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Etiology of childhood phobias: current status of Rachman's three pathways theory

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Abstract

Despite advances in the assessment and treatment of childhood phobias, little is known about their etiology. Rachman has proposed that phobias are acquired through three different pathways: direct conditioning, modeling or instructions/information. We evaluate the empirical support for Rachman's theory in relation to the origins of childhood phobias. Although we find support for Rachman's theory, a number of methodological and theoretical issues are emphasized. For example, insufficient attention has been given to the reliability and validity of retrospective subject reports on the acquisition of childhood phobias. Also some findings on the origins of childhood fears and phobias are more consistent with a nonassociative account of phobia onset, thus providing an interesting challenge to Rachman's theory.

Children experience many fears over the course of development. Numerous studies have documented the quantitative and qualitative changes that occur in the normal developmental fear pattern (reviews by King et al., 1988; Morris and Kratochwill, 1983). These fears are usually short-lived and not of sufficient magnitude to be problematic. On the other hand, some children exhibit fear reactions that are maladaptive, persist for a considerable period of time and cause much distress. Fears of this nature are referred to as 'clinical fears' or 'specific phobias'. Common examples of these phobias include excessive fears of animals, water, heights, thunderstorms, darkness, and medical and dental procedures. Following the tripartite model originally developed by Lang (1968, 1977), childhood fears and phobias can be conceptualized in terms of three response systems: cognitive, physiological and overt-behavioral. King et al. (1988) have documented the variety of cognitive responses (e.g.

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thoughts of being scared, self-deprecatory thoughts), physiological responses (e.g. increased heart rate and changes in respiration), and overt-behavioral responses (e.g. rigid posture, thumbsucking and avoidance) that may occur in the fearful or phobic child.

In recognition of their seriousness and stability, phobias are included in the two most widely accepted diagnostic classification systems (American Psychiatric Association, 1994; World Health Organization, 1992). For example, the fourth edition of the *Diagnostic and statistical manual of mental disorders* (DSM-IV) specifies the following criteria for 'specific' phobia: (a) marked and persistent fear that is excessive or unreasonable, cued by the presence or anticipation of a specific object or situation; (b) exposure to the phobic stimulus almost invariably provokes an immediate anxiety response or panic attack; (c) the person recognizes that the fear is excessive or unreasonable; (d) the phobic situation(s) is avoided or else endured with intense anxiety; (e) the phobia causes significant interference to functioning or there is marked distress about having the phobia; (f) in individuals under 18 yr, the duration is at least 6 months; and (g) the anxiety or phobic avoidance are not better accounted for by another disorder such as obsessive–compulsive disorder and separation anxiety disorder. In relation to developmental factors, the DSM-IV acknowledges that children may not recognize their fears as excessive or unreasonable. Thus, phobias in young children may be expressed in 'childhood' ways such as crying, tantrums, freezing or clinging. A similar definition of specific phobia (referred to as 'isolated' phobia) is given in the ICD-10.

In the past 10 years, a number of well controlled epidemiological studies have been conducted on the prevalence of phobic disorders (as well as other anxiety disorders) in community samples of children and adolescents (e.g. Anderson et al., 1987; Bird et al., 1988; Costello et al., 1993; Kashani et al., 1987; McGee et al., 1990). Estimates of specific phobia range in prevalence from 2.4 to 9.1%, and average about 5% across studies. In their excellent review of epidemiological studies, Costello and Angold (1995, p. 115) conclude that "OAD/GAD (overanxious disorder/generalized anxiety disorder), separation anxiety, and simple (i.e. specific) phobia are nearly always the most commonly diagnosed anxiety disorders, occurring in around 5% of children, while social phobia, agoraphobia, panic disorders, avoidant disorder and obsessive–compulsive disorder are rare, with prevalence rates generally below 2%". Thus, on a comparative basis, specific phobias occur with considerable frequency; moreover, they are more prevalent among girls than boys (Anderson et al., 1987; Graziano and De Giovanni, 1979). Epidemiological findings also suggest a modest level of continuity for anxiety disorders in general, as well as specific phobias in particular across intervals varying from 2 to 5 yr. In short, childhood phobias appear to be relatively stable (see Costello and Angold, 1995; Ollendick and King, 1994; Nottelmann and Jensen, 1995, for reviews).

Fortunately, childhood phobias can be successively treated via exposure-based interventions such as *in vivo* desensitization, participant modeling and contingency management procedures (see reviews by King & Ollendick, 1997; Ollendick & King, 1997). Successful intervention hinges on a careful diagnostic and behavioral assessment of the phobic child (see King et al., 1997). Despite the significant advances that have occurred in the assessment and treatment of childhood phobias, their etiology and maintenance remains a perplexing issue for therapists and researchers. Children's phobias are believed to have a complex etiology involving genetic, constitutional and environmental factors (King et al., 1988; Ollendick, Hagopian and King, 1997). Environmental-based explanations of childhood phobias are of particular interest for

this review. In this vein, Rachman has proposed an influential three-pathways theory of phobia onset. According to this theory, phobias are acquired through direct conditioning, vicarious conditioning or the transmission of information and instructions. Much research has recently investigated the validity of Rachman's theory in relation to the origins of childhood phobias. We believe that a critical review is now timely and hope that a better understanding of the determinants of childhood phobias will help in assessment and treatment, and ultimately prevention.

