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Environmental transmission of generalized anxiety disorder from parents to children: worries, experiential avoidance, and intolerance of uncertainty

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Generalized anxiety disorder (GAD) runs in families. Building on recent theoretical approaches, this review focuses on potential environmental pathways for parent-to-child transmission of GAD. First, we address child acquisition of a generalized pattern of fearful/anxious and avoidant responding to potential threat from parents via verbal information and via modeling. Next, we address how parenting behaviors may contribute to maintenance of fearful/anxious and avoidant reactions in children. Finally, we consider intergenerational transmission of worries as a way of coping with experiential avoidance of strong negative emotions and with intolerance of uncertainty. We conclude that parents with GAD may bias their children's processing of potential threats in the environment by conveying the message that the world is not safe, that uncertainty is intolerable, that strong emotions should be avoided, and that worry helps to cope with uncertainty, thereby transmitting cognitive styles that characterize GAD. Our review highlights the need for research on specific pathways for parent-to-child transmission of GAD.

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Defined by excessive levels of anxiety and worry,¹ generalized anxiety disorder (GAD) is a common and debilitating disorder among adolescents and adults.²⁻⁶ Lifetime prevalence ranges from 2% to 6%,^{4,6} and onset occurs between the late teens and twenties.^{7,8} Early-onset forms run a chronic course and are resistant to treatment.^{8,9}

Like other anxiety disorders, GAD runs in families.^{10,11} Its presence in first-degree relatives predicts a twofold increase in the prevalence of anxiety/internalizing disorder and a five- to sixfold increase in the prevalence of GAD in other family members, suggesting some specificity in familial loading.¹¹ Genetic heritage from GAD parents, namely, a general disposition toward affective psychopathology, accounts for a significant but moderate (0.30 to 0.38) part of the variance in

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the overlap in GAD between parents and children.^{10,12,13} Environmental influences should explain the remaining variance and the observed specificity of GAD transmission.¹¹

This review focuses on the environmental transmission of GAD from parents to children. In contrast to adulthood years, where a stronger effect for nonshared than shared environment^{14,15} was observed, in childhood years, a more pronounced contribution of shared environment to GAD was shown.^{16,17} However, like other anxiety disorders, neither genetic dispositions nor shared/nonshared environmental components solely determine GAD in children.^{16,17} As stressed by theoretical accounts of anxiety, it is the multiple interactions between risk and resilience factors at the genetic and environmental levels that determine the final adaptation in children.¹⁸⁻²¹ Thus, environmental influences related to having a GAD parent are one of the many risk factors that probabilistically determine childhood GAD together with other risk or resilience-promoting aspects of the child and environment.

A better understanding of parent-to-child transmission of GAD is essential for devising effective strategies to prevent anxiety in children of GAD parents and for the treatment of children who meet GAD criteria. Considering the high prevalence,²⁻⁶ the chronic and debilitating course of GAD,^{8,9} and its economic burden to society,²² efforts to reduce intergenerational transmission in families where one or both parents have GAD are highly valuable.

What distinguishes GAD from other anxiety disorders is not only the “generalized” nature of anxiety (eg, social, separation, somatic, performance, environmental threats, future), but also the specific way it is expressed via excessive worry due to anticipation of possible future threats.^{23,24} The current review addresses both of these features. We first focus on the transmission of high levels of nonspecific trait anxiety from GAD parents via modeling, verbal transfer of anxiety, and parenting. More specifically, we address verbal and nonverbal pathways for a child’s learning of fear/anxiety from parents in addition to parenting behaviors that may serve to maintain a child’s fear/anxiety and avoidance. These three potential pathways for parent-to-child transmission of anxiety have been tested over a range of anxiety domains, but not yet investigated in GAD transmission. We therefore refer to these pathways as nonspecific (to GAD). We then address the second distinguishing

feature of GAD, namely excessive worry and its intergenerational transmission. In regard to specific GAD transmission, we discuss children’s learning of worrying from parents as a way of coping with high intolerance of uncertainty and experiential avoidance.

Nonspecific pathways in the parent-to-child transmission of anxiety

Verbal and nonverbal pathways for parent-to-child transmission of fear/anxiety and avoidance

Theoretical accounts on environmental transmission of fear/anxiety from parents to children have been largely conceptualized within the framework of fear acquisition models and social-learning theory.²⁵⁻²⁷ Fears can be acquired indirectly from others via nonverbal and verbal transmission pathways. As GAD parents are, by definition, more likely to experience and express excessive anxiety to potentially threatening stimuli in daily life, verbal and nonverbal pathways for fear acquisition provide a useful framework to understand the environmental transmission of GAD from parents to children in daily interactions.

Nonverbal pathways for parent-to-child transmission of fear/anxiety and avoidance

Nonverbal fear acquisition involves learning from observation of others’ reactions to ambiguous stimuli²⁸ (also referred to as vicarious/observational learning or modeling) and has been demonstrated as early as the end of the first year of life.²⁹⁻³⁴ This early form of modeling, also known as social referencing (SR), refers to infants’ use of others’ reactions in response to novel stimuli to determine their own reactions to those stimuli.

SR studies explored the effect of parental fear/anxiety expressions on infants’ reactions to ambiguous stimuli (most often strangers, ambiguous toys, or a visual cliff) to shed light on early nonverbal transmission of fear/anxiety and avoidance in typical development. de Rosnay and colleagues compared the effect of maternal anxious (trained) versus nonanxious signals to strangers in a SR paradigm.³⁰ In this paradigm, a stranger engages the parent in an interaction while the child observes the interaction. Next, the stranger gradually approaches the infant and picks him/her up. Temperamentally inhibited infants who witnessed their mothers react in an

anxious (vs nonanxious) way to strangers were found to be more fearful and avoidant during their subsequent interaction with strangers. In their famous visual cliff experiment, Sorce and colleagues demonstrated that none of the infants dared to cross to the deep end of a visual cliff when parents expressed fear in this situation, whereas most children crossed following their parents' happy facial expressions.³⁵ Rosen and colleagues showed that infants are less eager to interact with novel toys when their parents react with fear (vs joy).³⁶ Taken together, evidence supports a causal effect of parental anxious/fearful signals on child acquisition of fear/anxiety and avoidance of ambiguity, across the domains of social and situational anxiety in typical development at the end of the first year.

