were intended to be sent to nonrespondents three weeks after initial distribution. Given such low response rates, however, several alternate methods were employed in attempt to increase the response (e.g., second and third full redistribution, pizza party incentive). In each case, the contents of the packets remained the same as the original,

with the exception of the cover letter which now included stronger appeals for parents' participation. These alternate methods aimed at increasing response rates resulted in little added benefit.

Follow-up visits, the purpose of which was described to participants as a home safety check for a related study, were conducted at 6 weeks post-intervention (i.e., 6 weeks upon returning questionnaire) in order to assess whether a bicycle helmet had been purchased between the initial intervention and the home-visit. One item on the home safety checklist (see Appendix M) concerned bicycle helmet ownership. Parents were simply asked whether their child had a bicycle helmet. If parents responded positively, they were asked to produce the helmet in order to obtain an objective measure of helmet ownership. "Safety goody packages" were also delivered at the time of the home-visit. In addition, to the goody packages, parents in the no-intervention group also received a copy of the informational message included in the PMT intervention condition. After completing the home safety checklist, the home-visit assessment was terminated and parents received a debriefing letter explaining the purpose of the study. All questions were answered.

Dependent measures

Two dependent variables were assessed: (a) behavioral intentions and (b) actual behavior. The behavioral intention measure consisted of one item on the post-experimental questionnaire which concerned parents' intentions to purchase a bicycle safety helmet for their child and children's intentions to use bicycle helmets (see Appendix E). While the behavioral intention model holds that a voluntary behavior (such as purchasing or using a bicycle helmet) is best predicted by the intention to perform that behavior (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975), a measure of *actual* behavior was also assessed, the actual purchase of a bicycle safety helmet. Data were obtained during follow-up visits to participants' homes. The dependent variable in this

case was noted as either yes or no regarding whether parents could produce a bicycle safety helmet.

Results

Demographic Variables

Comparisons were performed on age and gender of the children as well as socioeconomic status to ensure comparability among groups. Socioeconomic status was computed using the Hollingshead (1975) Four Factor Index. No significant differences were revealed among groups on any of the variables. See Table 1 for a summary of group characteristics.

Manipulation Checks

Perceptions of severity, vulnerability, response-efficacy, self-efficacy, and response-cost. Perceptions of severity, vulnerability, response-efficacy, self-efficacy, and response-cost were measured with self-report items (7-point Likert scales). Severity was measured with five items (alpha = .64); for example, "My child suffering a head injury could result in many problems for our family." Vulnerability contained five items (alpha = .64); for example, "My child will probably suffer a bicycle-related injury." Six items (alpha = .81) were used to assess response-efficacy; for example, "Bicycle helmets have been found to decrease the number of head injuries associated with bicycle crashes." Self-efficacy was measured with five items (alpha = .41); for example, "I know enough about bicycle safety and helmets to instruct my child." Response-cost was assessed with six items (alpha = .68); for example, "I would have to force my child to wear a bicycle helmet, which are generally uncomfortable."

A 2 (intervention condition: PMT-based v. no-information) x 2 (response-cost: high v. low) multivariate analysis of variance (MANOVA) was conducted to assess whether the PMT-based intervention condition and response-cost manipulations were successful in producing differential ratings by the parents in different conditions as well

as control for inflations in alpha level resulting from multiple tests. The analysis was performed on the mean composite scores for each participant on the five vulnerability items, the five severity items, the six response-efficacy items, the five self-efficacy items, and the six response-cost items. Contrary to initial predictions, no significant main or interaction effects were revealed, $\underline{F}$ (1,65) = .663, $\underline{p} < .66$.

Insert Table 2 about here

Overall, the responses indicated that parents perceived bicycle-related head injuries as severe, they believed their child is vulnerable to bicycle-related head injuries, they believed that bicycle-helmets are effective for controlling bicycle-related head injuries, they believed in their own ability to provide their child with a helmet and ensure its use, and they believed there are only moderate costs associated with providing their child with a bicycle helmet.

Believability and comprehensibility. The believability and comprehensibility of the informational essay were also assessed using participants' responses (on a 1-7 Likert-type scale) to two questions on the post-experimental questionnaire (items 40 and 41 respectively). Results demonstrated that parents who received the PMT-based informational essay rated the essay as both believable ($\underline{M}$ = 6.472; $\underline{SD}$ = 1.00) and understandable ($\underline{M}$ = 1.694; $\underline{SD}$ = 1.546).

Response Bias. A Chi-square analysis was also conducted to evaluate for differential participation rates among conditions based on coupon receipt. The analysis revealed no significant differences among groups such that approximately the same number of responses were received in each condition, $\underline{X}^2$ (3, n = 69) = .768, $\underline{p} < .86$.

Dependent Measures

Behavioral Intentions. Parents' intentions to purchase a bicycle helmet for their child were measured on a graded scale (1-7). A 2 x 2 univariate analysis of variance (ANOVA) was performed to assess the effects of intervention condition (PMT-based v. no-information) and response-cost (low v. high) on parents' intentions to purchase a bicycle helmet. No significant main or interaction effects were found, $F(1, 65) = 1.267$, $p < .27$. Rather, parents in all conditions indicated that they were fairly likely to purchase a bicycle helmet for their child.

Insert Table 3 about here

In addition to the specific intention to purchase a bicycle helmet for their child, parents' intentions to teach their child general bicycle safety information were also examined. A 2 x 2 analysis of variance (ANOVA) was conducted on the mean composite score for each participant on the five general bicycle safety items. Results demonstrated that parents reported that they were fairly likely to teach their child about general bicycle safety, $F(1, 65) = 2.237$, $p < .15$. See Table 3 for means.

Finally, separate analyses were also conducted on parents' intentions to find out whether their child wanted a bicycle helmet and their intentions to encourage their child to wear a bicycle helmet (items 29 and 30 respectively on parent questionnaire). Again neither analysis revealed significant differences in parents' intentions among conditions, $F(1, 65) = 2.888$, $p < .10$ and $F(1, 65) = 2.63$, $p < .15$ respectively. Parents, regardless of condition, reported that they were fairly likely to ask their child whether he/she wanted a bicycle helmet and were fairly likely to encourage their child to wear a bicycle helmet. See Table 3 for means.

Actual Purchases. The actual purchases of bicycle helmet were represented by categorical data (i.e., "yes" or "no"). At the time of the home visit, a total of 6 parents had purchased a bicycle helmet for their child.

Insert Table 4 about here

A Chi-square test was utilized to determine the effect of experimental condition (PMT/low RC v. PMT/high RC v. No Information/low RC v. No Information/high RC) on parents' actual purchases of bicycle helmets. The results indicated that bicycle helmet purchasing behavior was not dependent on experimental condition, $\underline{X}^2$ (3, n = 69) = .555, $\underline{p} < .10$. It should be noted, however, that the data did not meet the assumptions of the test (i.e., lower than five expected value in 50% of the cells) due to the limited number of total purchases made. As a result the test may not be a valid test of the relationship between experimental condition and bicycle helmet purchasing behavior.

Safety Consciousness Scale

Given that the Safety Consciousness Scale (SCS; alpha = .87) was included as an exploratory component of the present study, reliability and validity data are not available. A *t* test was conducted to examine the relationship between parents' reported level of safety consciousness and their injury preventive efforts (i.e., purchase v. no purchase of a bicycle helmet). The results indicated no differences between parents who had purchased a bicycle helmet ($\underline{M}$ = 3.46; $\underline{SD}$ = .38) and those who did not ($\underline{M}$ = 3.43; $\underline{SD}$ = .55), $\underline{t}$ (67) = .14, $\underline{p} < .90$. Overall, all parents indicated high levels of safety consciousness ($\underline{M}$ = 3.433; $\underline{SD}$ = .54) as measured by the SCS.

Intention - Behavior Analyses

According to the behavioral intention model, intentions are thought to be the best predictor of behavior (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). A logistic

regression was used to examine the relationship between intention and behavior in the present study in which parents' intention ratings were entered as the predictor variable for parents' actual helmet purchasing behavior. A logistic regression was computed since purchasing behavior was represented by a dichotomous variable. The chi-square estimate was .437 (df=1) and parents' reported intentions were not found to be a significant predictor of parents' actual behavior, $p < .51$.

As an additional test of the relationship between parents' intentions and actual behavior, a *t* test was used to compare the rating intentions of parents who purchased a helmet versus those who did not. Consistent with the finding of the regression, there was not a significant difference between the intentions of parents who purchased a bicycle helmet and the intentions of those who did not, $t(67) = -.632$, $p < .53$.

Child Variables

Perceptions of severity, vulnerability, response-efficacy, self-efficacy, and response-cost. Children's perceptions of severity, vulnerability, response-efficacy, self-efficacy, and response-cost were also measured with self-report items (5-point Likert scales). Severity was measured with five items (alpha = .69); for example, "If I hurt my head while bicycling, it could lead to many problems for my family." Vulnerability contained five items (alpha = .66); for example, "I will probably get hurt from a bicycle crash." Six items (alpha = .71) were used to assess response-efficacy; for example, "Bicycle helmets have been found to decrease the number of head injuries associated with bicycle crashes." Self-efficacy was measured with five items (alpha = .67); for example, "I know about bicycle safety." Response-costs was assessed with six items (alpha = .54); for example, "Bicycle helmets are uncomfortable." Overall, children reported that they believe bicycling head injuries are severe ($M = 1.77$; $SD = .75$), that they are vulnerable to bicycle-related head injuries ($M = 2.15$; $SD = .83$), that bicycle-helmets are effective for controlling head injuries ($M = 2.21$; $SD = .79$), that they can get

and wear a bicycle helmet (M = 1.90; SD = .83), and that there are not significant costs for wearing a bicycle safety helmet (M = 3.09; SD = .80).