1. Rachman's theory of phobia acquisition

For many years childhood phobias have been explained in terms of traumatic experience and classical aversive conditioning (Eysenck and Rachman, 1965; Wolpe and Rachman, 1960; Rachman and Costello, 1961). While a full exposition of conditioning theory explanation is beyond the scope of our review, we emphasize that a conditioning theory explanation requires identification of the unconditioned stimulus (UCS), the unconditioned response (UCR), the conditioned stimulus (CS) and the conditioned response (CR). The likelihood of a conditioned fear developing is increased by confinement, by exposure to high-intensity pain and/or fear situations, and by frequent repetitions of the association between the conditioned stimulus and the pain/fear. Stimuli resembling the fear-evoking ones also acquire fearful properties, that is they become secondary conditioned stimuli. Of course, it must also be recognized that important conceptual refinements have been made to the original conditioning theory formulation of phobia onset ['preparedness' (Seligman, 1971), 'latent inhibition' (Booth et al., 1989) and 'USC inflation' (Davey, 1989)].

Laboratory demonstrations of fear induction with children are frequently cited as evidence for the conditioning theory account of childhood phobias (e.g. Jones, 1931; Watson and Rayner, 1920). In their now legendary study, Watson and Rayner succeeded in conditioning an infant ('little Albert') to fear a white rat. Prior to the experimental manipulation, the *S* had never shown fear of rats. Conditioning trials involved the repeated presentation of the rat to the *S*, together with a noxious stimulus (aversive sound arising from a steel bar being struck by a hammer). Following the conditioning trials the infant demonstrated a fear reaction on presentation of the rat. As predicted by conditioning theory, fear reactions generalized to stimuli resembling the conditional stimulus such as Watson's hair and a Santa Claus mask.

However, the laboratory demonstrations of conditioned fear reactions in children constitute fairly soft experimental evidence (Jones, 1931; Watson and Rayner, 1920). Not surprisingly these studies have been criticized in terms of the small number of *S*s involved and lack of experimental rigour (cf. Rachman, 1990). Moreover, attempts to replicate these earlier studies have proven to be largely unsuccessful (English, 1929; Bregman, 1934). Another criticism of conditioning theory has been its concentration on conditioned phenomena in the physiological and behavioral dimensions while virtually ignoring self-reported fear (see Thorpe and Salkovskis, 1997). Overall though, the greatest limitation of conditioning theory is that this theory alone cannot account for the observation that not all children who have traumatic experiences subsequently become phobic (e.g. Herbert, 1994; Milne, 1977) and that not all children with

phobias or their parents can remember an unpleasant experience with the phobic object or situation (Rabbit and Parrish, 1991; Waye, 1979).

We now realize that nontraumatic learning experiences can play a pivotal role in the etiology of childhood phobias. Given the efficacy of modeling as a therapeutic procedure, Rachman (1977, 1978) suggests that vicarious conditioning is probably an important factor in phobia acquisition. Similarly, Rachman (1977) posits that negative information and instructions from parents and family members are also likely to be influential in phobia acquisition:

> Although I am unaware of any conventionally acceptable evidence that fear can be acquired through the transmission of information (and particularly, by instruction), it seems to be undeniable. Information-giving is an inherent part of child-rearing and is carried on by parents and peers in an almost unceasing fashion, particularly in the child's earliest years. It is probable that informational and instructional processes provide the basis for most of our commonly encountered fears of everyday life. Fears acquired informationally are more likely to be mild than severe. Like the acquisition of fear by vicarious experience, informational and instructional processes have no difficulty in coping with the fact that people display fears of situations and objects which they have never encountered. Acceptance of the notion that fears can be acquired by informational processes, also enables us to explain some but by no means all of the failures to acquire fear in situations where it might, on the conditioning theory, have been expected to arise. Not only do we learn by information and instruction which situations to fear, we also learn to distinguish those situations and objects which are not dangerous and therefore not to be feared. We also learn and are taught to cope with dangers and to endure the accompanying discomfort of pain. (Rachman, 1977, p. 384)

Importantly, many clinical reports are suggestive of the potency of modeling and negative information in the development of childhood phobias (for example, see Danquah, 1974; Waye, 1979). While we should be careful in extrapolating from animal studies to humans, some research findings on the fears of rhesus monkeys are of particular interest. In comparing wild-reared and laboratory-reared rhesus monkeys on fear of snakes, Joslin and colleagues found that only the wild-reared monkeys consistently exhibited a strong fear of snakes (Joslin et al., 1964). The researchers suggested that these monkeys had probably learned their fear of snakes when in the wild from watching other monkeys (observational conditioning). A number of controlled laboratory studies subsequently confirmed that rhesus monkeys can indeed acquire a fear of snakes as a result of watching other monkeys reacting fearfully to real or toy snakes (e.g. Cook and Mineka, 1989; Mineka et al., 1984). Clearly a more comprehensive theory of childhood phobias is required than afforded by classical aversive conditioning alone.