From toddlerhood onwards, relatively less is known on observational learning of fear and avoidance of ambiguity from parents. Gerull and Rapee compared toddlers' reactions to fear-relevant objects (a rubber snake and spider) when mothers expressed negative (fear-disgust) versus positive (happy-encouraging) emotions.³⁷ Toddlers showed more fear and avoidance of toys paired with the maternal negative emotions. Dubi and colleagues replicated this finding, also showing that child temperament does not moderate the influence of maternal verbal threat expressions on a child's behavior.³⁸ Dunne and Askew³⁹ investigated modeling of fear of unknown animals in an experimental paradigm where 6- to 10-year-olds were presented with pictures of maternal happy (vs fearful) facial expressions paired with novel animals. Children reported stronger fear of novel animals that were paired with the mother's fearful (vs happy) face. In a study investigating observational learning of panic-relevant escape and avoidance from parents, Bunaciu and colleagues used an experimental paradigm where 12-year-old female adolescents observed their parent performing a hyperventilation exercise.⁴⁰ In one condition, the parent completed the exercise; in the other, he/she modeled escape by discontinuing it. The findings revealed that participants who watched their parents quit the exercise themselves quit the hyperventilation exercise earlier. To summarize, the available evidence from community samples in infancy and childhood years reveal a causal influence of parental fearful and avoidant signals in the acquisition of fear, anxiety, and avoidance across the domains of situational and physical anxiety.

Murray and colleagues proposed that the emergence of SR and stranger anxiety at the end of infancy may mark a sensitive period for the parent-to-child transmission of social anxiety.³¹ In a longitudinal comparison between infants of parents with versus without social anxiety disorder (SAD) in the stranger SR paradigm, they demonstrated that temperamentally inhibited children of socially anxious mothers become increasingly avoidant of strangers from 10 to 14 months, possibly as a result of exposure to parental expressions of anxiety. In a later replication and extension of this paradigm, Aktar and colleagues tested this direct link between parental expressions of anxiety and children's fear/avoidance in a longitudinal design.²⁹ Similar to earlier evidence,^{30,31} direct links were found between more expressed anxiety in parents and more avoidance of novel stimuli in temperamentally inhibited children across social (a stranger) and nonsocial (a robot) SR contexts.²⁹ The findings revealed that how much parents express anxiety matters, rather than their lifetime anxiety diagnoses. To summarize, the findings consistently reveal that observational learning from parental expressions of anxiety in infancy may lead to increased avoidance of ambiguity, especially in temperamentally fearful children of parents with anxiety disorders.

The findings from Aktar and colleagues^{30,31} constitute the only longitudinal evidence available that extended the study of observational learning beyond infancy to study the parent-to-child transmission of anxiety in parents with (vs without) anxiety disorders.^{41,42} In contrast to experimental studies (summarized above) revealing a causal influence of parental anxiety signals when children encounter an unknown stimulus (like a novel animal), findings after infancy from this sample reveal that parental expressions of anxiety no longer directly predict a child's reactions in response to strangers and mechanical robots. Nevertheless, the longitudinal investigation of SR processes in this sample^{41,42} revealed significant longitudinal links between more expressed anxiety in parents and more fear/avoidance in children in the period between infancy and early childhood, but only in the case of additional vulnerabilities resulting from an inhibited temperament or from severe anxiety disorders in parents.^{41,42} Taken together, findings suggest that observational learning from parents' earlier expressions of anxiety in SR situations may have immediate effects on a child's anxious/avoidant behaviors in infancy, and prolonged effects on later child behavior.

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Verbal pathways for parent-to-child transmission of fear/anxiety and avoidance

Verbal fear acquisition refers to learning of fear/anxiety and avoidance via parental verbal transfer of threat information (also called instruction learning). In his seminal work on fear acquisition, Rachman²⁵ highlighted verbal transmission of fear/anxiety as one of the main pathways through which parents transmit information about potential dangers to offspring. In contrast to the hypothesized importance of verbal pathways for parent-to-child transmission of anxiety and to available evidence on a causal role of the verbal information pathway in children's acquisition of fear from others,⁴³ only a few studies have investigated the verbal transmission of fear/anxiety.

Experimental studies investigating the causal role of verbal threat information on child fear acquisition have predominantly focused on childhood years. Muris and colleagues studied the effect of parental verbal threat information on 8- to 13-year-old children's fear of unknown animals.⁴⁴ Parents were provided with positive, threat, or neutral information about an unknown animal and instructed to communicate this information to their children. They found that the narratives of parents who were provided with threat (versus positive) information were indeed more negative and threatening, giving rise to children believing the animals were dangerous. In addition to self-reported fear beliefs, Bosmans and colleagues⁴⁵ and Remmerswaal and colleagues⁴⁶ measured children's behavioral avoidance in this experimental paradigm using a touch box said to contain the animals their mothers provided threat information about. Threat information caused behavioral avoidance,^{45,46} and children with more anxious attachment were more strongly influenced by parents' verbal threat information.⁴⁵

Longitudinal studies on the links between parents' verbal communication and children's anxiety have focused on broader characteristics of parental communication, such as negative and positive statements and elaboration.⁴⁷ To our knowledge, the longitudinal effects of maternal verbal threat information on the development of childhood fear/anxiety and avoidance of novelty have been studied only in a specific context by Murray and colleagues.^{48,49} They compared socially anxious vs control mothers' narratives to their children about school, and measured children's subsequent

school representations (via the doll play task) and later functioning. Children of mothers with SAD were more negative/anxious in their school representations. As expected, parents with SAD attributed more threat to school experiences and more vulnerability to their children.⁴⁸ Moreover, higher levels of parental threat attributions predicted a higher likelihood of SAD the next term, but only in securely attached children.⁴⁹ This latter finding is interesting in that it reveals that a secure attachment style can create *more* vulnerability to parents' threat attributions. In contrast, studies of cross-sectional links between GAD and insecure attachment in adolescence have revealed that *less* attachment security is linked to more GAD symptoms/higher likelihood of GAD diagnosis.^{50,51} A longitudinal study revealed bidirectional links between adolescents' perception of their attachment quality with their father and GAD symptoms, whereas only GAD symptoms predicted lower attachment quality with mothers (and not vice versa). Taken together, the findings reveal that insecure attachment to parents may lead to more GAD in adolescents, and vice versa.⁵² It is unknown whether differences in findings on the links of anxiety and attachment security are related to the differences in age and anxiety disorder subtype.