Multiple independent *t* tests were computed to compare the perceptions of children whose parents purchased a bicycle helmet compared to those of children whose parents who had not. There were no significant differences among any of the variables

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Insert Table 5 about here

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with the exception of response-efficacy and response cost. Children whose parents purchased a bicycle helmet during the time of the study reported perceptions of greater response-efficacy than children whose parents had not purchased a bicycle helmet, t (67) = 2.02, p < .05. Greater perceptions of response-cost were reported by children whose parents did not purchase a helmet as compared to children whose parents did, t (67) = -2.005, p < .05. The analyses should be interpreted with caution, however, given the small number of parents who actually purchased a helmet (n = 6). Moreover, while these tests reach significance at the .05 level, after a Bonferonni correction for the number of tests, they are not significant and therefore, should not be interpreted.

Children's intentions. Children reported that they were fairly likely to start wearing a bicycle safety helmet (M = 1.84; SD = 1.17) and to inform their parents that they wanted a bicycle helmet (M = 1.58; SD = 1.10). An estimate of children's intentions to practice general bicycle safety was also obtained by averaging their ratings across the five general bicycle safety items. The results revealed that in addition to the specific use of bicycle safety helmets, children indicated that they intend to practice general bicycle safety (M = 1.76; SD = .81) as well.

Discussion

The purpose of the present study was to examine the relationship between parental attitudes and their injury preventive efforts concerning bicycle helmets. Specifically, the proposed study assessed the contribution of components of PMT (severity, vulnerability, response-efficacy, self-efficacy, response-cost) in persuading parents to engage in the preventive action of purchasing a bicycle helmet for their child. Contrary to predictions, no differences were found among parents' perceptions of severity, vulnerability, response-efficacy, self-efficacy, and response costs associated with bicycle-related head injuries and bicycle-helmets. Similarly, neither the PMT-based intervention (i.e., informational message) nor the availability of discount coupons produced greater intentions to purchase or greater actual purchases of bicycle helmets. Rather, parents in all conditions generally reported that they were fairly likely to purchase a bicycle helmet for their child although very few actually did so. As such, the most interesting finding in the present study was the failure of parents' intentions to provide their child with a bicycle helmet to predict their behavior (i.e., whether or not they purchased a bicycle helmet).

Based on the theory of reasoned action (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975), Protection Motivation Theory assumes that intentions are the immediate determinant of behavior and when measured appropriately, the most accurate predictor of behavior. The lack of relationship between parents' intentions to purchase a bicycle helmet and their actual behavior (i.e., purchase of a helmet) found in the present study, challenges the premise that intentions are immediate antecedents of action. Before abandoning the model, however, other factors should be considered that could account for the finding. While the theory holds that intentions are the best measure of behavior, it also acknowledges that a measure of intention will not always be an accurate predictor of behavior. According to the theory, intentions predict behavior if they are both measured

at the same level of specificity, if the intention remains stable, and if the behavior is under volitional control. Since the purchase of a bicycle helmet can, for the most part, be considered to be under volitional control, the remaining two conditions will be evaluated as they pertain to the present study. Fishbein and Ajzen (1975) purported that the most important factor influencing the size of the intention-behavior relation is the degree to which the intention is measured at the same level of specificity as the behavior to be predicted. The specificity of the intentions and behaviors can vary in terms of action, target, context, and time. To ensure correspondence, the elements of the intention have to be identical to those of the behavior. In the present case, both the intention and behavioral criterion were in reference to the purchase of a bicycle helmet. Specifically, both had the same action (i.e., buying) and the same target (i.e., a bicycle helmet), but failed to identify the context or a time period for the purchase of bicycle helmets. While the intention and behavior were, in a sense, identical, all of the elements were not completely specified. It is not surprising then that parents' intentions were not successful in predicting their actual behavior. Similarly, another study found that while participants' intentions to exercise regularly were significant predictors of self-reported exercise levels, the intention-behavior correlation was still low (r=.30; Wurtele & Maddux, 1987). The authors hypothesized that the low intention-behavior correlation may have been due to the use of general rather than specific measures such that several specific types of exercises were recommended to participants while the intention and behavior measures were concerned with exercises in general, not specific exercises.

Another factor that will influence the strength of the observed relationship between intentions and behavior is the degree to which the intention remains stable over time. Intentions can change over time and a measure of intention taken at some time prior to observation of the behavior may differ from the intention at the time the behavior is observed. The longer the time interval, the greater the likelihood that events will occur

to produce changes in intentions such that less accurate prediction increases as the time interval increases. In this study, there were six weeks between the time the measure of intention was obtained and the behavioral observation occurred. It is possible that events occurred during that time to change parents' original intentions and thereby decrease the predictive power of their original intentions. For example, if a parent had planned to buy a helmet for the child but an unexpected expense arose, their intention would likely be altered and would therefore need to be taken into account if accurate behavioral prediction was to be achieved. Given that intentions change over time, Fishbein and Ajzen (1975) suggested that it is important to measure the intention proximally to the behavioral observation in order to obtain an accurate prediction. However, there are instances in which it is not feasible or practical to measure the intention in close proximity to the behavior as in the present case. Intervening events that may lead to changes in intentions can be taken into consideration and prediction improved by means of conditional intentions. Thus, prediction in the present sample may have been improved if potential influencing events were accounted for from the onset. For example, intention measures could have included items such as "I plan to purchase a bicycle helmet for my child if we have extra money next month" or "I plan to purchase a bicycle helmet for my child if he/she expresses an interest in having one."

The PMT-based informational essay highlighted the severity of and children's vulnerability to bicycling head injuries as well as the effectiveness of bicycle helmets for controlling head injuries, and parents' ability to obtain and ensure their child's use of a bicycle safety helmet. Thus, parents who received the PMT-based informational essay were expected to report greater perceptions of severity, vulnerability, response-efficacy, and self-efficacy. In addition, parents who received the discount coupon for a bicycle helmet were also expected to report perceptions of fewer response costs. Instead parents' responses to the questionnaire items indicated that, overall, parent's perceived bicycle-

related head injuries as severe, they believed their child is vulnerable to bicycle-related head injuries, they believed in the effectiveness of bicycle-helmets for controlling bicycle-related head injuries, they believed in their own ability to provide their child with a helmet and ensure its use, and they believed there are only moderate costs associated with providing their child with a bicycle helmet. There are several reasons that could explain the finding of similar perceptions of severity, vulnerability, response-efficacy, self-efficacy, and response costs associated with bicycling head injuries among parents in all conditions.

First, the lack of difference among parents' perceptions could indicate that the experimental manipulations were not effective in producing differential perceptions as intended. In other words, the written information which functioned as the experimental manipulation may not have been strong enough to produce differential effects between those parents who received the information and those who did not. Previous attempts to influence participants beliefs and intentions by incorporating components of PMT in informational messages have been successful (Campis et al., 1989; Fruin, et al., 1991; Maddux, Norton, & Stoltenberg, 1986; Maddux & Rogers, 1983; Wurtele & Maddux, 1987). For example, Wurtele and Maddux (1987) presented participants with persuasive appeals for increasing exercise which varied (present v. absent) on the dimensions of severity, vulnerability, response efficacy, and self-efficacy. Participants who received written information in which the variable was present reported significantly greater perceptions of the particular variable than those who did not receive information regarding the variable. Similarly, a study that examined the effects of PMT theory components (RE+SE, RE, SE, threat information, no information) on parents' intentions to inform their child regarding sexual abuse found that all participants who read the essays containing the variables indicated greater beliefs on the respective variable than those who did not (Campis et al., 1989). The fact that the written information has been

shown to be an effective manipulation in previous PMT studies weakens this hypothesis for the present study. For the most part, these previous studies represented attempts to evaluate the usefulness of PMT as a model for explaining people's behavior in the face of a threat. In contrast, the present study attempted to evaluate the effectiveness of an intervention based on the assumptions and variables of PMT (e.g., self-efficacy, response-efficacy, response cost), which have been found to be related to bicycle helmet use and injury prevention in general, in producing increased injury control efforts by parents.

Second, rather than the manipulations themselves being ineffective, it is also possible that the instrumentation used to assess the effectiveness of the manipulations (i.e., the questionnaire) was not adequate. The rating scale (Likert-type ranging from 1-7) used to measure parents' perceptions may not have been sensitive enough to detect differences in parents' perceptions at the lower end of the scale resulting in a ceiling effect. In essence, because of a lack of sensitivity at the extremes of the scale, all parents may have appeared to have similar perceptions when in reality they did not. Several PMT studies in the past which have found significant differences in beliefs assessed through a similar questionnaire format have used 11- (Stanley & Maddux, 1986) or 14-point rating scales (Campis et al., 1989; Maddux & Rogers, 1983; Maddux et al., 1986; Wurtele & Maddux, 1987). The increased range of the 11- and 14-point scales may allow greater detection of differences in participants' perceptions while the limited range of the 7-point scale is less likely to show differences as in the present case. Given the relatively low alpha levels observed in the present study, it is also possible that the items within each cluster were not tapping a unitary construct or that parents were not reporting their beliefs accurately. As such, the conclusions drawn regarding the relationship between the protection motivation variables and intentions and behavior in the present study may be less valid. At the same time, the alpha levels reported in this study are comparable to

those reported in the existing PMT literature which have ranged from .19 to .85 depending in the particular study (Campis et al., 1989; Maddux et al., 1986; Maddux & Rogers, 1983; Stanley & Maddux, 1986; Wurtele & Maddux, 1987). There were also some high intercorrelations among the variables (see Table 7) which may reflect a failure of the items in tapping separate and distinct variables of PMT or a lack of differential responding to the items by parents. Further, since no test-retest reliability data was obtained, the stability of the measures for assessing parents' beliefs and intentions is unclear.

A third possible explanation for the similarity of parents' reported perceptions among groups is that parents' responses represent an attempt to respond in a socially desirable fashion. In a desire to present a positive image to the researchers, parents may have reported beliefs to make it appear as though they were knowledgeable about bicycle safety and aware of the issues related to bicycling head injuries rather than reporting their true beliefs.