Recognizing the limitations of traditional conditioning theory and likelihood of indirect pathways in phobia acquisition, Rachman (1976, 1977, 1978) proposes that there are three distinct pathways in phobia acquisition: direct conditioning (e.g. child being attacked by a dog), vicarious conditioning (e.g. child observing fearful nighttime behavior of older siblings), and instruction/information (e.g. child hearing stories and jokes about dentists). In outlining his theory of phobia acquisition, Rachman (1978) also put forward the following hypotheses on the relationship of the three pathways to the various components of phobic reactions. First, "in fears acquired by a conditioning process... the components that will be most prominent are the psychophysiological and behavioral" (p. 198). Second, "where fears have been transmitted indirectly (vicariously or informationally) we might expect the subjective aspect to

be predominant'' (p. 198). Further, Rachman speculated that ''fears acquired informationally are more likely to be mild than severe'' (p. 194). Rachman's three pathways theory has also been used as a guide in the selection of treatment strategies. For example, directly conditioned anxiety and avoidance behavior are thought to be appropriate for desensitization, flooding or other deconditioning procedures. On the other hand, phobias acquired through the indirect pathways are seen as being more appropriate for modeling and cognitive restructuring. Clearly Rachman has offered a comprehensive and far reaching theoretical account of childhood phobias.

2. Review of retrospective studies on the origins of childhood fears and phobias

Recently, a number of retrospective studies have attempted to empirically evaluate Rachman's three pathways theory in the acquisition of childhood fears and phobias. We have identified seven studies of interest in this review (Doogan and Thomas, 1992; Graham and Gaffan, 1997; King et al., 1997; Menzies and Clarke, 1993; Merckelbach et al., 1996; Muris et al., in press; Ollendick and King, 1991). As shown in Table 1, the studies vary considerably in terms of their sociodemographic characteristics (age and gender) and the identified fear or phobia. While four studies focus on a specific phobia such as spider phobia, dog phobia or water phobia, two studies examined the pathways of fear acquisition for the more common childhood fears, such as fear of nuclear war, fear of not being able to breath and fear of being hit by a car or truck. Interviews or questionnaires were the chief means of obtaining information about the origins of the fears or phobias from the child or caregiver. In their examination of the origins of childhood fears and phobias, most studies are confined to Rachman's three pathways theory. More recently, however, several studies have also examined the origins of childhood phobias from a Darwinian nonassociative perspective. According to this theory, children who have undergone normal maturational development will show fear or excitation on their first contact with evolutionary relevant stimuli regardless of their associative learning experiences (Menzies and Clarke, 1993).

In the first of these investigations, Ollendick and King (1991) explored Rachman's three pathways of fear acquisition in 1092 Australian and American children between 9 and 14 yr of age. In response to 10 commonly reported fears in children (Ollendick et al., 1989), the youths were asked to indicate on a self-report questionnaire their own level of fear and then whether: (1) they remembered having a bad or frightening experience with the feared object (direct conditioning experience), (2) their parents, friends or other acquaintances ever showed fear or avoidance of the feared object (vicarious conditioning), and (3) they had been told, or heard stories about, frightening things regarding the feared object from either parents, teachers, friends, or other acquaintances (instruction or information pathway). Results indicated that the majority of the children attributed the onset of their fears to vicarious and instructional factors (56 and 39%, respectively), rather than to direct conditioning events (37%). For a minority of children and adolescents, these indirect sources alone were sufficient to evoke high levels of fear. More commonly, however, and depending on the specific fear, it was necessary for both of these indirect sources of fear to be present or for them to be combined with direct conditioning experiences. Overall, findings suggest that the

Table 1
Summary of research findings on the origins of childhood fears and phobias