Parental behaviors that enhance child anxiety and avoidance

Theoretical accounts of anxiety development⁵³⁻⁵⁵ additionally emphasize the aspects of parental behavior that may contribute to maintenance of fear/anxiety and avoidance in children, for example, by reinforcing avoidant reactions and by limiting children's independence and exposure to stimuli. Parents with GAD, perhaps even more than parents with other anxiety disorders (eg, see Messer and Berdel⁵⁶ and Whaly et al⁵⁷) may have a tendency to overcontrol their child's environment because of their generalized fear that something threatening could happen to their child. Hence, they may try to take control over ambiguous situations, which in turn decreases the child's opportunity for exposure, favoring avoidance. Moreover, GAD parents may be overprotective of their children, that is, they may be excessively concerned with the child's safety and be overly cautious with their children, thereby limiting their children's exposure to various situations. In line with theoretical accounts highlighting the potential

links of overcontrolling and overprotective parenting styles to child anxiety, meta-analytic evidence reveals a medium-effect ($d=0.52$ to 0.58) size association between parental overcontrol and child anxiety and a small but significant association between parental overprotection and child anxiety ($d=0.12$).⁵⁸⁻⁶⁰

Similarly, lack of parental reinforcement of exposure or approach to novelty has been implicated in the maintenance of anxious behavior in children. For example, Murray and colleagues showed that socially anxious mothers who fail to encourage approach to strangers promote more avoidance of strangers in their temperamentally fearful infants.³¹ Note, however, that replication by Aktar and colleagues revealed a link between more parental encouragement and *more* child avoidance in infancy and in toddlerhood.^{29,41} Thus, parental encouragement of approach could acquire a challenging quality in direct confrontations with novelty. Moreover, the study by Murray and colleagues on the role of maternal narratives about school revealed that SAD mothers were less likely to verbally encourage their children about school.^{48,49} Less verbal encouragement from parents predicted more negative school representations and higher levels of internalizing problems in temperamentally fearful children the next term.

Some evidence suggests that parents may reinforce avoidant solutions in their discussions with anxious children: Barrett and colleagues tested 7- to-14-year-old anxious (GAD, SAD, and separation anxiety) children's reactions to ambiguous scenarios involving potentially threatening situations before and after they discussed their reaction with their parents.⁶¹ Results showed that anxious children increased their avoidant strategies after discussion with their parents. Further analysis revealed that parents of anxious children support their child's avoidant strategies.

Nonspecific pathways in the parent-to-child transmission of anxiety: implications for parent-to-child GAD transmission

Evidence reveals that anxious parents can transmit fear/anxiety and avoidance to the offspring by showing nonverbal fear/anxiety signals and by verbally communicating threat information about ambiguous stimuli and situations. Building on this evidence, we propose that elevated anxiety expressions and verbal threat information from GAD parents create multiple learning/

modeling opportunities for children to acquire fear/anxiety and avoidance in a variety of ambiguous situations. These not only include specific contexts addressed in earlier studies (eg, fear of strangers, unknown animals, toy robots), but also extend beyond those (eg, fear of taking a test, not succeeding in life, accidents, illnesses, what will happen to the world). Repeated exposure to parental nonverbal and verbal anxious behavior in children with GAD parents may, alone or in interaction with other vulnerabilities, contribute to GAD development. Broader characteristics of parental communication, such as negative and positive statements or rational versus emotional content await further research in the context of GAD.

On the basis of evidence from specific anxiety disorders, we additionally suggest that parents with GAD may contribute to the maintenance of their children's fearful/anxious and avoidant reactions in the following ways: by showing overcontrolling or overprotective parenting, by reinforcing avoidance, by limiting exposure, and by failing to encourage approach to novelty. In line with this idea, parents with GAD (vs nondiagnosed) were found to be more passive and less encouraging during their interactions with their child in a series of tasks involving playdough, a mysterious box, and social speech.⁶³ GAD parents also promoted more avoidance of the mysterious box, whereas they did not differ from nondiagnosed parents in modeling of anxiety, in warmth, or in intrusiveness. The question of which specific parenting dimensions may be impaired in specific contexts awaits further investigation in parents with GAD.

Specific pathways in the parent-to-child transmission of GAD: parent-to-child transmission of experiential avoidance and worries

In addition to a generalized form of trait anxiety that is, to some extent, shared with other specific anxiety disorders, worry, a maladaptive verbally rooted coping strategy is a central characteristic of GAD.²⁴ Worry is what distinguishes GAD from specific forms of anxiety disorders. What differentiates parent-to-child transmission of worry from the nonspecific verbal fear acquisition pathway addressed above is that the latter is triggered by an ambiguous, anxiety-provoking aspect that is present in the environment, whereas worry does not require the threatening aspect to be present now. Worries are directed to

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the possibility of future, rather than actual occurrences of threat. In this section, we summarize theoretical frameworks addressing the role of worry in the development and maintenance of GAD to shed light on the transmission of worry from GAD parents to children.