Finally, if it is assumed that the parents reported an honest appraisal of their perceptions of severity, vulnerability, response-efficacy, self-efficacy, and response-costs, the case could be made that these parents were already aware of the issues related to bicycle-related head injuries prior to their participation in the study. If this indeed was the case, then the manipulation attempts in the present study, designed to produce a differential effect, would be undetectable; the perceptions reported by parents' would have already been consistent with the desired effect of the manipulations. For instance, if all parents at the outset believed that bicycle-related head injuries are severe, providing some parents with severity information and not providing others with the same information during the study is unlikely to have resulted in differences in perceptions of severity since their perceptions would have been the same initially. Interestingly, if the perceptions reported by parents in the present study do in fact represent a true awareness

of the risks associated with bicycling head injuries, then the findings contradict Eichelberger et al.'s (1990) findings, which revealed that parents in their sample had a poor understanding of many childhood safety issues and consistently underestimated the dangers to children from certain injuries, including bicycle injuries. However, it should be recognized that, given the low participation rate, the present sample of parents may represent a biased sample of parents. In essence, it is possible that the parents who chose to participate did so as a function of an inherent interest in bicycling, bicycle safety or safety in general. If any one or all three of these interests was a common characteristic of the parents who participated, then it is not unlikely that they would have a preexisting awareness of bicycle safety (e.g., risk of head injury, efficacy of bicycle helmets for controlling head injuries). While parents who responded seemed to be aware of the issues related to bicycle safety, it is unknown whether the parents who chose not to participate held similar perceptions or whether they would conform more to Eichelberger et al.'s (1990) sample.

Overall, parents' responses (in all conditions) suggested that they perceived bicycle-related head injuries as severe, they believed their child is vulnerable to bicycle-related head injuries, they believed in the effectiveness of bicycle-helmets for controlling bicycle-related head injuries, they believed in their own ability to provide their child with a helmet and ensure its use, and they believed there are only moderate costs associated with providing their child with a bicycle helmet. In addition, parents in general reported that they were fairly likely to purchase a bicycle helmet for their child. As such, these findings are consistent with previous PMT studies which have shown that greater perceptions of PMT components are related to peoples' intentions to engage in a variety of preventive behaviors including exercising (Fruin et al., 1991; Wurtele & Maddux, 1987), quitting smoking (Maddux & Rogers, 1983), performing breast exams (Rippetoe & Rogers, 1987), and informing their child about sexual abuse (Campis et al., 1989). The

present findings, however, are only consistent with PMT to the extent that behavioral intentions are used as a measure of protection motivation. Protection motivation is conceptualized as an intervening variable hypothesized to initiate, sustain, and direct behavior (Prentice-Dunn & Rogers, 1986; Rogers, 1983). Theoretically-based views of Protection Motivation Theory (Prentice-Dunn & Rogers, 1986; Rogers, 1983) assume that protection motivation is maximized when (a) the threat to health is perceived to be severe, (b) the individual feels vulnerable to the threat, (c) the individual believes that the adaptive response is an effective means for avoiding the threat, (d) the individual is confident that he/she can successfully complete the adaptive response, (e) the rewards associated with the maladaptive behavior are small, and (f) the costs associated with the adaptive response are small. When protection motivation is produced by these factors, the individual is expected to enact the adaptive or coping response and thereby reduce the threat. Parents' perceptions reported in the present study seem to fulfill the criteria for maximization of protection motivation as specified above. Thus, according to PMT, one would have expected parents to elicit the adaptive response (i.e., provide their child with a bicycle helmet). In contrast, however, very few parents in the present study acted accordingly (i.e., purchased a bicycle helmet for their child). Since very few helmets were purchased despite the fact that the specified conditions for protection motivation seem to have been met, the present results seem to contradict suggestions from theoretically-based views of PMT. The conditions thought to produce protection motivation may not necessarily lead to the enactment of the adaptive or coping response.

On the other hand, if parents' perceptions of severity, vulnerability, response-efficacy, self-efficacy, and response costs related to bicycle head injuries and helmets reported in the present study are thought to reflect a true awareness of bicycle safety on the part of parents, the results are consistent with the position that parental knowledge is a necessary, but insufficient, factor in the prevention of injuries (Pless & Arsenault, 1987).

Parents seem to be aware of the risks and severity of bicycling head injuries, yet they do not take action toward the prevention of bicycling head injuries for their child. Historically speaking, educational methods to promote safety have for the most part been markedly unsuccessful (Peterson, Mori, & Farmer, 1987). The present study represents an attempt to evaluate a theoretically-based approach incorporating variables - response-efficacy, self-efficacy, and response-costs - that have been shown to be related to parents injury prevention efforts, including bicycle-related injury prevention. Specifically, in addition to the threat and severity of injury, parents' beliefs regarding the efficacy of the prevention strategy, parents' confidence in their ability to implement the injury prevention strategy (i.e., provide their child with a bicycle helmet), and parents' perceptions of costs associated with engaging in the injury preventive strategy were incorporated. While the present study attempted to go beyond a health education approach alone to incorporate these other factors, it may be that in reality, the present intervention simply functioned as a health education approach. Thus, if conceptualized as a health education approach, the limited effectiveness of the present study is not surprising and is consistent with similar findings regarding the limited effectiveness of health education efforts alone towards childhood injury in other areas including traffic injuries sustained in automobiles or during street crossing, drownings, burns, poisoning, or fatal falls (Finney et al., 1993).

Although barriers for not purchasing a bicycle safety helmet were not directly addressed in the present study, informal explanations offered by parents at the time of the home visits provide some insight into these barriers. The most common reason for not having purchased a bicycle helmet at the time of the home visit, with the exception of no reason, involved the fact that the child does not ride on the road or in traffic and only rides in the yard or on the driveway. Several parents also indicated that their child does not ride his/her bicycle very often. This anecdotal information supports evidence in the literature which has demonstrated similar factors identified by parents as common

barriers towards injury preventive behaviors (Diguiseppi et al., 1990). Further, the same type of responses were even offered by parents who had received information in the PMT-based informational essay which specifically stated that bicycle-related head injuries can occur anywhere and anytime regardless of where and how often the child bicycles. Parents' responses to vulnerability items on the questionnaire indicated, however, that they do perceive there to be a risk of bicycle-related head injuries. As such, in addition to the discrepancy between parents' intentions to and their actual purchase of bicycle helmets, there is a also a discrepancy between parents' reports of vulnerability at the time of questionnaire completion and their explanations at the time on the home visits. In a sense, parents' explanations for not having purchased a bicycle helmet suggest that they may have an illusion of invulnerability based on their child's particular bicycling patterns. For example, although parents reported perceptions of vulnerability, they may not perceive the risk to be as great when their child rides only in driveway or does not ride near traffic. Thus, while they may perceive a general risk of head injury associated with bicycling, the risk may not be perceived to be as great when bicycling occurs infrequently or away from traffic as with their own child. The fact that four out of the five vulnerability items involved specific reference to the particular parent's child (e.g., "My child will probably suffer a bicycle head injury") and parents still reported perceptions of vulnerability makes this supposition less tenable.

Rather than reflecting barriers to bicycle helmet usage, parents' explanations for the discrepancy between their intentions and actual behavior may reflect an entirely different process. It may be that when completing the questionnaire, parents truly did intend to purchase a helmet for their child. At the time of the home visit, however, when they had not purchased a helmet, parents may have responded to reduce any discomfort they experienced as a result of the discrepancy between their reported intentions and their actual behavior. As such, parents' attempts to reduce this discrepancy may instead

represent a cognitive dissonance process (Festinger, 1957). Parents' original attitudes (i.e., belief in the risk of head injury) and intentions to purchase a bicycle helmet were not consistent with their behavior (i.e., not having purchased a helmet), thus they changed their attitude (i.e., no risk of head injury because of child's riding habits) to be consistent with their behavior.

The impact of discount coupons on parents' intentions and behavior related to providing the child with a bicycle helmet was examined in the present study based on previous research which has shown expense to be a barrier to the purchase and eventual use of bicycle helmets (Diguiseppi et al., 1990). The finding that the availability of discount coupons resulted in neither enhanced intentions to purchase a helmet nor actual purchases of helmets does not support previous findings which have shown bicycle helmet coupons/subsidies to be an important component of bicycle helmet campaigns that did result in greater helmet usage. In one study, the impact of a comprehensive awareness program to increase bicycle helmet use among school children was compared to the impact of the same awareness program plus a bicycle helmet subsidy which consisted of a coupon for the purchase of a helmet at a reduced price (i.e., $15) and purchasing instructions (Morris & Trimble, 1991). The potential role of discount coupons in the promotion of helmet use among children was substantiated by the fact that the proportion of helmet wearers at the school that obtained the awareness plus subsidy program increased from 0% to 22% while no impact was demonstrated for the educational program alone (i.e., no children who were observed riding to school wore helmets before or after the program). Additionally, the authors' conclusion that efforts to prevent head injuries by encouraging bicycle helmet purchases cannot rely on education alone lends further support to the previously mentioned notion that education/awareness is essential but not sufficient to change behavior and increase injury prevention (Pless & Arsenault, 1987). Bicycle helmet coupons and/or discount rates on bicycle helmets were

also incorporated as a component of the Seattle Bicycle Helmet Campaign (Bergman, 1990). Although the impact of the subsidies was not specifically examined, the results indicated that of the 109,450 coupons that were handed out, 5155 (4.7%) were redeemed, a figure labeled extraordinary by those involved in product promotion. Thus, while expense seems to be a factor that has potential to benefit bicycle helmet campaigns, it may be that other response costs, related to parents providing their child with a helmet, were inadvertently overlooked in the present study. Besides expense, the notion of response cost has been suggested to include other factors such as inconvenience, difficulty, disruption of daily life, unpleasantness, and complexity (Rogers, 1984), which are thought to reduce the likelihood of an individual engaging in an adaptive response. Thus, other response costs, not directly assessed in the present study, could have functioned to reduce the likelihood of parents providing their child with a helmet. The hypothesis is weakened by the fact that parents reported only moderate costs associated with providing their child with a helmet and ensuring its use (as indicated by parents' responses to items on questionnaire). However, consideration of the items thought to tap response-cost suggest that they may have served to assess costs primarily associated with parents' following through on their child's use of the helmet rather than costs associated with their actually obtaining a helmet. A helmet must be available before parents can take steps to ensure that the helmet is worn by their child. As such, it may have been more appropriate for questionnaire items to focus more on response costs associated with the actual obtaining of the helmet rather than those associated with ensuring its use by the child.