Author	Phobia	Sample	Method of investigation	Phobic origins	
Doogan and Thomas (1992)	Fear of dogs	30 children 15 boys 15 girls 8 and 9 yr	Child interview and questionnaire	At least one painful/ frightening encounter with a dog	91.0%
				Father dislikes dogs	73.0%
				Distressed by media reports of dog attacks	82.0%
				Above are examples of findings for high fear group (n = 11)	
Graham and Gaffan (1997)	Fear of water	36 children 5–8 yr	Parent-completed questionnaire	Direct conditioning	0.0%
				Vicarious conditioning	0.0%
				Fear present at first contact	78.0%
				No explanation	22.0%
				Above data for 'children with current fear' (n = 9)	
King et al. (1997)	Dog phobia	30 children 14 boys 16 girls 1–12 yr	Parent-completed questionnaire	Direct conditioning	27.0%
				Vicarious conditioning	53.0%
				Information	7.0%
				No explanation	13.0%
Menzies and Clarke (1993)	Water phobia	50 children 20 boys 30 girls Mean age: 5.5 yr	Parent-completed questionnaire	Direct conditioning	2.0%
				Vicarious conditioning	26.0%
				Information	0.0%
				Always been this way	56.0%
				No explanation	16.0%
Merckelbach et al. (1996)	Spider phobia	22 girls 9–14 yr	Child and parent interviews using adaptation of Phobic Origins Questionnaire	Direct conditioning	41.0%
				Modeling mother	14.0%
				Modeling father	5.0%
				Modeling others	0.0%
				Information	5.0%
				Always been afraid	46.0%
				Above data derived from child reports	
Muris *et al.* (in press)	Ten common fears	129 children 74 boys 55 girls 9–13 yr	Standard interview with child	Direct conditioning	61.0%
				Vicarious conditioning	50.0%
				Information	88.0%
				Above data for the most "liberal" classification	
Ollendick and King (1991)	Ten common fears	1092 children 553 boys 556 girls 9–14 yr	Self-report questionnaire	Direct conditioning	37.0%
				Vicarious conditioning	56.0%
				Information	39.0%

Note: One study reports data on phobic origins for both children and adults. Data on adult phobics are excluded from the table. In several studies *S*s were classified into more than one category of onset. Thus, totals within studies may exceed 100%.

three pathways of fear may not be independent but, rather, interactive. Effects for gender, age and nationality were also examined. Boys and preadolescents were found to report more direct and vicarious experiences than girls or adolescents. Effects due to nationality were minimal (not surprising in view of the similarity in cultural experiences across the two countries). Overall, findings supported Rachman's three pathways theory of fear acquisition.

Another study on the origins of common childhood fears has been reported by researchers from the Netherlands (Muris et al., in press). In this investigation, children were asked not only whether they had ever had conditioning, modeling and/or information experiences in connection with their fear, but also to what extent such experiences had played a role in the actual onset of their fears. The vast majority of children reported that they had heard frightening things about their most feared stimulus or situation (88%), while comparatively fewer children endorsed modeling and direct conditioning experiences (50 and 61%, respectively). However, more conservative results were obtained when children were asked to what extent their experiences marked the onset of their fear. For example, 40% ascribed the actual onset of their fear to a direct conditioning experience (27 and 1% reported information and modeling pathways, respectively; not able to identify a pathway—33%). Clearly the reports of children about the origins of their fears are dependent on the way in which questions are phrased. Even with this caveat though, the findings of the study support Rachman's three pathways theory.

Two studies have explored Rachman's theory of fear acquisition with dog phobic children (Doogan and Thomas, 1992; King et al., 1997). In the Doogan and Thomas study 30 children (15 boys, 15 girls) were recruited in a school setting. On the basis of their self-ratings of level of fear towards strange dogs, 11 children were classified as 'high fear' while 10 were classified as 'low fear'. Children were questioned individually about their experiences concerning dogs. Although there were no significant differences between the low and high fear groups in relation to reports of being bitten or chased by a dog, significantly more high fear *S*s reported other kinds of frightening experiences such as a dog jumping up (direct conditioning). There were no significant differences between the two groups in relation to parent dislike of dogs or observing fear in others (modeling). Significantly more high fear *S*s reported being distressed by media stories of dog attacks and being warned about dogs by parents (information/instruction).

In their investigation, King et al. (1997) surveyed the parents of 30 dog-phobic children (16 girls, 14 boys). The families were on a waiting list at a university-based phobia clinic. In the survey, parents were presented with a number of alternatives drawn from Rachman's theory that might explain the origins of their child's dog phobia. The parents were required to endorse the most likely option. Results showed that nearly all parents attributed their child's dog phobia to one of the three fear pathways. A few of the parents believed direct conditioning events such as being attacked by a dog to be the major factor in the acquisition of their child's dog phobia ($n = 8$, 27%). However, a majority of parents endorsed modeling to be the most important influence ($n = 16$, 53%). Interestingly, many parent themselves reported being afraid of dogs since childhood and to still be 'nervous' around dogs. Very few of the parents endorsed instructions/information as the major pathway ($n = 2$, 7%). The latter finding suggests that transmission of information is not as powerful in the development of clinical

phobias as it may be for the more common developmental fears experienced by children (cf. Muris et al., in press; Ollendick and King, 1991). In only a few cases were the origins of dog phobia unknown to the parents ($n = 4$, 13%). Gender and age did not have a significant influence on the findings. Again the findings of the study were consistent with Rachman's three pathways theory of phobia onset.