Theoretical accounts of GAD conceptualize worry as a cognitive avoidance strategy that inhibits the experience and processing of negative emotional stimuli, and thereby contributes to prolonging the anxiety response.⁶³⁻⁶⁶ Avoidance models propose that worry is generated to cope with future potential threats at a cognitive level.^{63,66,67} It prepares for future confrontations with the threat and future reactions at a behavioral level.

Are worries transmitted from GAD parents to the offspring? A study by Pasarelu and colleagues, investigating the associations between mothers' and children's worry and generalized anxiety symptoms in 11- to 17-year-old children revealed that the relation between more worry in mothers and more generalized anxiety symptoms in children was fully mediated by child worries.⁶⁸ Therefore, parent-to-child transmission of worries may be an important pathway in the intergenerational transmission of GAD. Thus, parents with GAD may transmit anxiety by communicating to their child their appraisals and worries of potential future threats.

In addition to the direct overlap between worry in parents and children, certain aspects of parenting behavior may feed worries in offspring.^{69,70} Muris and colleagues reported that children worried more when they perceived their parents as more rejecting.⁷⁰ Higher levels of anxious rearing, as well as insecure attachment styles, seem to predict higher levels of worry in children. Because parenting dimensions have not yet been investigated together with parental worry, it is unclear if the link between these parenting dimensions and child worry remain after accounting for parents' own worries.

Two other individual characteristics, highlighted in the theoretical accounts of GAD are important to shed light on intergenerational transmission of worries: experiential avoidance⁷¹ and intolerance of uncertainty.⁷² Defined as the tendency to avoid feeling strong (negative) emotions, experiential avoidance has a central role in theoretical models of GAD. Placed within parenting context, experiential avoidance is the tendency of parents to help their child avoid strong negative emotions like anxiety/fear.⁷¹ Parental experiential avoidance also helps parents avoid their own strong negative emotions triggered by observing their child's experience of

anxiety/fear. Parents with GAD may either intervene to control the situation or excessively reassure the child. Excessive parental reassurance may prevent the child from developing autonomous fear coping strategies and, possibly, foster reassurance seeking of the child in future feared situations. Moreover, excessive worry triggered by a child's confrontation with potential threats in daily life, in the case of parental GAD, may mean that parents will be less emotionally available for their children when they are preoccupied with their own worries about their children's fears. In line with this idea, inducing worry in GAD parents of 6-month-old infants decreased parent-to-infant vocalizations, as well as responsiveness to their infant's vocalizations.⁷³ Note, however, that natural observations of GAD parents' interactions with their infants show that GAD parents are not less sensitive or less than parents without psychopathology⁷⁴; thus, the differences seem to be rather specific to worrying episodes.

Intolerance of uncertainty⁷² refers to the discomfort that individuals with GAD experience when confronted with uncertainty/ambiguity in everyday life. The potential dangers embedded in the uncertain situations make GAD individuals avoid these at the behavioral and cognitive levels. Seeing threat in ambiguity due to their own lack of tolerance of uncertainty, and not being able to confront these threats due to their own experiential avoidance, GAD parents are likely to model for their children their own negative cognitions about uncertainty and worry as a coping strategy.

The investigation of the familiarity of GAD-relevant characteristics, such as intolerance of uncertainty, experiential avoidance, and worry is still in its infancy; the only available evidence is confined to the study by Pasarelu,⁶⁸ which implies that an overlap between parents' and offspring's worries may account for parent-to-child transmission of GAD. The extent to which the hypothesized overlap in GAD parents' and children's intolerance of uncertainty, experiential avoidance, and worry is accounted for by environmental (vs genetic/dispositional) influences remains to be investigated in future twin studies.

Discussion

This review builds on two defining features of GAD—generalized trait anxiety and worrying—to discuss potential pathways for parent-to-child environmental transmission of GAD (*Figure 1*). With respect to ac-

quisition of generalized anxiety, we addressed the potential role of parental verbal and nonverbal anxious/negative signals on children's acquisition of fear/anxiety and avoidance of ambiguous stimuli in specific contexts. In light of the summarized evidence, we propose that observational and instructional learning of fear/anxiety and avoidance are two important pathways for transmission that await further research in the context of GAD. We also addressed parental behaviors that may contribute to the maintenance of acquired fearful/anxious and avoidant/fearful tendencies. To that end, in line with earlier models on child anxiety,⁵³⁻⁵⁵ we propose that parenting behaviors that limit children's chances for exposure to anxiety-provoking stimuli, thereby prolonging fear/anxiety, may contribute to the intergenerational GAD transmission. With respect to specific parent-to-child transmission of worries in GAD, we stressed parents' maladaptive use of worry as a way of coping with high levels of experiential avoidance and intolerance of uncertainty. We propose that GAD parents may encourage child worries by modeling a view of the world as full of potential dangers, but also by promoting worrying as a coping strategy. Below, we briefly

address the mechanisms of transmission that may explain child acquisition of fear/anxiety, avoidance, and worry from GAD parents.

The mechanisms explaining parent-to-child transmission of fear/anxiety and avoidance via parental verbal and nonverbal anxiety expressions have been operationalized within the framework of associative learning.^{27,43,75} Observational learning of fear/anxiety emerges in development earlier than language and instructional learning and it may operate via the emotional brain systems involved in classical conditioning.²⁷ Parental nonverbal signals of anxiety during confrontations with novelty act as unconditional stimuli that inherently evoke stress and fear reactions (unconditioned response) that become associated with the novel stimulus and evoke a conditioned fear response.^{28,75} Parental verbal communication of anxiety and worry was proposed to activate the mental representation of the ambiguous situation together with threat, establishing and/or strengthening its association with the fear/anxiety response.⁴³ Additionally, parental enhancement of fear/anxiety and avoidance has been operationalized in terms of operant conditioning processes that reinforce fearful/anxious and avoidant behavior in children and enhance its future likelihood.¹⁹

The intergenerational transmission of information-processing biases⁷⁶ from parents to offspring has been stressed as another potentially important mechanism in parent-to-child transmission of anxiety. Creswell and colleagues propose that anxious parents' vigilance to detect ambiguity/threat in their own, and their child's, environment gives rise to parental anxious behaviors that increase children's vigilance to threat at different levels of information processing (attention, selection, interpretation, and memory bias).⁷⁶ Similarly, Field and Lester⁷⁷ proposed that each confrontation of the child with ambiguity is a trial in real-life bias training, in which parents guide their children's attention toward threat or safety. In GAD, parents may bias their children's processing of ambiguity by conveying the message that the world is not safe, that uncertainty is intolerable, that strong emotions should be avoided, and that worry and reassurance help to cope with uncertainty, thereby transmitting cognitive styles that characterize GAD.