While no differences for bicycle helmet purchases were found among conditions, all parents who had purchased a bicycle helmet for their child at the time of the home visit indicated that they had purchased the helmet as a result of their participation in the study. Rather than serving as an effective approach for producing behavior change in

large numbers of individuals, it seems possible that the present intervention served as a trigger to action for those parents who had already been considering purchasing a bicycle helmet for their child prior to their participation.

Despite their role as the most likely candidate for providing their child with a bicycle helmet, it is likely that focusing solely on parents to increase helmet use among children is insufficient for producing the increase in children's helmet use necessary to substantially decrease bicycling head injuries. Similarly, Cushman et al. (1990) report finding that interventions to increase helmet use that were conducted by physicians alone also had a limited impact on helmet use. As such, it seems probable that a singular approach will not suffice. Rather, a multifaceted approach such as, the Seattle program which incorporated widespread media coverage, physician involvement, coupons for helmets, participation by businesses, manufacturer's and dealers, will be required to promote meaningful increases in helmet use among children. Callahan (1989) in an editorial discussion of the study by Thompson et al. (1989) stated his belief that "nothing less than a law requiring the use of helmets will do" but questioned the desirability of passing such a law and suggested that intensive educational programs should be attempted first. Such legislation has all ready been enacted in Howard County, Maryland with positive results to the extent that at the time of the study, the rate of helmet use in Howard County was the highest reported rate among children in the U.S. (Cote et al., 1992). It may be that as with car restraints, passive strategies, such as legislative action, will be needed in combination with more active strategies aimed at the individual to make a meaningful impact on bicycling related head injuries.

Despite the failure of the present study in supporting the assumptions of PMT, Protection Motivation Theory should not be abandoned as a potentially useful framework for conceptualizing variables involved in injury prevention efforts as well as health promotion in general. As described above, a number of explanations may help account

for the findings. Future studies should strive to improve upon the limitations of the present study. Specifically, better measures of intention should be used to evaluate the effectiveness of intentions for predicting behavior within the PMT framework. In addition, questionnaires used to assess perceptions of the PMT variables should be evaluated for sufficient variation in subjects' responses to reflect different beliefs, sufficient alpha levels, limited intercorrelations among the variables, and adequate test-retest reliability. Varying time spans should be included to examine the impact of time on the intention-behavior relationship within the injury prevention or health promotion context. The present results also suggest that it would be beneficial to incorporate a broader definition of response- cost to assess their influence on behavior. In addition, the small sample size may have limited the power of the statistics so that only a large effect could be detected. Larger sample sizes should be a goal for future research. Such improvements would permit a more thorough evaluation of the effectiveness of PMT as a framework for developing interventions aimed at injury control or health promotion in general.

As demonstrated in the present study the factors thought to be required for protection motivation in this sample of parents seemed to be in place, including the intention to perform the adaptive response although the adaptive response was rarely initiated. Thus, future research should strive to identify factors that motivate people to follow through on the adaptive response. Research efforts should also be directed towards identifying the variables that mediate the intention-behavior relationship so that more effective interventions can be developed. The present intervention aimed at controlling unintentional injuries in children, specifically bicycling head injuries, was met with limited success. Thus, as suggested by Finney et al. (1993), determining the factors that result in the most effective behavior change remains a major direction for injury control research. At the same time, the magnitude of change (in terms of bicycle helmet

purchases) demonstrated in the present study is consistent with interventions that use written information as their primary mode of transmission. As such, more powerful applications of PMT in the injury control context with larger sample sizes can be expected to demonstrate more meaningful magnitudes of change.

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Table 1

Summary of Group Characteristics

Group	n	Child Gender		Child Mean Age	SES[a]
		F	M		
PMT-Based Intervention					
Low Response-Cost	18	11	7	9.06	40.75
High Response-Cost	18	8	10	9.11	36.47
No-Information					
Low Response-Cost	17	13	4	9.41	38.79
High Response-Cost	16	8	8	9.13	36.28

[a] Computed using Hollingshead (1975) Four Factor Index; range = 8-66.

Table 2

Parents' Mean Ratings of Severity (S), Vulnerability (V), Response-Efficacy (RE), Self-Efficacy (SE), and Response-Cost (RC)

Group	n	PMT Variable				
		S	V	RE	SE	RC
PMT-Based Intervention						
Low Response-Cost	18					
M		1.84	3.14	2.23	2.28	4.82
SD		.69	1.25	.89	.66	1.38
High Response-Cost	18					
M		2.21	3.24	2.35	2.31	4.53
SD		1.17	1.34	1.24	1.09	1.07
No-Information						
Low Response-Cost	17					
M		2.31	3.42	2.30	2.55	4.43
SD		.43	.95	.93	.65	.88
High Response-Cost	16					
M		2.04	3.33	2.14	2.51	4.26
SD		.83	.74	.96	.93	1.27

Table 3

Parents' Intention Ratings

Group	n	Intention: Purchase a helmet	Intention: Find out if child wants a helmet	Intention: Encourage child to wear a helmet	Intention: Teach child general bicycle safety[a]
PMT-Based Intervention					
Low Response-Cost	18				
M		2.33	2.11	1.61	1.31
SD		1.85	2.11	.92	.44
High Response-Cost	18				
M		2.78	3.39	2.06	1.69
SD		1.56	2.28	1.63	1.38
No-Information					
Low Response-Cost	17				
M		3.29	2.47	2.06	1.71
SD		1.80	2.04	1.14	1.07
High Response-Cost	16				
M		2.75	2.06	1.56	1.36
SD		2.08	1.73	.96	.59

[a] Mean composite rating for five general bicycle safety items.

Table 4

Number and Percentage of Purchasers and Non-purchasers Per Condition

Group	n	Purchasers number (%)	Non-purchasers number (%)
PMT-Based Intervention			
Low Response-Cost	18	2 (.11)	16 (.89)
High Response-Cost	18	2 (.11)	16 (.89)
No-Information			
Low Response-Cost	17	1 (.06)	16 (.94)
High Response-Cost	16	1 (.06)	15 (.94)

Table 5

Mean Ratings of Severity (S), Vulnerability (V), Response-Efficacy (RE), Self-Efficacy (SE), and Response-Cost (RC) of Purchasers' versus Non-Purchasers ' Children

Variable	Group	
	Purchasers (n=6)	Non-purchasers (n=66)
Severity		
M	1.33	1.81
SD	.24	.77
Vulnerability		
M	2.10	2.16
SD	.37	.86
Response Efficacy		
M	1.60*	2.27
SD	.36	.80
Self-efficacy		
M	1.70	1.92
SD	.75	.84
Response Cost		
M	3.69*	3.03
SD	.73	.78

* $p < .05$.

Table 6

Explanations for not having purchased a bicycle helmet

Reason	# of parents who cited
Child does not ride on the road or where there is traffic; only rides bicycle in the driveway/sidewalk/yard; child stays near home.	10
Child does not ride very often.	7
Children will not wear them; children think they will look funny in a bicycle helmet.	3
Too expensive/too expensive for the family to afford at the present time.	2
Children generally skin their knees and elbows.	1
Went once to purchase a helmet, but child could not decide on the color; never went back.	1
Never thought about it until received this information through the school.	1
No plans to get a helmet.	1
Planned to purchase one, but lost coupon.	1
Child would like one; good idea to get a helmet.	3
Still planning to (e.g., planning to get a helmet for Christmas; when get new bikes).	9
No explanation offered.	26

Note. Parents may have cited more than one response.

Table 7

Correlation matrix for parents' ratings of the protection-motivation variables (severity, vulnerability, response-efficacy, self-efficacy, response-cost)

	Vulnerability	Response-Efficacy	Self-Efficacy	Response-Cost
Severity	.292*	.591***	.528***	.015
Vulnerability		.252*	.255*	.257*
Response-Efficacy			.381**	-.150
Self-Efficacy			___	-.139
Response-Cost				___

*$p < .05$ **$p < .01$ ***$p < .0001$

PROTECTION-MOTIVATION THEORY

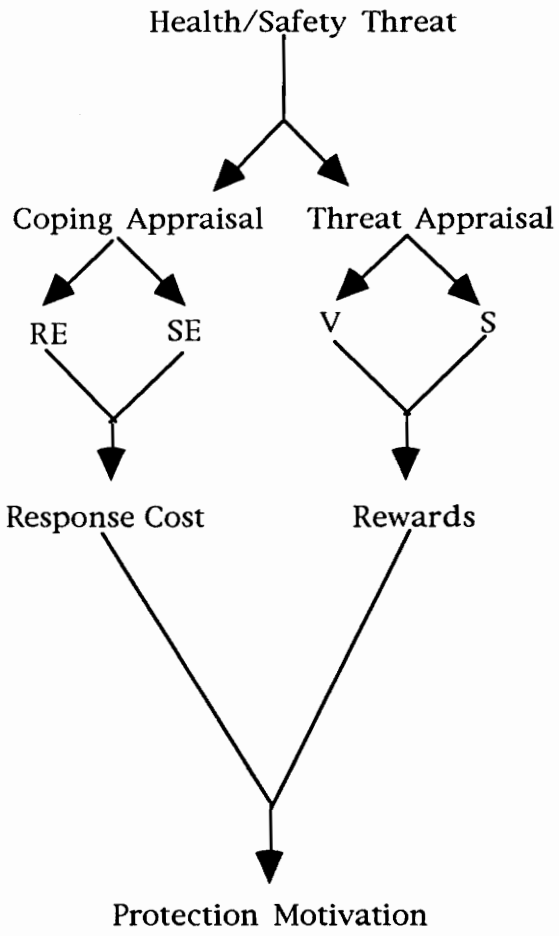


Figure 1. A schema of Protection-Motivation Theory

Appendixes

Appendix A

Letter to Parents

Dear Parent or Guardian,

We are conducting a project on attitudes and beliefs regarding children's accidental injuries. You are invited to participate in the study on common injuries among children, for example bicycle injuries.