Reflecting the increasing popularity of the Darwinian nonassociative theory of phobia acquisition, several researchers have broadened their investigation of the etiology of childhood phobias. According to the nonassociative account, "given maturational processes and normal background experiences, most members of the species will show fear to a set of evolutionary-relevant stimuli on their *first* encounter" (Menzies and Clarke, 1993, p. 500). It is further proposed that this initial fearful response will typically diminish across time due to repeated, non-traumatic exposure to the feared object or situation (i.e. habituation). On the other hand, poor habituators and those who do not get the opportunity for safe exposure will remain fearful of such stimuli from their first encounter, often appearing for treatment at a later age (Clarke and Jackson, 1983). In light of recent advances in this nonassociative theory, we now review studies that allow for the possibility of both nonassociative and associative learning accounts of phobia onset in children.

Results of two recent studies on the origins of water phobia are particularly challenging for Rachman's theory (Graham and Gaffan, 1997; Menzies and Clarke, 1993). In the Menzies and Clarke study, parents of 50 water-phobic children completed a questionnaire on the origins of their child's phobia. The majority of parents (56%) believed that their child's phobia had been present from the very first contact with water in the absence of any associative learning—a finding that supports a nonassociative perspective of phobia onset. In relation to Rachman's theory, a substantial proportion of parents (26%) did report vicarious conditioning episodes as the most influential factor. However, only 2% of parents attributed their child's phobia onset to a direct Pavlovian conditioning episode. Moreover, none of the parents believed information/instruction to be the most influential factor. In an investigation of a smaller sample of children with 'current' water fears ($n = 9$), Graham and Gaffan found that an even higher proportion of parents (78%) believed their child's fear had always been present. None of the parents attributed fear onset directly to any of the three pathways as proposed by Rachman. Clearly, the findings of these two studies are more supportive of the nonassociative account of water phobia onset.

In the investigation by Merckelbach et al. (1996), 22 children with spider phobia were interviewed about the origins of their fear. All children met DSM-III-R criteria for simple phobia (animal type) as determined by a structured diagnostic interview schedule. A revised and extended version of the Phobic Origins Questionnaire (POQ; Öst and Hugdahl, 1981) was followed in the interviews with the children about phobia onset. In response to the criticism that the POQ is biased in favour of Rachman's theory, the interview with the POQ was expanded and included a "have always been afraid" option. To evaluate the reliability of information provided by the children, parents were interviewed separately about the origins of their child's spider phobia. While 46% of the children claimed to have always been afraid, 41% did ascribe the onset of their fear to direct conditioning events. Modeling and the transmission of negative information were endorsed less frequently as factors responsible for fear onset: modeling mother (14%), modeling father

(5%), modeling others (0%) and negative information (5%). Parent reports tended to parallel those of their children and satisfactory agreement was found between child and parent reports. Overall, findings of the study support both nonassociative and associative accounts of spider phobia onset in children.

3. Methodological and theoretical issues

Before drawing any conclusions about the empirical status of Rachman's three pathways theory, we should emphasize several important methodological problems about the research investigations (see also Menzies and Clark, 1994). First, the definitions or descriptions of three pathways that are presented to the child or parents are usually an oversimplification of the parameters involved in the conditioning or learning paradigms. For example, endorsing a report of a traumatic event is taken as prima facie evidence of classical aversive conditioning. The essential ingredients of a Pavlovian conditioning procedure are typically not identified (e.g. presence of an independent UCS, pairing of the CS and UCS, prior affective neutrality of the CS; for further discussions see Menzies and Clarke, 1993, 1994. Thus, a challenge for future research will be to probe children and parents for more details about their experiences within each of the three pathways in order to establish 'closeness of fit' with conditioning/learning paradigms (cf. Merckelbach et al., 1996).

Second, the studies require children and/or parents to provide *retrospective* accounts of the origins of the phobia. As retrospective reports they are subject to memory bias or forgetfulness about crucial events. However, few studies reviewed examined their reliability and validity. A useful starting point for future research would be to examine test–retest reliability, and the concordance between child and parent reports as regards the three pathways of phobia acquisition. As noted in our review, Merckelbach et al. (1996) did find strong agreement between child and parent reports about events surrounding the onset of spider phobia when using an adaptation of the Phobic Origins Questionnaire (Öst and Hugdahl, 1981). However, this is the only investigation for the moment to have considered such issues.

Third, the studies usually involve serious design limitations. In general, researchers have not included a comparison group of normal or nonfearful children in order to establish the etiological significance of child or caregiver reported events. This is an important issue since it has emerged that non fearful individuals often have similar painful or frightening experiences without subsequently developing a phobia. For example, Di Nardo et al. (1988) found that histories of painful and/or frightening encounters with dogs were equally often reported by adult *S*s with low- and high-fear of dogs respectively. As noted in our review, Doogan and Thomas (1992) formed high and low fear groups in their study of the origins of dog fear in children. Interestingly, there were no significant differences in the frequency with which high and low fear children reported being bitten or chased by a dog. However, the high fear group reported more frightening experiences with dogs (direct conditioning). Overall, this controlled investigation yielded limited support for Rachman's theory although it must be emphasized that the study involved low numbers of high fear and low fear children (11 and 10, respectively). Nonetheless, future research should involve appropriate control comparisons.