In line with theoretical accounts and empirical findings on anxiety,⁷⁸⁻⁸² our findings highlight the importance of considering additional vulnerabilities in the child and in the parent-child relationship as potential modulators

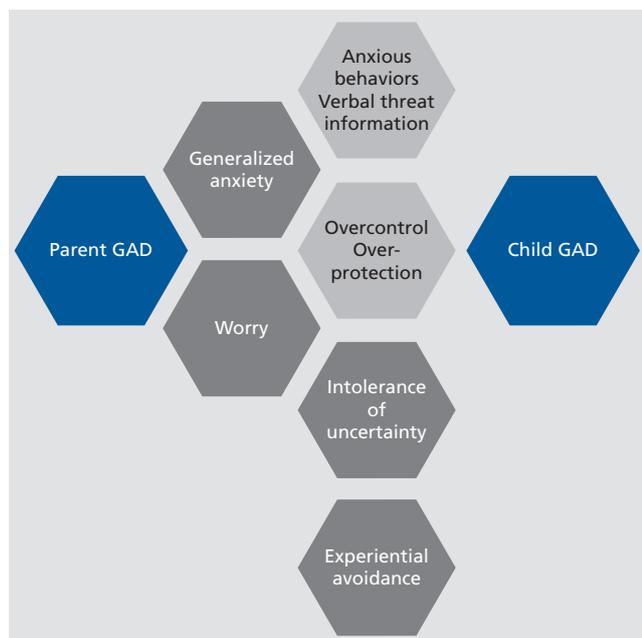


Figure 1. An overview of the potential environmental pathways in parent-to-child transmission of generalized anxiety disorder (GAD). Specific pathways for GAD transmission are presented in dark gray, and general pathways for anxiety transmission are presented in light gray.

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of the impact of environmental influences in the study of intergenerational GAD transmission. Notably, studies investigating behavior in everyday interactions in GAD parents have predominantly focused on mothers. As stressed by recent theoretical approaches⁸²⁻⁸⁵ and empirical evidence,^{41,42} it is important to include fathers in future studies of GAD transmission. Finally, despite the present exclusive focus on GAD transmission from parents to children, children who—because of a genetic vulnerability—display strong anxiety and worry will become a major source of anxiety and worry for their GAD parents, and as such shape their parenting. The bidirectionality of influences awaits attention in the study of familiarity in GAD.

REFERENCES

1. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*. 5th ed; *DSM-V*. Washington, DC: American Psychiatric Association, 2013.
2. Burstein M, Beesdo-Baum K, He JP, Merikangas KR. Threshold and subthreshold generalized anxiety disorder among US adolescents: prevalence, sociodemographic, and clinical characteristics. *Psychol Med*. 2014;44(11):2351-2362.
3. Bittner A, Goodwin RD, Wittchen HU, Beesdo K, Höfler M, Lieb R. What characteristics of primary anxiety disorders predict subsequent major depressive disorder? *J Clin Psychiatry*. 2004;65(5):618-626, quiz 730.
4. Merikangas KR, He JP, Burstein M, et al. Lifetime prevalence of mental disorders in US adolescents: results from the National Comorbidity Survey Replication—Adolescent Supplement (NCS-A). *J Am Acad Child Adolesc Psychiatry*. 2010;49(10):980-989.
5. Bijl RV, Ravelli A, van Zessen G. Prevalence of psychiatric disorder in the general population: results of the Netherlands Mental Health Survey and Incidence Study (NEMESIS). *Soc Psychiatry Psychiatr Epidemiol*. 1998;33(12):587-595.
6. Kessler RC, Berglund P, Demler O, Jin R, Merikangas KR, Walters EE. Lifetime prevalence and age-of-onset distributions of distributions of *DSM-IV* disorders in the national comorbidity survey replication. *Arch Gen Psychiatry*. 2005;62(6):593-602.
7. Rogers MP, Warshaw MG, Goisman RM, et al. Comparing primary and secondary generalized anxiety disorder in a long-term naturalistic study of anxiety disorders. *Depress Anxiety*. 1999;10(1):1-7.
8. Yonkers KA, Bruce SE, Dyck IR, Keller MB. Chronicity, relapse, and illness - Course of panic disorder, social phobia, and generalized anxiety disorder: findings in men and women from 8 years of follow-up. *Depress Anxiety*. 2003;17(3):173-179.
9. Sanderson WC, Wetzler S. Chronic anxiety and generalized anxiety disorder: Issues in comorbidity. In: Rapee RM, Barlow DH, eds. *Chronic Anxiety: Generalized Anxiety Disorder and Mixed Anxiety-Depression*. New York, NY: Guilford Press; 1991:119-135.
10. Hettema JM, Neale MC, Kendler KS. A review and meta-analysis of the genetic epidemiology of anxiety disorders. *Am J Psychiatry*. 2001;158(10):1568-1578.
11. Noyes R, Clarkson C, Crowe RR, Yates WR, McChesney CM. A family study of generalized anxiety disorder. *Am J Psychiatry*. 1987;144(8):1019-1024.
12. Hettema JM, Prescott CA, Myers JM, Neale MC, Kendler KS. The structure of genetic and environmental risk factors for anxiety disorders in men and women. *Arch Gen Psychiatry*. 2005;62(2):182-189.
13. Scherrer JF, True WR, Xian H, et al. Evidence for genetic influences common and specific to symptoms of generalized anxiety and panic. *J Affect Disord*. 2000;57(1-3):25-35.
14. Kendler KS, Walters EE, Neale MC, et al. The structure of the genetic and environmental risk factors for six major psychiatric disorders in women. *Arch Gen Psychiatry*. 1995;52(5):374-383.
15. Jardine R, Martin NG, Henderson AS, Rao DC. Genetic covariation between neuroticism and the symptoms of anxiety and depression. *Genet Epidemiol*. 1984;1(2):89-107.
16. Topolski TD, Hewitt JK, Eaves LJ, et al. Genetic and environmental influences on child reports of manifest anxiety and symptoms of separation anxiety and overanxious disorders: a community-based twin study. *Behav Genet*. 1997;27(1):15-28.
17. Thapar A, McGuffin P. Are anxiety symptoms in childhood heritable? *J Child Psychol Psychiatry*. 1995;36(3):439-447.
18. Degnan KA, Almas AN, Fox NA. Temperament and the environment in the etiology of childhood anxiety. *J Child Psychol Psychiatry Allied Discip*. 2010;51(4):497-517.
19. Ollendick TH, Vasey MW, King NJ. Operant conditioning influences in childhood anxiety. In: Vasey MW, Dadds MR, eds. *The Developmental Psychopathology of Anxiety*. New York, NY: Oxford University Press; 2001:231-252.
20. Vasey MW, Dadds MR. An introduction to the developmental psychopathology of anxiety. In: Vasey MW, Dadds MR, eds. *The Developmental Psychopathology of Anxiety*. New York, NY: Oxford University Press; 2001: 3-26.
21. Muris P. The pathogenesis of childhood anxiety disorders: considerations from a developmental psychopathology perspective. *Int J Behav Dev*. 2006;30(1):5-11.
22. Wittchen HU. Generalized anxiety disorder: prevalence, burden, and cost to society. *Depress Anxiety*. 2002;16(4):162-171.
23. Hudson JL, Rapee RM. From anxious temperament to disorder. An etiological model. In: Heimberg RG, Turk CL, Mennin DS, eds. *Generalized Anxiety Disorder Advances in Research and Practice*. New York, NY: Guilford Press; 2004:51-74.
24. Andrews G, Hobbs MJ. The effect of the draft *DSM-5* criteria for GAD on prevalence and severity. *Aust N Z J Psychiatry*. 2010;44(9):784-790.
25. Rachman S. The conditioning theory of fear acquisition: a critical examination. *Behav Res Ther*. 1977;15(5):375-387.
26. Bandura A. Human agency in social cognitive theory. *Am Psychol*. 1989;44(9):1175-1184.
27. Olsson A, Phelps EA. Social learning of fear. *Nat Neurosci*. 2007;10(9):1095-1102.
28. Askew C, Field AP. The vicarious learning pathway to fear 40 years on. *Clin Psychol Rev*. 2008;28(7):1249-1265.