To participate in this project, you will need to read a short informational message, and then complete a questionnaire and brief information section. As you read the essay please underline phrases or portions which are particularly meaningful or have a strong impact on you. This will enable us to understand the aspects of safety and injury prevention that are most important to parents like yourself. Your child will be asked to complete a similar questionnaire although he/she will not be required to read the informational message. Please allow your child to complete the questionnaire on his/her own as we are interested in children's own beliefs and behaviors regarding bicycling practices. After you and your child have completed the questionnaires please return them, along with both the parent's and child's signed consent forms, to your child's teacher from whom they will be retrieved by the researcher. Packet will take approximately 30-45 minutes to complete. Safety "goody" packages will be offered to children whose parents participate in the study by reading the enclosed essay and returning the questionnaire.

An associated project regarding home safety is also being conducted. As part of your agreement to participate in the present study, we ask that you agree to a follow-up visit approximately six weeks after you return your packet. The purpose of the follow up visit is to complete a home-safety checklist concerning measures that can be taken at home to increase safety and reduce the risk of accidents (e.g., plug stoppers). The visit will be conducted by a research assistant and will take approximately 15 minutes of your time. All information obtained will be kept strictly confidential, and you are free to discontinue participation in the study at any time. The safety "goody" packages for the children will be distributed at this time as well.

If you agree to participate in the study, please sign the attached consent form, complete the rest of the packet as instructed, and return it to your child's teacher. We would greatly appreciate you and your child's participation, as it will give us important information regarding parents' and children's beliefs about injuries. If you have any questions, please feel free to call Katie Miller (951-8311) or Dr. Jack Finney (231-6670) at the Psychology Department at Virginia Tech. Thank you.

Sincerely,

Kathryn M. Miller
Graduate Researcher

Jack W. Finney
Faculty Supervisor

Appendix B

Parent Consent Form

The purpose of this study is to learn more about parents' and children's beliefs and behaviors regarding children's accidental injuries. One example of which is bicycle injuries. In the end we hope to use this information to development methods to promote more effective safety and injury prevention programs.

If you wish to participate in this project, you will be asked to read a short informational message and then complete a brief information section and questionnaire. It will take approximately 30-45 minutes to read the message and complete the questionnaire. As you read the essay please underline phrases or portions which are particularly meaningful or have a strong impact on you. This will enable us to understand the aspects of safety and injury prevention that are most important to parents like yourself. Since we are also interested in children's beliefs about bicycle practices, your child will be asked to complete a short questionnaire although he/she will not be required to read the message. This will take about 15-30 minutes for your child to complete. Safety "goody" packages will be offered to children whose parents participate in the study by reading the message and returning the questionnaire. In addition, participation will include a follow-up visit approximately six weeks after you have returned your packet. At this time, a research assistant will complete a home safety checklist with you at your home. The home visit will take approximately 15 minutes of your time to complete. Safety "goody" packages will also be distributed to children at this time.

There are no special risks to you or your child for being in the project. You and your child may both acquire self-knowledge regarding your beliefs and behaviors regarding bicycle riding and safety by reading the messages and completing the questionnaire. All information obtained will be kept strictly confidential and will be revealed only to Katie Miller, Dr. Jack Finney, and project staff.

The information from this study may be used for scientific or educational purposes. It may be presented at scientific meetings and/or published in professional journals or books, or used for any other purpose which Virginia Tech's Department of Psychology considers proper in the interest of education, knowledge, or research.

You are free to withdraw from this project at any time, at no risk of prejudice or penalty. The project has been approved by the Human Subjects Research Committee and the Institutional Review Board. Please direct any questions you may have to Katie Miller (951-8311), principal investigator; Dr. Jack W. Finney (231-6670), faculty advisor; Dr. R.J. Harvey (231-7030); Human Subjects Committee Chair; Janet Johnson (231-6077), Institutional Review Board Chairperson.

"I hereby agree to voluntarily participate in the research project described above and under the conditions described above."

Parent's Signature: _____ Date: _____

** Please read the following page with your child before he/she completes the children's questionnaire.

Appendix C

Child Consent Form

The purpose of this study is to learn more about children's beliefs about injury and safety. One kind of injury is bicycle injuries.

If you agree to be in this study, you will have to fill out a short information section and answer some questions. The questions will ask about your beliefs about bicycle riding and safety. It will take about 15-30 minutes to do and you will only have to do this one time. All of your answers will be kept confidential. They will only be told to the people working on this study.

If you have any questions now or after this study is finished, you may call Katie Miller (951-8311). It is up to you whether or not you want to be in the study. There are no risks to you for being in the study. If you decide to be in the study you may stop at any time. By choosing to be in the study, you will help us understand different beliefs that children have about bicycle safety.

If you want to be in the study, please sign this form to let us know that you understand what the study is about, that you know who to ask if you have any questions, and that you can stop at any time.

"I agree to be in the study."

Child's Signature:_____ Date:_____

Appendix D

Stimulus Message

PMT-based Intervention Essay

(V, S, RE, & SE)

What you should know about bicycle injuries among children

Injuries are the leading cause of death and account for more that 30,000 permanent disabilities among children in this country. Bicycles, usually considered a toy, represent a major source of injuries to children. Most children love their bikes. Learning to ride a two-wheeler is a real landmark in a child's life, a sign of growing up. At the same time, however, the same bike that gives your youngster hours of pleasure can, instantaneously, result in pain, injury, possible long term disability or even death. Each year in the United States, bicycle injuries to children account for approximately 300,000 emergency department visits and 500 to 600 deaths. Children between the ages of 5 and 14 account for nearly 70% of all bicycle-related injuries treated in hospital emergency rooms and over half of the deaths related to bicycling. Most bicycling-related hospital admissions and deaths result from injuries to the skull and brain. Thus, while you may believe that a head injury could never happen to your child, children suffer bicycle-related accidents more often than most parents realize. Given the evidence above, your child can suffer a head injury.

Many parents believe that their child is not at risk for suffering a bicycle-related injury because they only ride their bike in the driveway or on the sidewalk and not at night. However, bicycle accidents causing head injuries can occur under any circumstances - during a short casual ride or a long tour, alone or in traffic, while commuting or pleasure riding - and cannot be predicted by you or your child. The fact is a substantial number of bicycle accidents do occur in driveways, on bike paths, in parks and not just on streets or being hit by a car. Most children do not wear bicycle helmets or any other type of protective gear when bicycling. Even children who own helmets rarely wear them. Helmets are useless unless children wear them.

The impact of any injury, particularly a head injury, can be devastating for a child and his/her family. Besides death, head injuries can cause brain damage possibly leading to permanent learning or physical handicaps. Permanent disability can even result from head injuries which appear to be quite minor. All in all, the necessary medical treatment and rehabilitation programs can end up costing many thousands of

dollars. Besides the financial burden associated with head injuries, head injuries can lead to emotional difficulties for both the child and the family.

A child wearing a helmet is a safe child

Since head injuries are so common and severe among children, protecting your child's head is essential. Because they absorb much of the kinetic energy released in a crash or fall, impact tested and approved bicycle helmets are likely to reduce bicycle injury severity and frequency. The use of protective helmets has reduced the incidence of serious head injury in other sports such as football, baseball and ice hockey and are accepted by the people who play these sports. Helmets are now in general use among experienced adult cyclists; all bicycle racers are also required to wear them. These people are smart and want to protect their head because they know how devastating a head injury can be. Controlled research has shown that helmets, particularly ANSI or Snell-approved helmets, can provide excellent protection against bicycle-related head injury. One study indicated that bicycle helmets could reduce the risk of head injury by 85% and brain injury by 88%. Overall, the wide use of bicycle helmets would result in significant reductions in mortality and morbidity from bicycle trauma. Few actions in the health field are known to reduce the risk of illness or injury; the wearing of bicycle helmets is effective and is one such action that will definitely save lives. Your own child's risk of head injury would be greatly reduced, if he/she wore a bicycle helmet everytime he/she rode.

You have an important role in your child's bicycle safety

The prevention of head injuries associated with bicycle accidents can only begin if parents like yourself are willing to educate and start a program of helmet use with your child. Many researchers in the field of injury prevention advocate that prevention is the best cure and that it is never too early to take steps to protect your child's health and safety. The sooner children learn about the importance of wearing bicycle helmets and start to adopt the habit, the better the chances of protecting your child. Many parents have already adopted the recommendation that their children be instructed to wear bicycle safety helmets. These parents are no different than you; they were simply convinced that they could effectively implement a program of helmet use for their children. If helmet use accompanies your child's first bike, it will become a