Lastly, when investigating origins of clinical phobias in children it would seem imperative that diagnostic screening be undertaken in order to confirm that children meet DSM or ICD criteria for specific phobia. To date only one study of the origins of clinically phobic children has involved a diagnostic evaluation (Merckelbach et al., 1996). Of the many structured diagnostic interview schedules that are now available, we recommend the Anxiety Disorders Interview Schedule for DSM-IV Child Version (Silverman and Albano, 1996). The interview schedule has a diagnostic section on specific phobias. Separate interview schedules have been developed for children and parents. Discussions of the instruments' reliability and validity can be found in other sources (e.g. King et al., 1997; Silverman, 1994).

Notwithstanding these methodological shortcomings, our review found empirical support for Rachman's three pathways theory. In general, studies show that the onset of childhood fears and phobias involve reported events or experiences that are consistent with the three pathways: direct conditioning, vicarious conditioning and instruction/information (King et al., 1997; Merckelbach et al., 1996; Ollendick and King, 1991). Also, it appears that more than one pathway is typically involved in the acquisition of childhood fears and phobias (Ollendick and King, 1991) However, it cannot be assumed that the three pathways theory accounts for the acquisition of *all* childhood fears and phobias. In some instances, it appears that the fears and phobias have always been present, thus suggesting the possibility of a nonassociative onset. Studies of water-phobic children found a nonassociative onset for the majority of children, with few children experiencing direct/indirect conditioning events (Graham and Gaffan, 1997; Menzies and Clark, 1993). Compared to research findings on the onset of animal (i.e. dogs and spiders) phobias in children (Doogan and Thomas, 1992; King et al., 1997; Merckelbach et al., 1996), it would appear that water phobias may not require an associative learning mechanism and may be easily triggered by exposure to water-related stimuli. Interestingly, water fears have held the fascination of various authorities dating back to the nineteenth century. In 1897, Stanley Hall suggested that the first experience with water may excite fear (Marks, 1987; Menzies, 1997). Clearly this kind of excitation is of enormous evolutionary significance. Whether or not water phobia represent a 'special case' in our etiological formulations is a matter for further research.

4. Conclusions

Since the latter part of the nineteenth century, the etiology of childhood phobias has been a perplexing issue for researchers and therapists. Children's phobias are probably due to a complex interaction of genetic, constitutional and environmental factors. From a behavioural perspective, early theoretical explanations were confined to direct conditioning (i.e. classical aversive conditioning). However, it eventually became apparent that childhood phobias can be acquired in indirect ways as well thus calling for a more comprehensive theory of phobia onset. Rachman (1977) proposed that there are three pathways to phobia acquisition: direct conditioning, vicarious conditioning and information/instructions. Rachman's theory has sparked a considerable amount of research on the origins of childhood fears and phobias. Studies involving retrospective child or parent reports have attempted to ascertain the role of direct conditioning, vicarious conditioning and information/instruction experiences in phobia

onset. Our review found empirical support for Rachman's three pathways theory in relation to the origins of common childhood fears as well as some clinical phobias of childhood. Contrary to Rachman's theory, however, we noted reports of phobic children who 'have always been afraid' with no evidence of direct conditioning or the indirect pathways of phobia acquisition. More consistent with a nonassociative account of phobia onset, such findings provide an interesting challenge to Rachman's theory. While Rachman's three pathways theory has proven to be a useful heuristic device, further research is required on the etiology of childhood phobias attendant to the kind of methodological and theoretical issues raised in this review. Ideally, we need a prospective, longitudinal study of a large cohort of children in order to identify the crucial processes and influences responsible for the development of childhood fears and phobias. Such an investigation would constitute a far more stringent scientific evaluation of Rachman's theory.

References

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders*. 4th edn. Washington, DC: Author.

Anderson, J. C., Williams, S., McGee, R., & Silva, P. A. (1987). DSM-III disorders in preadolescent children. *Archives of General Psychiatry, 44,* 69–76.

Bird, H. R., Canion, G., Rubio-Stipes, M., Gould, M. S., Ribera, J., Sesman, M., Woodbury, M., Heurtas-Goldman, S., Pagan, A., Sanches-Lacey, A., Moscoso, M. (1988). Estimates of the prevalence of childhood maladjustment in a community survey in Puerto Rico. *Archives of General Psychiatry, 45,* 1120–1126.

Booth, M. L., Siddle, D. A. T., & Bond, N. W. (1989). Effects of conditioned fear-relevance and preexposure on expectancy and electrodermal measures of human Pavlovian conditioning. *Psychophysiology, 26,* 281–291.