29. Aktar E, Majdandžić M, De Vente W, Bögels SM. The interplay between expressed parental anxiety and infant behavioural inhibition predicts infant avoidance in a social referencing paradigm. *J Child Psychol Psychiatry Allied Discip.* 2013;54(2):144-156.
30. de Rosnay M, Cooper PJ, Tsigaras N, Murray L. Transmission of social anxiety from mother to infant: An experimental study using a social referencing paradigm. *Behav Res Ther.* 2006;44(8):1165-1175.
31. Murray L, De Rosnay M, Pearson J, et al. Intergenerational transmission of social anxiety: the role of social referencing processes in infancy. *Child Dev.* 2008;79(4):1049-1064.
32. Feinman S, Roberts D, Hsieh KF, Sawyer D, Swanson D. A critical review of social referencing in infancy. In: Feinman S, ed. *Social Referencing and the Social Construction of Reality in Infancy.* New York, NY: Springer US; 1992:15-54.
33. Feinman S. Social referencing in infancy. *Merrill Palmer Q.* 1982;28(4):445-470.
34. Feinman S. Emotional expression, social referencing, and preparedness for learning—Mother knows best, but sometimes I know better. In: Zivin G, ed. *The Development of Expressive Behaviour: Biology-Environment Interactions.* New York, NY: Academic Press; 1985:291-318.
35. Sorce JF, Emde RN, Campos JJ, Klinnert MD. Maternal emotional signaling: its effect on the visual cliff behavior of 1-year-olds. *Dev Psychol.* 1985;21(1):195-200.
36. Rosen WD, Adamson LB, Bakeman R. An experimental investigation of infant social referencing: mothers' messages and gender differences. *Dev Psychol.* 1992;28(6):1172-1178.
37. Gerull FC, Rapee RM. Mother knows best: effects of maternal modeling on the acquisition of fear and avoidance behaviour in toddlers. *Behav Res Ther.* 2002;40(3):279-287.
38. Dubi K, Rapee RM, Emerton JL, Schniering CA. Maternal modeling and the acquisition of fear and avoidance in toddlers: influence of stimulus preparedness and child temperament. *J Abnorm Child Psychol.* 2008;36(4):499-512.
39. Dunne G, Askew C. Vicarious learning and unlearning of fear in childhood via mother and stranger models. *Emotion.* 2013;13(5):974-980.
40. Bunaciu L, Leen-Feldner EW, Blumenthal H, Knapp AA, Badour CL, Feldner MT. An experimental test of the effects of parental modeling on panic-relevant escape and avoidance among early adolescents. *Behav Ther.* 2014;45(4):517-529.
41. Aktar E, Majdandžić M, De Vente W, Bögels SM. Parental social anxiety disorder prospectively predicts toddlers' fear/avoidance in a social referencing paradigm. *J Child Psychol Psychiatry Allied Discip.* 2014;55(1):77-87.
42. Aktar E, Majdandžić M, De Vente W, Bögels SM. Parental lifetime social anxiety diagnoses predict daughters' but not sons' avoidance of strangers in a social referencing task. Paper presented at: 46th European Association of Behavioural and Cognitive Therapies Congress; August 31-September 3, 2016; Stockholm, Sweden.
43. Muris P, Field AP. The role of verbal threat information in the development of childhood fear. "Beware the Jabberwock!" *Clin Child Fam Psychol Rev.* 2010;13(2):129-150.
44. Muris P, van Zwol L, Huijding J, Mayer B. Mom told me scary things about this animal: parents installing fear beliefs in their children via the verbal information pathway. *Behav Res Ther.* 2010;48(4):341-346.
45. Bosmans G, Dujardin A, Field AP, Salemink E, Vasey MW. Fear acquisition through maternal verbal threat information in middle childhood: the role of children's attachment to mother. *Parenting.* 2015;15(4):288-294.
46. Remmerswaal D, Muris P, Huijding J. "Watch out for the gerbils, my child!" The role of maternal information on children's fear in an experimental setting using real animals. *Behav Ther.* 2013;44(2):317-324.
47. Percy R, Creswell C, Garner M, O'Brien D, Murray L. Parents' verbal communication and childhood anxiety: a systematic review. *Clin Psychol Rev.* 2016;19(1):55-75.
48. Pass L, Arteche A, Cooper P, Creswell C, Murray L. Doll play narratives about starting school in children of socially anxious mothers, and their relation to subsequent child school-based anxiety. *J Abnorm Child Psychol.* 2012;40(8):1375-1384.
49. Murray L, Pella JE, De Pascalis L, et al. Socially anxious mothers' narratives to their children and their relation to child representations and adjustment. *Dev Psychopathol.* 2014;26(4 pt 2):1531-1546.
50. Eng W, Heimberg RG. Interpersonal correlates of generalized anxiety disorder: self versus other perception. *J Anxiety Disord.* 2006;20(3):380-387.
51. Hale WW, Engels R, Meeus W. Adolescent's perceptions of parenting behaviours and its relationship to adolescent generalized anxiety disorder symptoms. *J Adolesc.* 2006;29(3):407-417.
52. van Eijck FE, Branje SJ, Hale WW 3rd, Meeus WH. Longitudinal associations between perceived parent-adolescent attachment relationship quality and generalized anxiety disorder symptoms in adolescence. *J Abnorm Child Psychol.* 2012;40(6):871-883.
53. Fisak B, Grills-Taquechel AE. Parental modeling, reinforcement, and information transfer: risk factors in the development of child anxiety? *Clin Child Fam Psychol Rev.* 2007;10(3):213-231.
54. Murray L, Creswell C, Cooper PJ. The development of anxiety disorders in childhood: an integrative review. *Psychol Med.* 2009;39(9):1413-1423.
55. Bögels SM, Brechman-Toussaint ML. Family issues in child anxiety: attachment, family functioning, parental rearing and beliefs. *Clin Psychol Rev.* 2006;26(7):834-856.
56. Messer SC, Beidel DC. Psychosocial correlates of childhood anxiety disorders. *J Am Acad Child Psy.* 1994;33(7):975-983.
57. Whaley SE, Pinto A, Sigman M. Characterizing interactions between anxious mothers and their children. *J Consult Clin Psychol.* 1999;67(6):826-836.
58. van der Bruggen CO, Stams GJ, Bögels SM. Research review: the relation between child and parent anxiety and parental control: a meta-analytic review. *J Child Psychol Psychiatry.* 2008;49(12):1257-1269.
59. McLeod BD, Weisz JR, Wood JJ. Examining the association between parenting and childhood depression: a meta-analysis. *Clin Psychol Rev.* 2007;27(8):986-1003.
60. Möller EL, Nikolić M, Majdandžić M, Bögels SM. Associations between maternal and paternal parenting behaviors, anxiety and its precursors in early childhood: a meta-analysis. *Clin Psychol Rev.* 2016;45:17-33.
61. Barrett PM, Rapee RM, Dadds MM, Ryan SM. Family enhancement of cognitive style in anxious and aggressive children. *J Abnorm Child Psychol.* 1996;24(2):187-203.
62. Murray L, Lau PY, Arteche A, et al. Parenting by anxious mothers: effects of disorder subtype, context and child characteristics. *J Child Psychol Psychiatry Allied Discip.* 2012;53(2):188-196.
63. Borkovec TD, Shadick RN, Hopkins M. The nature of normal and pathological worry. In: Rapee RM, Barlow DH, eds. *Chronic Anxiety: Generalized Anxiety Disorder and Mixed Anxiety Depression.* New York, NY: Guilford Press; 1991:29-51.
64. Mathews A. Why worry? The cognitive function of anxiety. *Behav Res Ther.* 1990;28(6):455-468.
65. Mennin DS, Heimberg RG, Turk CL, Fresco DM. Applying an emotion regulation framework to integrative approaches to generalized anxiety disorder. *Clin Psychol Sci Pract.* 2002;9(1):85-90.
66. Behar E, DiMarco ID, Hekler EB, Mohlman J, Staples AM. Current theoretical models of generalized anxiety disorder (GAD): conceptual review and treatment implications. *J Anxiety Disord.* 2009;23(8):1011-1023.
67. Newman MG, Llera SJ. A novel theory of experiential avoidance in generalized anxiety disorder: a review and synthesis of research supporting a contrast avoidance model of worry. *Clin Psychol Rev.* 2011;31(3):371-382.
68. Pasarelu C, Dobrea A, Predescu E, Sipoș R, Lupu V. Intergenerational transmission of worry a transdiagnostic factor in child internalizing symptomatology. *Rom J Child Adolesc Psychiatry.* 2015;3(1):1-7.
69. Brown AM, Whiteside SP. Relations among perceived parental rearing behaviors, attachment style, and worry in anxious children. *J Anxiety Disord.* 2008;22(2):263-272.
70. Muris P, Meesters C, Merckelbach H, Hülsenbeck P. Worry in children is related to perceived parental rearing and attachment. *Behav Res Ther.* 2000;38(5):487-497.
71. Cheron DM, Ehrenreich JT, Pincus DB. Assessment of parental experiential avoidance in a clinical sample of children with anxiety disorders. *Child Psychiatry Hum Dev.* 2009;40(3):383-403.
72. Dugas MJ, Buhr K, Ladouceur R. The role of intolerance of uncertainty in etiology and maintenance. In: Heimberg RG, Turk C, Mennin D, eds. *Generalized Anxiety Disorder: Advances in Research and Practice.* New York, NY: Guilford Press; 2004:143-163.