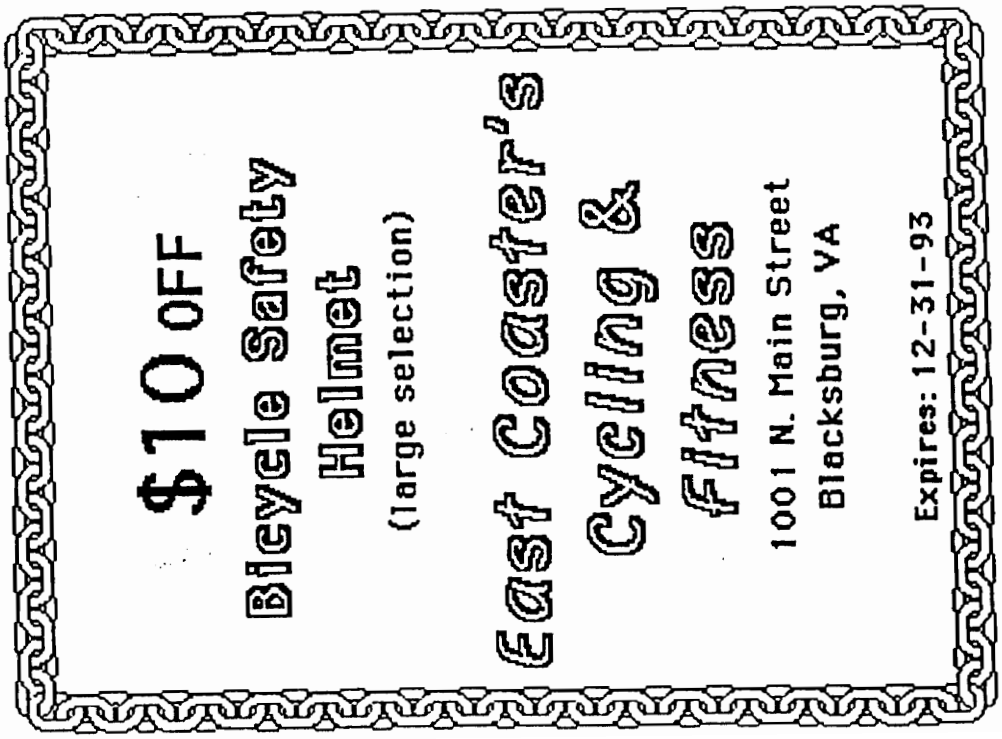
part of the normal routine. As a habit, it will be much easier for you to ensure that your child wears a helmet. In addition, parents provide role models for their children; simply by wearing a helmet yourself when you ride will increase the likelihood of your child wearing his/her helmet. Praise and reward for helmet use will also increase the likelihood that children will want to wear their helmets. Simply by allowing your child to help pick out his/her own helmet, he/she will probably be more interested in wearing it.

Educating children about bicycle helmets is not too difficult and can easily be explained by parents; in fact, most children accept the information without reacting too negatively. Parents are the best source of information for teaching safety and injury prevention to their child. As the primary educator of your child, you are the most appropriate person to inform your children about the importance of bicycle safety helmets. In addition, you are capable of presenting this type of information to your children in a helpful and nonthreatening manner. Parents also have an inborn need to protect their children from potential danger and continually provide them with information to ensure safekeeping. When your child was younger, you taught him/her safety information (e.g., not touching a hot stove). Educating your children about bicycle helmet use is no different. This natural concern for your child's safety will serve to motivate you to take the necessary action to inform them about the importance of wearing a bicycle helmet to reduce the risk of head injury. Thus, parents are often the most appropriate, motivated, and capable person to effectively communicate with their child.

Conclusion. Your child is much more vulnerable to bicycle related injuries, especially head injuries, than you may have realized. Bicycle accidents can occur anywhere and are unpredictable. Besides death, the most serious injuries related to bicycle accidents are head injuries which can result in permanent learning or physical handicaps as well as financial and psychological difficulties. However, the use of a bicycle safety helmet can significantly reduce your child's risk of suffering a bicycle-related head injury. Providing your child with a helmet and taking steps to ensure that he/she wears a helmet every time he/she rides, is the best and most effective protection you could give your child. You can educate your child about the importance of bicycle safety helmets and can effectively implement a program of helmet use with your child.

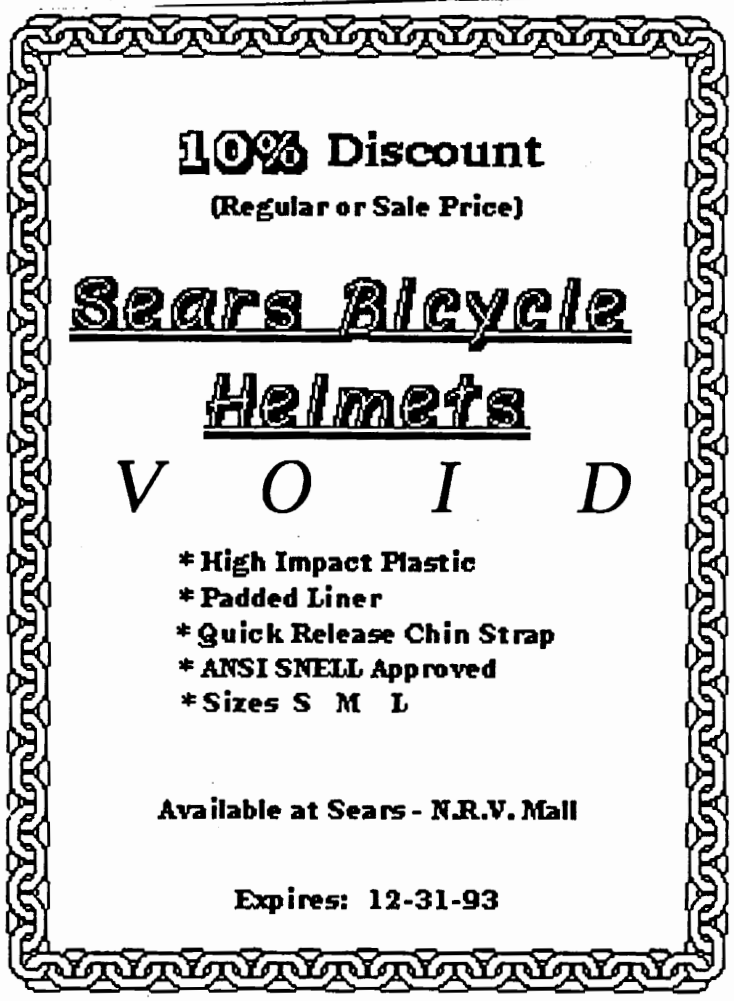
Appendix E

Valid Coupons



You will receive valid coupons in the mail shortly after we have received your completed questionnaire.

Thank You!



Appendix G

Dependent Measure Questionnaire Items - (Parents)

Vulnerability:

1. Bicycling head injuries are very common in children.

6. My child will probably suffer a bicycle injury.

11. My child is at risk for suffering a bicycle injury if he/she does not receive bicycle safety education.

16. If my child, does not wear a helmet while bicycling, he/she will probably suffer a head injury.

21. My child is more likely than other children to get a bicycle-related head injury.

Severity

2. My child suffering a head injury could result in many problems for him/her.

7. It would be better for my child's health if he/she avoided getting a bicycling-related head injury.

12. My child suffering a head injury could result in many problems for our family.

17. A head injury from a bicycle crash is usually pretty serious.

22. Most bicycle crashes are not serious.

Response Efficacy

3. Providing my child with a bicycle helmet will reduce the chances of he/she suffering a head injury as a result of bicycling.

8. Bicycle helmets have been found to decrease the number of head injuries associated with bicycle crashes.

13. Children who wear bicycle helmets are less likely to suffer a head injury.

18. Head injuries from bicycle crashes will still happen even if my child wears a bicycle helmet.

23. Helmets are an important part of bicycle safety.

26. Bicycle helmets are not as important as other bicycle safety rules (e.g., stopping at stop signs, riding with traffic).

Self-Efficacy

4. I am able to provide my child with a bicycle helmet.

9. I feel confident that I could instruct my child on the appropriate use of a bicycle helmet.

14. I would be able to get my child to wear his/her helmet whenever he/she rode his/her bike.

19. I know enough about bicycle safety and helmets to instruct my child.

24. Even if my child did have a helmet, I would not be able to get him/her to wear it.

Response-Costs

5. Bicycle helmets cost too much.

10. Since children do not like to wear bicycle helmets, it would require a lot of effort to get my child to wear a helmet.

15. Making my child wear a helmet is just one more rule I would have to enforce.

20. I would have to force my child to wear a bicycle helmet, which are generally uncomfortable.

25. Requiring my child wear a bicycle helmet would be requiring he/she to wear something that is ugly.

27. I would have to force may child to wear a bicycle helmet, which would be likely to result in he/she being teased by other kids.

Intention

28. I plan to buy my child a bicycle helmet.

29. I plan to find out whether my child wants a bicycle helmet.

30. I plan to encourage my child to wear a bicycle helmet.

31. I plan to teach my child about bicycle safety.

32. I plan to teach my child to always obey traffic signals while bicycling.

33. I plan to teach my child to always ride with both hands on the handlebars .

34. I plan to teach my child to use hand signals when turning on a bicycle.

35. I plan to teach my child to always ride with traffic.

General Information

36. How often does your child ride a bicycle?

37. Has your child ever had a bicycle-related injury?

38. Does your child have a bicycle safety helmet now?

39. If yes, what percent of the time does your child wear the helmet?

Believability & Understandability

40. I do not really believe what I read in the essay.

41. The information in the essay was easy to understand.

Dependent Measure Questionnaire Items - (Children)

Vulnerability:

1. Bicycling head injuries are very common in children.

6. I will probably get hurt from a bicycle crash.

11. If I don't learn bicycle safety rules, I will probably get hurt while bicycling.

16. If I do not wear a helmet while bicycling, I will probably hurt my head.

21. I am more likely than other children to get a bicycle-related head injury.

Severity

2. If I hurt my head while bicycling, it could lead to many other problems for me.

7. It would be better for my health if I avoided hurting my head while bicycling.

12. If I hurt my head while bicycling, it could lead to many other problems for my family.

17. A head injury from a bicycle crash is usually pretty serious.

22. Most bicycle crashes are not serious.

Response Efficacy

3. Wearing a bicycle helmet would reduce my chances of hurting my head while bicycling.

8. Bicycle helmets have been found to decrease the number of head injuries from bicycle crashes.

13. Children who wear bicycle helmets are less likely to hurt their head.

18. Even if I wear a bicycle helmet, I will still probably hurt my head in a bicycle crash.

23. Helmets are an important part of bicycle safety.

26. Bicycle helmets are not as important as other bicycle safety rules (e.g., stopping at stop signs, riding with traffic).