Bregman, E. O. (1934). An attempt to modify the emotional attitudes of infants by the conditioned response technique. *Journal of Genetic Psychology, 45,* 169–198.

Clark, J. C., & Jackson, J. A. (1983). *Hypnosis and behavior therapy: The treatment of anxiety and phobias*. New York: Springer.

Cook, M., & Mineka, S. (1989). Observational conditioning of fear to fear-relevant versus fear-irrelevant stimuli in rhesus monkeys. *Journal of Abnormal Psychology, 98,* 448–459.

Costello, E. G., & Angold, A. (1995). Epidemiology. In J. S. March (Ed.), *Anxiety disorders in children and adolescents*, (pp. 109–122). New York: Guilford Press.

Costello, E. J., Stouthamer-Loeber, M., & De Rosier, M. (1993). *Continuity and change in psychopathology from childhood to adolescence*. Paper presented at the Annual Meeting of the Society for Research in Child and Adolescent Psychopathology, Sante Fe.

Danquah, S. J. (1974). The treatment of monosymptomatic phobia by systematic desensitization. *Psychopathologic Africaine, 10,* 115–120.

Davey, G. C. L. (1989). UCS revaluation and conditioning models of acquired fears. *Behaviour Research and Therapy, 27,* 521–528.

Di Nardo, P. A., Guzy, L. T., Jenkins, J. A., Bak, R. M., Tomasi, S. F., & Copland, M. (1988). Etiology and maintenance of dog fears. *Behaviour Research and Therapy, 26,* 241–244.

Doogan, S., & Thomas, G. V. (1992). Origins of fear of dogs in adults and children: The role of conditioning processes and prior familiarity with dogs. *Behaviour Research and Therapy, 30,* 387–394.

English, H. B. (1929). Three cases of the "conditional fear response". *Journal of Abnormal and Social Psychology, 24,* 221–225.

Eysenck, H. J., & Rachman, S. (1965). *The causes and cures of neurosis*. London: Routledge.

Graham, J., & Gaffan, E. A. (1997). Fear of water in children and adults: Etiology and familial effects. *Behaviour Research and Therapy, 35,* 91–108.

Graziano, A. M., & De Giovanni, I. S. (1979). The clinical significance of childhood phobias: A note on the proportion of child-clinical referrals for the treatment of children's fears. *Behaviour Research and Therapy, 17,* 108–112.

Herbert, M. (1994). Etiology considerations. In T. H. Ollendick, N. J. King & W. Yule (Ed.), *International handbook of phobic and anxiety disorders in children and adolescents*, (pp. 3–20). New York: Plenum Press.

Jones, H. E. (1931). The conditioning of overt emotional responses. *Journal of Educational Psychology, 22,* 127–130.

Joslin, J., Fletcher, H., & Emlen, J. (1964). A comparison of the responses to snakes of lab- and wild-reared rhesus monkeys. *Animal Behavior, 12,* 348–352.

Kashani, J. H., Beck, N. C., Hoeper, E. W., Fallahi, C., Corcoran, C. M., McAllister, J. A., Rosenberg, T. K., & Reid, J. C. (1987). Psychiatric disorders in a community sample of adolescents. *American Journal of Psychiatry, 144,* 584–549.

King, N. J., Clowes-Hollins, V., & Ollendick, T. H. (1997). The etiology of childhood dog phobia. *Behaviour Research and Therapy, 35,* 77.

King, N. J., Hamilton, D. I., & Ollendick, T. H. (1988). *Children's phobias: A behavioural perspective*. Chichester, England: Wiley.

King, N. J., & Ollendick, T. H. (1997). Annotation. Treatment of childhood phobias. *Journal of Child Psychology and Psychiatry, 38,* 389–400.

King, N. J., Ollendick, T. H., & Murphy, G. C. (1997). Assessment of childhood phobias. *Clinical Psychology Review, 17,* 667–687.

Lang, P. J. (1968). Fear reduction and fear behavior: Problems in treating a construct. In J. M. Shliem (Ed.), *Research in psychotherapy*. Washington, DC: American Psychological Association.

Lang, P. J. (). Fear imagery: An information processing analysis. *Behavior Therapy, 8,* 862–886.

Marks, I. M. (1987). *Fears, phobias and rituals. Panic, anxiety and their disorders.* New York: Oxford University Press.

McGee, R., Feehan, M., Williams, S., Partridge, F., Silva, P. A., & Kelly, J. (1990). DSM-III disorders in a large sample of adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry, 29,* 611–619.

Menzies, R. (1997). Water phobia. In G. L. C. Davey (Ed.), *Phobias. A handbook of theory, research and treatment*, (pp. 129–127). Chichester: Wiley.

Menzies, R. G., & Clarke, J. C. (1993). The etiology of childhood water phobia. *Behaviour Research and Therapy, 31,* 499–501.