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73. Stein A, Craske MG, Lehtonen A, et al. Maternal cognitions and mother-infant interaction in postnatal depression and generalized anxiety disorder. *J Abnorm Child Psychol*. 2012;121(4):795-809.
74. Murray L, Cooper P, Creswell C, Schofield E, Sack C. The effects of maternal social phobia on mother-infant interactions and infant social responsiveness. *J Child Psychol Psychiatry Allied Discip*. 2007;48(1):45-52.
75. Field AP. Is conditioning a useful framework for understanding the development and treatment of phobias? *Clin Psychol Rev*. 2006;26(7):857-875.
76. Creswell C, Cooper P, Murray L. Intergenerational transmission of anxious information processing biases. In: Hadwin JA, Field AP, eds. *Information Processing Biases and Anxiety: A Developmental Perspective*. Hoboken, NJ: John Wiley and Sons; 2010:280-295.
77. Field AP, Lester KJ. Learning of information processing biases in anxious children and adolescents. In: *Information Processing Biases and Anxiety: A Developmental Perspective*. Hoboken, NJ: John Wiley and Sons; 2010:253-278.
78. Rapee RM. The development and modification of temperamental risk for anxiety disorders: prevention of a lifetime of anxiety? *Biol Psychiatry*. 2002;52(10):947-957.
79. Degnan KA, Almas AN, Fox NA. Temperament and the environment in the etiology of childhood anxiety. *J Child Psychol Psychiatry Allied Discip*. 2010;51(4):497-517.
80. Rapee RM. The development and modification of temperamental risk for anxiety disorders: prevention of a lifetime of anxiety? *Biol Psychiatry*. 2002;52(10):947-957.
81. Brumariu LE, Kerns KA. Parent-child attachment and internalizing symptoms in childhood and adolescence: a review of empirical findings and future directions. *Dev Psychopathol*. 2010;22(1):177-203.
82. Colonnese C, Draijer EM, Stams GJJM, Van der Bruggen CO, Bögels SM, Noom MJ. The relation between insecure attachment and child anxiety: a meta-analytic review. *J Clin Child Adolesc Psychol*. 2011;40(4):630-645.
83. Bögels SM, Phares V. Fathers' role in the etiology, prevention and treatment of child anxiety: a review and new model. *Clin Psychol Rev*. 2008;28(4):539-558.
84. Bögels SM, Perotti EC. Does father know best? A formal model of the paternal influence on childhood social anxiety. *J Child Fam Stud*. 2011;20(2):171-181.
85. Möller EL, Majdandzic M, de Vente W, Bögels SM. The evolutionary basis of sex differences in parenting and its relationship with child anxiety in Western societies. *J Exp Psychopathol*. 2013;4(2):88-117.