Self-Efficacy

4. I can get a bicycle helmet.

9. I know how to use a bicycle helmet.

14. I would be easy for me to remember to wear my helmet whenever I ride my bike.

19. I know about bicycle safety.

24. Even if I had a helmet, I would not wear it.

Response Costs

5. Bicycle helmets cost too much.

10. Children do not like to wear bicycle helmets.

15. Wearing my helmet is just one more rule I would have to follow.

20. Bicycle helmets are uncomfortable.

25. Bicycle helmets are ugly.

27. Other kids would make fun of me if I wore a bicycle helmet.

Intention

28. I plan to start wearing a bicycle safety helmet.

29. I plan to tell my parents that I want a bicycle helmet.

30. I plan to learn more about bicycle safety.

31. I plan to always obey traffic signals while bicycling.

32. I plan to always ride with both hands on the handlebars .

33. I plan to use hand signals when turning on a bicycle.

34. I plan to always ride with traffic.

Appendix H

Post-experimental Questionnaires

Parent PMT Questionnaire

We are interested in your beliefs about each of the questions. Please rate your beliefs for each question on a 1 to 7 scale.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

1. Bicycling head injuries are very common in children.

1 2 3 4 5 6 7

2. My child suffering a head injury could result in many problems for him/her.

1 2 3 4 5 6 7

3. Providing my child with a bicycle helmet will reduce the chances of he/she suffering a head injury as a result of bicycling.

1 2 3 4 5 6 7

4. I am able to provide my child with a bicycle helmet.

1 2 3 4 5 6 7

5. Bicycle helmets cost too much.

1 2 3 4 5 6 7

6. My child will probably suffer a bicycle injury.

1 2 3 4 5 6 7

7. It would be better for my child's health if he/she avoided getting a bicycling-related head injury.

1 2 3 4 5 6 7

8. Bicycle helmets have been found to decrease the number of head injuries associated with bicycle crashes.

1 2 3 4 5 6 7

9. I feel confident that I could instruct my child on the appropriate use of a bicycle helmet.

1 2 3 4 5 6 7

10. Since children do not like to wear bicycle helmets, it would require a lot of effort to get my child to wear a helmet.

1 2 3 4 5 6 7

11. My child is at risk for suffering a bicycle injury if he/she does not receive bicycle safety education.

1 2 3 4 5 6 7

12. My child suffering a head injury could result in many problems for our family.

1 2 3 4 5 6 7

13. Children who wear bicycle helmets are less likely to suffer a head injury.

1 2 3 4 5 6 7

14. I would be able to get my child to wear his/her helmet whenever he/she rode his/her bike.

1 2 3 4 5 6 7

15. Making my child wear a bicycle helmet is just one more rule I would have to enforce.

1 2 3 4 5 6 7

16. If my child does not wear a helmet while bicycling he/she will probably suffer a head injury.

1 2 3 4 5 6 7

17. A head injury from a bicycle crash is usually pretty serious.

1 2 3 4 5 6 7

18. Head injuries from bicycle crashes will still happen even if my child wears a bicycle helmet.

1 2 3 4 5 6 7

19. I know enough about bicycle safety and helmets to instruct my child.

1 2 3 4 5 6 7

20. I would have to force my child to wear a bicycle helmet, which are generally uncomfortable.

1 2 3 4 5 6 7

21. My child is more likely than other children to get a bicycle-related head injury.

1 2 3 4 5 6 7

22. Most bicycle crashes are not serious.

1 2 3 4 5 6 7

23. Helmets are an important part of bicycle safety.

1 2 3 4 5 6 7

24. Even if my child did have a helmet, I would not be able to get him/her to wear it.

1 2 3 4 5 6 7

25. Requiring my child wear a bicycle helmet would mean requiring him/her to wear something that is ugly.

1 2 3 4 5 6 7

26. Bicycle helmets are not as important as other bicycle safety rules (e.g., stopping at stop signs, riding with traffic).

1 2 3 4 5 6 7

27. I would have to force may child to wear a bicycle helmet, which would likely result in him/her being teased by other kids.

1 2 3 4 5 6 7

28. I plan to buy my child a bicycle safety helmet.

1 2 3 4 5 6 7
Not very likely in the near future — Very likely in the near future

29. I plan to find out whether my child wants a bicycle helmet.

1 2 3 4 5 6 7
Strongly Agree — Strongly Disagree

30. I plan to encourage my child to wear a bicycle helmet.

1 2 3 4 5 6 7

31. I plan to teach my child about bicycle safety.

1 2 3 4 5 6 7

32. I plan to teach my child to always obey traffic signals while bicycling.

1 2 3 4 5 6 7

33. I plan to teach my child to always ride with both hands on the handlebars.

1 2 3 4 5 6 7

34. I plan to teach my child to use hand signals when turning on a bicycle.

1 2 3 4 5 6 7

35. I plan to teach my child to always ride with traffic when bicycling.

1 2 3 4 5 6 7

36. How often does your child ride a bicycle?

a.) Very often
b.) Often
c.) Sometimes
d.) Hardly ever
e.) Never

37. Does your child have a bicycle safety helmet now?

a.) Yes
b.) No

38. If yes, what percentage of time does your child wear his/her helmet while bicycling?

a.) 75 - 100%
b.) 25 - 49%
c.) 50 - 74%
d.) 0 - 24%

39. I do not really believe what I read in the essay.

1 2 3 4 5 6 7

40. The information in the essay was easy to understand.

1 2 3 4 5 6 7

Children's PMT Questionnaire

Age: _____ Sex: M or F Date:_____

Directions: Below are a series of questions that describe children's feelings and behaviors about bicycle safety. Please indicate how true each statement is for you by circling a number after each question.

1. Bicycling head injuries are very common in children.

1	2	3	4	5
I Agree/True for me				I Disagree/Not true for me

2. If I hurt my head while bicycling, it could lead to many other problems for me.

1	2	3	4	5
I Agree/True for me				I Disagree/Not true for me

3. Wearing a bicycle helmet would reduce my chances of hurting my head while bicycling.

1	2	3	4	5
I Agree/True for me				I Disagree/Not true for me

4. I can get a bicycle helmet.

1	2	3	4	5
I Agree/True for me				I Disagree/Not true for me

5. Bicycle helmets cost too much.

1	2	3	4	5
I Agree/True for me				I Disagree/Not true for me

6. I will probably get hurt from a bicycle crash.

1	2	3	4	5
I Agree/True for me				I Disagree/Not true for me

7. It would be better for my health if I avoided hurting my head while bicycling.

1	2	3	4	5
I Agree/True for me				I Disagree/Not true for me

8. Bicycle helmets have been found to decrease the number of head injuries from bicycle crashes.

1 2 3 4 5
I---------I---------I---------I---------I
I Agree/True for me I Disagree/Not true for me

9. I know how to use a bicycle helmet.

1 2 3 4 5
I---------I---------I---------I---------I
I Agree/True for me I Disagree/Not true for me

10. Children do not like to wear bicycle helmets.

1 2 3 4 5
I---------I---------I---------I---------I
I Agree/True for me I Disagree/Not true for me

11. If I don't learn bicycle safety rules, I will probably get hurt while bicycling.

1 2 3 4 5
I---------I---------I---------I---------I
I Agree/True for me I Disagree/Not true for me

12. If I hurt my head while bicycling, it could lead to many other problems for my family.

1 2 3 4 5
I---------I---------I---------I---------I
I Agree/True for me I Disagree/Not true for me

13. Children who wear bicycle helmets are less likely to hurt their head.

1 2 3 4 5
I---------I---------I---------I---------I
I Agree/True for me I Disagree/Not true for me

14. It would be easy for me to remember to wear my helmet whenever I ride my bike.

1 2 3 4 5
I---------I---------I---------I---------I
I Agree/True for me I Disagree/Not true for me

15. Wear a bicycle helmet is just one more rule I would have to follow.

1 2 3 4 5
I---------I---------I---------I---------I
I Agree/True for me I Disagree/Not true for me

16. If I do not wear a helmet while bicycling, I will probably hurt my head.

1 2 3 4 5
I---------I---------I---------I---------I
I Agree/True for me I Disagree/Not true for me

17. A head injury from a bicycle crash is usually pretty serious.

1 2 3 4 5
I---------I---------I---------I---------I
I Agree/True for me I Disagree/Not true for me

18. Even if I wear a bicycle helmet, I will still probably hurt my head in a bicycle crash.

1 2 3 4 5
I---------I---------I---------I---------I
I Agree/True for me I Disagree/Not true for me

19. I know about bicycle safety.

1 2 3 4 5
I---------I---------I---------I---------I
I Agree/True for me I Disagree/Not true for me

20. Bicycle helmets are uncomfortable.

1 2 3 4 5
I---------I---------I---------I---------I
I Agree/True for me I Disagree/Not true for me

21. I am more likely than other children to hurt my head in a bicycle crash.

1 2 3 4 5
I---------I---------I---------I---------I
I Agree/True for me I Disagree/Not true for me

22. Most bicycle crashes are not serious.

1 2 3 4 5
I---------I---------I---------I---------I
I Agree/True for me I Disagree/Not true for me

23. Helmets are an important part of bicycle safety.

1 2 3 4 5
I---------I---------I---------I---------I
I Agree/True for me I Disagree/Not true for me

24. Even if I had a helmet, I would not wear it.

1 2 3 4 5
I---------I---------I---------I---------I
I Agree/True for me I Disagree/Not true for me

25. Bicycle helmets are ugly.

1 2 3 4 5
I---------I---------I---------I---------I
I Agree/True for me I Disagree/Not true for me

26. Bicycle helmets are not as important as other bicycle safety rules (e.g., stopping at stop signs, riding with traffic).