Menzies, R. G., & Clarke, J. C. (1994). Retrospective studies of the origins of phobias: A review. *Anxiety Stress and Coping, 7,* 305–318.

Merckelbach, H., Muris, P., & Schouten, E. (1996). Pathways to fear in spider phobic children. *Behaviour Research and Therapy, 34,* 935–938.

Milne, G. (1977). Cyclone Tracy: II. The effects on Darwin children. *Australian Psychologist, 12,* 55–62.

Mineka, S., Davidson, M., Cook, M., & Keir, R. (1984). Observational conditioning of snake fear in rhesus monkeys. *Journal of Abnormal Psychology, 93,* 355–372.

Morris, R. J., & Kratochwill, T. R. (1983). *Treating children's fears and phobias: A behavioral approach.* New York: Pergamon Press.

Muris, P., Merckelbach, H., & Collaris, R. (in). Common childhood phobias and their origins. *Behaviour Research and Therapy, press,* .

Nottelmann, E. D., & Jensen, P. S. (1995). Comorbidity of disorders in children and adolescents: Developmental perspectives. In T. H. Ollendick & R. J. Prinz (Ed.), *Advances in clinical child psychology*, (Vol. 17, pp. 109–155). New York: Plenum Press.

Ollendick, T. H., Hagopian, L. P., & King, N. J. (1997). Specific phobias in children. In G. L. C. Davey (Ed.), *Phobias. A handbook of theory, research and treatment*, (pp. 201–225). Chichester: Wiley.

Ollendick, T. H., & King, N. J. (1991). Origins of childhood fears: An evaluation of Rachman's theory of fear acquisition. *Behaviour Research and Therapy, 29,* 117–123.

Ollendick, T. H., & King, N. J. (1994). Diagnosis, assessment and treatment of internalizing problems in children: The role of longitudinal data. *Journal of Consulting and Clinical Psychology, 62,* 918–927.

Ollendick, T. H., & King, N. J. (in press). *Empirically supported treatments for children with phobic and anxiety disorders: Current status.* Journal of Clinical Child Psychology.

Ollendick, T. H., King, N. J., & Frary, R. B. (1989). Fears in children and adolescents: Reliability and generalizability across gender, age, and nationality. *Behaviour Research and Therapy, 27,* 19–26.

Öst, L-G., & Hugdahl, K. (1981). Acquisition of phobias and anxiety response patterns in clinical patients. *Behaviour Research and Therapy, 19,* 439–447.

Rabbit, R. L., & Parrish, J. M. (1991). Phone phobia, phact or phantasy?An operant approach to a child's disruptive behavior induced by telephone usage. *Journal of Behavior Therapy and Experimental Psychiatry, 22,* 122–129.

Rachman, S. (1976). The passing of the two-stage theory of fear and avoidance fresh possibilities. *Behaviour Research and Therapy, 14,* 125–134.

Rachman, S. (1977). The conditioning theory of fear acquisition: A critical examination. *Behaviour Research and Therapy, 15,* 375–387.

Rachman, S. (1978). *Fear and courage.* San Francisco: Freeman.

Rachman, S. (1990). The determinants and treatment of simple phobias. *Advances in Behaviour Research and Therapy, 12,* 1–30.

Rachman, S., & Costello, C. G. (1961). The aetiology and treatment of children's phobias: A review. *American Journal of Psychiatry, 118,* 97–105.

Seligman, M. E. P. (1971). Phobias and preparedness. *Behavior Therapy, 2,* 307–320.

Silverman, W. K. (1994). Structured diagnostic interviews. In T. H. Ollendick, N. J. King & W. Yule (Ed.), *International handbook of phobia and anxiety disorders in children and adolescents*, (pp. 293–315). New York: Plenum Press.

Silverman, W. K., & Albano, A. M. (1996). *Anxiety Disorders Interview Schedule for DSM-IV. Child Version.*. San Antonio: The Psychological Corporation.

Thorpe, S. J., & Salkovskis, P. M. (1997). Animal phobias. In G. C. L. Davey (Ed.), *Phobias. A handbook of theory, research and treatment*, (pp. 81–105). Chichester: Wiley.

Watson, J. B., & Rayner, R. (1920). Conditioned emotional reactions. *Journal of Experimental Psychology, 3,* 10–14.

Waye, M. F. (1979). Behavioral treatment of a child displaying comic-book mediated fear of a shrinking hand: A case study. *Journal of Pediatric Psychology, 4,* 43–47.

Wolpe, J., & Rachman, S. (1960). Psychoanalytic 'evidence': a critique based on Freud's case of Little Hans. *Journal of Nervous and Mental Diseases, 131,* 135–148.

World Health Organization (1992). *International classification of mental and behavioral disorders, clinical descriptions and diagnostic guidelines* (10th ed.). Geneva: Author.