Transmisión ambiental del trastorno de ansiedad generalizada desde los padres a los hijos: preocupaciones, evitación e intolerancia a la incertidumbre

El trastorno de ansiedad generalizada (TAG) ocurre en familias. De acuerdo con aproximaciones teóricas recientes, esta revisión se centra en las potenciales vías ambientales de transmisión del TAG desde los padres a los hijos. Primero, nos enfocamos en la adquisición del niño de un patrón generalizado de respuestas ansiosas/temerosas y de evitación frente a potenciales amenazas de los padres, a través de información verbal y mediante el modelado. Luego, analizamos cómo las conductas parentales pueden contribuir al mantenimiento de reacciones ansiosas/temerosas y evitativas en los niños. Por último, consideramos la transmisión intergeneracional de preocupaciones como una forma de adaptación a la evitación experiencial de emociones negativas intensas y a la intolerancia a la incertidumbre.

Concluimos que los padres con TAG pueden sesgar en sus hijos el procesamiento de potenciales amenazas ambientales, transmitiendo el mensaje que el mundo no es seguro, que la incertidumbre no es tolerable, que las emociones intensas deben ser evitadas y que las preocupaciones ayudan a adaptarse a la incertidumbre, con lo que se transmiten estilos cognitivos que caracterizan al TAG. Nuestra revisión destaca la necesidad de una investigación orientada a vías específicas de la transmisión del TAG desde los padres a los hijos.

Transmission environnementale de l'anxiété généralisée des parents aux enfants : inquiétude, évitement et intolérance à l'incertitude

Les troubles de l'anxiété généralisée (TAG) sont familiaux. S'appuyant sur des approches théoriques récentes, cet article s'attache aux voies environnementales potentielles de la transmission des TAG des parents aux enfants. Tout d'abord, nous nous intéressons à l'acquisition par l'enfant d'un schéma généralisé de réponse craintive/ anxieuse et évitante à une menace potentielle transmise par les parents via une information verbale et une modélisation. Puis nous abordons la façon dont les comportements parentaux peuvent contribuer au maintien des réactions craintives/ anxieuses et évitantes chez les enfants. Enfin, nous analysons la transmission intergénérationnelle de l'inquiétude comme une façon de s'adapter à l'évitement des émotions négatives fortes et à l'intolérance à l'incertitude. Nous concluons que les parents ayant un TAG peuvent influencer sur les processus de menaces potentiels de l'environnement pour leurs enfants en transmettant que le monde n'est pas sûr, que l'incertitude est intolérable, que les émotions fortes doivent être évitées et que l'inquiétude aide à supporter l'incertitude, transmettant ainsi les schémas cognitifs qui caractérisent les TAG. Notre article souligne le besoin de recherche sur les voies spécifiques de transmission des TAG des parents aux enfants.