1 2 3 4 5
I---------I---------I---------I---------I
I Agree/True for me I Disagree/Not true for me

27. Other kids would make fun of me if I wore a bicycle helmet.

1 2 3 4 5
I---------I---------I---------I---------I
I Agree/True for me I Disagree/Not true for me

28. I plan to start wearing a bicycle safety helmet.

1 2 3 4 5
I---------I---------I---------I---------I
I Agree/True for me I Disagree/Not true for me

29. I plan to tell my parents that I want a bicycle helmet.

1 2 3 4 5
I---------I---------I---------I---------I
I Agree/True for me I Disagree/Not true for me

30. I plan to learn more about bicycle safety.

1 2 3 4 5
I---------I---------I---------I---------I
I Agree/True for me I Disagree/Not true for me

31. I plan to always obey traffic signals while bicycling.

1 2 3 4 5
I---------I---------I---------I---------I
I Agree/True for me I Disagree/Not true for me

32. I plan to always ride with both hands on the handlebars while bicycling.

1 2 3 4 5
I---------I---------I---------I---------I
I Agree/True for me I Disagree/Not true for me

33. I plan to use hand signals when turning on my bicycle.

1	2	3	4	5
I	I	I	I	I

I Agree/True for me — I Disagree/Not true for me

34. I plan to always ride with traffic when bicycling.

1	2	3	4	5
I	I	I	I	I

I Agree/True for me — I Disagree/Not true for me

Appendix I

Safety Consciousness Scale

Directions: Please indicate how well each statement describes you by circling a number on the scale.

0	1	2	3	4
does not describe me at all				describes me very well

1. I reflect about my child's safety a lot.

   0 1 2 3 4

2. I'm very conscious about my child's safety.

   0 1 2 3 4

3. I'm generally attentive to my child's safety.

   0 1 2 3 4

4. I'm constantly examining my child's safety.

   0 1 2 3 4

5. I'm alert to changes in my child's safety.

   0 1 2 3 4

6. I'm usually aware of my child's safety.

   0 1 2 3 4

7. I'm aware of the state of my child's safety as I go through the day.

   0 1 2 3 4

8. I notice how my child's safety is as I go through the day.

   0 1 2 3 4

9. I'm very involved with my child's safety.

   0 1 2 3 4

Appendix J

Home-Visit Information

Since over 100 home-visits will be conducted, it will be important for the researchers to know when it is convenient to reach you at home. The home safety visits will be conducted by geographic area and knowing good and bad times for your family will allow the visits to be coordinated within these areas. As such, please list the times when you are generally home and could be available for the home safety visit. The visit should only take about 15 minutes of your time. In addition, please list the times that you know are typically not good times to reach you at home (e.g., 8 - 5 workday).

Times that are generally good:	Times that are generally bad:
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Thank you again for your participation!

Appendix K

Demographic Information

Date:_____

Parents' name:_____

Child's name:_____ Gender: M or F

Date of birth:_____ Grade: _____

Address: _____

_____

_____

Phone number: _____

Please list all other persons who are currently living in the household.

Name	Relationship	Age
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Parents' marital status: a. married b. separated c. divorced d. remarried

Mother's education: a. less than high school

b. completed high school

c. some college or trade school

d. graduated from college

e. graduate or advanced education

Mother's occupation: _____

Father's education:

a. less than high school

b. completed high school

c. some college or trade school

d. graduated from college

e. graduate or advanced education

Father's occupation: _____

Appendix L

Follow-up Memo

Date, 1993

Dear Parent or Guardian,

Last week a packet was sent home with your child from some researchers at Virginia Tech. You were invited to participate in a study regarding parents' and children's beliefs about children's accidental injuries.

If you have already read the enclosed essay, completed the questionnaire(s), and returned them to us, please accept our sincere thanks. If not, please do so today. Because we can not obtain this information from all parents, it is extremely important that yours also be included in the study if the results are to accurately represent the beliefs of parents in the Montgomery County area.

If by some chance you did not receive the packet, or it got misplaced, please call me right now (951-8311), and I will get another one in the mail to you today.

Sincerely,

Kathryn M. Miller
Graduate Researcher

Appendix M

Home Visit Safety Check

Subject #: _____
Date of Visit: _____
Individual doing visit: _____

Safety item:	Yes	No	Comments
1. Smoke detectors present?			
- are they working?			
2. Do they regularly wear seat belts?			
- parents			
- children			
3. Non-skid backing on throw rugs?			
4. Child-proof safety covers on electrical outlets?			
5. Bicycle safety helmets?			
- parents			
- children			
6. Fire escape plan?			
7. Fire extinguishers present?			
8. Guns, if in home, stored behind a lock?			
9. Medicine kept out of reach of child?			
10. Old paint, cleaning supplies, or dirty rags not kept in hot, unventilated space?			
11. Fence/locked ladder around pool area, if there is a pool.			
12. Stairway free from clutter, objects obstructing use?			

Vita

Kathryn M. Miller
408 Harell Street Apt. 1
Blacksburg, VA 24060
(703) 951-8311

EDUCATION

Master of Science, December 1993
Clinical Psychology
Virginia Polytechnic Institute and State University

Bachelor of Arts, May 1991
Major: Psychology
University of Richmond
Magna Cum Laude

EXPERIENCE

Clinical

Graduate Clinician - August 1991 - Present
Psychological Services Center and Child Study Center
Virginia Polytechnic Institute and State University
3110 Prices Fork Road
Blacksburg, VA 24060
(703) 231-6914
Supervisors: Dr. Jack W. Finney
1993-1994 Dr. Robert S. Stephens

Supervisors: Dr. Thomas H. Ollendick
1992-1993 Dr. Ellie T. Sturgis

Supervisors: Dr. Robert S. Stephens
1991-1992 Dr. Russell T. Jones

Duties include outpatient counseling and assessment, psychological testing, participation on a practicum team, and weekly individual supervision.

Psychology Practicum Intern - May - August 1993
Virginia Treatment Center for Children
P.O. Box 489
MCV Station
Richmond, VA 23298-0489
(804) 786-4532
Supervisors: Dr. Donald Oswald
Dr. Molly Brunk
Dr. Debbie Webb Blackburn

counseling, participation in training seminars, and weekly individual supervision.

School Counselor - September 1992 - Present
Christiansburg Middle School
Christiansburg, VA 24073
(703) 382-5168
Supervisor: Dr. Thomas H. Ollendick

Provide weekly individual counseling for emotionally disturbed students as specified on IEP's; attend bi-weekly group supervision meetings and monthly staff meetings.

Therapist - May - August 1992
Psychological Services Center and Child Study Center
Virginia Polytechnic Institute and State University
3110 Prices Fork Road
Blacksburg, VA 24060
(703) 231-6914
Supervisor: Dr. Richard M. Eisler

Conducted individual outpatient counseling and assessment, performed children's psychological evaluations, facilitated a children's social skills group, and participated on a practicum team.

Student Intern - January - April 1990
Virginia Treatment Center for Children
Richmond, VA 23298

Served as a teacher's aide in an out-patient adolescent and an in-patient children's classroom; assisted patient advocate with data collection for future project investigating use of seclusion and restraints; attended interdisciplinary treatment team meetings.

Teaching

Graduate Teaching Assistant - August 1993 - Present
Department of Psychology
Virginia Polytechnic Institute and State University
Blacksburg, VA 24061
(703) 231-6279

Instructor of social psychology lab course.

Graduate Teaching Assistant - August 1991 - May 1993
Department of Psychology
Virginia Polytechnic Institute and State University
Blacksburg, VA 24061
(703) 231-6279
Coordinator: Michael Casey

Instruct lab sessions of introductory psychology course.

Graduate Teaching Assistant - August - December 1992
Dr. Danny Axsom
Department of Psychology
Virginia Polytechnic Institute and State University
Blacksburg, VA 24061
(703) 231-6495

Duties included grading course exams and papers, guest lecturing, and providing individual assistance to students as needed for undergraduate advanced social psychology course.

Graduate Teaching Assistant - August - December 1991
Dr. Robert S. Stephens
Department of Psychology
Virginia Polytechnic Institute and State University
Blacksburg, VA 24061
(703) 231-6304

Responsibilities involved grading course exams, guest lecturing, and providing individual assistance to students for undergraduate abnormal psychology course.

Research

Thesis Research - January 1992 - Present
Department of Psychology
Virginia Polytechnic Institute and State University
Blacksburg, VA 24061
(703) 231- 6670
Chairperson: Dr. Jack W. Finney

Designed and conducted a study investigating a Protection Motivation Theory based approach for promoting injury control, in particular bicycle safety.

Research Assistant - August 1991 - May 1993
Department of Psychology
Virginia Polytechnic Institute and State University
Blacksburg, VA 24061
(703) 231- 6670

Assisted other faculty and student research projects including subject recruitment, data collection, and administering structured interviews.

Research Assistant - September 1990 - April 1991
Dr. Andrew Newcomb
Department of Psychology
University of Richmond
Richmond, VA 23173
(804) 289-8128

Assisted with data management and analysis for research project investigating the effects of methylphenidate on ADHD children's peer relations.

Class Research - Spring semester 1990
Department of Psychology
University of Richmond
Richmond, VA 23173
(804) 289-8128
Instructor: Dr. Andrew Newcomb

Developed and carried out a meta-analysis examining three components of ADHD children's peer relations: the incidence of appropriate, negative and nonsocial behaviors; the effect of the method of assessment (direct observation v. ratings); and the role of psychostimulant medication.

HONORS

Psi Chi

Phi Beta Kappa

Phi Eta Sigma

Dean's List 1987-1991

PROFESSIONAL ORGANIZATIONS AND ACTIVITIES

American Psychological Association, Student Affiliate

Association for Advancement of Behavior Therapy

Virginia Psychological Association

PRESENTATIONS

Finney, J.W., Miller, K.M., & Adler, S.P. (April 1993) Preventing child-to-parent transmission of cytomegalovirus. Paper presented at the Florida Conference on Child Health Psychology in Gainesville, FL.

Newcomb, A., Strandburg, K., & Miller, K. (April 1991). A meta - analysis of ADHD children's peer relations. Paper presented at Biennial Meetings of the Society for Research in Child Development in Seattle, WA.

PUBLICATIONS

Finney, J.W., Miller, K.M., & Adler, S.P. (1993). Preventing child-to-parent transmission of cytomegalovirus by changing protective and risk behaviors. Journal of Applied Behavior Analysis, 26,

REFERENCES Available upon request.

Kathryn M Miller