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INTERPRETATION BIASES IN THE INTERGENERATIONAL TRANSMISSION OF WORRY: A PATH ANALYSIS

Costina R. PĂSĂRELU, Anca DOBREAN, Robert BALAZSI, Ioana R. PODINA, Cristina MOGOAŞE*

Babes-Bolyai University, Cluj-Napoca, Romania

Abstract

Objective. Despite the fact that worry is a common experience in children, its etiology is underinvestigated. The current study examines the intergenerational transmission of worry from mothers to offspring using a path analysis approach. ***Design.*** Four-hundred-and-seventy-seven children and adolescents (age range: 9 to 17 years) and their mothers filled in questionnaires regarding their general level of worry as well as their interpretation biases. ***Results.*** Data pointed in the direction of a complex model in which maternal worry is associated with children's worry either directly, or via unique paths including mothers' interpretation biases, mothers' expectancies of children's interpretations and children's interpretation biases. ***Conclusions.*** These findings suggest that worry could be transmitted across generations via both direct and indirect pathways.

Keywords: worry, interpretation bias, intergenerational transmission

Introduction

Worry, which can be defined as as an anxious apprehension for future and negative events that involves predominantly negatively loaded thoughts or images (Borkovec, Ray, & Stober, 1998), is a common phenomenon during childhood. Almost 70% of the children report to worry frequently (Orton, 1982; Muris, Meesters, Merckelbach, Sermon, & Zwakhalen, 1998), most often about health, school, disasters, personal harm, and future events (Weems, Silverman, & La Greca, 2000). Even though excessive and impairing worry is one of the defining characteristics of generalized anxiety disorder (GAD) (American Psychiatric

* Correspondence concerning this article should be addressed to:
E-mail: anca.dobrean@ubbcluj.ro

Association, 2013), worry is also associated with various other types of anxiety-related symptoms, like negative evaluation in social phobia, apprehensive anticipation in panic disorders, or fear of illness in hypochondria (Purdon, & Harrington, 2006). Worry along with rumination is a form of repetitive negative thinking which is a transdiagnostic process across mental health problems (McEvoy, Watson, Watkins, & Nathan, 2013).

Transmission of worry across generations

The origins of worry are poorly understood. Parental worry itself seems to be one important contributor, as studies have shown that parental worry is a better predictor of child anxiety than parental anxiety symptoms (Fisak, Holderfield, Douglas-Osborn, & Cartwright-Hatton, 2012). Also, there is a significant association between parental worry reported retrospectively by adolescents and adolescents' GAD symptoms (Fisak, Mann, & Heggeli, 2013). Yet, research regarding possible mechanisms implicated in the transmission of worry is still in its infancy. There is evidence that certain parenting behaviors, namely rejection and anxious rearing, are associated with child worry and explain significant proportions of the variance in children's worry scores (Muris, Meesters, Merckelbach, & Hülsenbeck, 2000a). Anxious rearing and over-protective parenting are found to be related to adolescents' worry (Muris, 2002b). Although these studies explored the links between parenting factors and childhood worry, little is known about the processes through which these parental factors contribute to the enhancement of children's worry levels.

Worry and interpretation biases

One of the factors involved in the etiology of worry might be the interpretation bias, defined as the tendency of negatively interpret ambiguous information or as inclination to exaggerate the negative meaning of unpleasant/undesired situations (Hirsch, Clark, & Mathews, 2006). According to the cognitive models of worry, information processing biases are involved in the etiology and maintenance of worry (Dash, Meeten, & Davey, 2013). Evidence sustaining the relationship between worry and information processing biases comes from two directions. In one direction, there are studies that report significant associations between interpretation biases and worry (Suarez & Bell-Dolan, 2001; Suarez-Morales & Bell, 2006). In another direction, there are experimental studies conducted on adult populations showing that worry levels

diminish after participants receive a cognitive bias modification for interpretations (CBM-I) intervention (Hayes, Hirsch, Krebs, & Mathews, 2010; Hirsch, Hayes, & Mathews, 2009). Despite the fact that worry and interpretation biases share many similarities, they are different constructs (see Dash et al., 2013 for a more nuanced difference between worry and systematic processing).

Indeed, compared to non-worriers, children who worry a lot interpreted both ambiguous and threatening situations as more threatening, expressed more worry in response to the events, and judged the events to have a higher probability of happening to them in the future (Suarez & Bell-Dolan, 2001). Also, there seems to be a positive association between children's worry scores and their search for information that confirms danger, as they use more verifying rather than falsifying reasoning strategies (Muris, Debipersad, & Mayer, 2013). In addition, at least one study showed that, when compared with mothers of children with externalizing disorders or with mothers of non-referred children, mothers of children with internalizing disorders worry more catastrophically, showing a greater number of worry steps and a higher catastrophic content of real worries (Triantafyllou, Cartwright-Hatton, Korpa, Kolaitis, & Barrowclough, 2012). Therefore, worried mothers may transmit their own interpretation biases to their offspring, increasing children's tendency to interpret ambiguous information in a negative way (Lester, Seal, Nightingale, & Field, 2010).

There is evidence indicating that certain interpretation biases, namely parents' expectancies of children's interpretations influence parenting behaviors, which in turn maintain children's anxiety levels (Creswell, Shildrick, & Field, 2010). Furthermore, mothers' own interpretation biases mediate the relationship between maternal anxiety and maternal expectancies of child's responses to hypothetical scenarios (Orchard, Cooper, Phil, & Creswell, 2015).

Intergenerational transmission of interpretation biases

Research conducted so far on the intergenerational transmission of cognitive bias has shown that there is a significant association between children's and mothers' interpretation biases (Creswell, O'Connor, & Brewin, 2006; Creswell, Schniering, & Rapee, 2005). Consequently, children learn to interpret ambiguous situations according to their mothers' previous interpretations (Lester et al., 2010), probably via mothers' expectancies of children's interpretations that could be expressed directly (e.g., verbally) or indirectly (e.g., through parenting behaviors). Although untested until now, this possibility is plausible, as a recent study has demonstrated that mothers' own information search bias predicted their

children's information search bias (Remmerswaal, Muris, & Huijding, 2015), suggesting that mothers play a significant role in the development of children's cognitive biases.

Worry and cognitive development

Cognitive development plays an important role in the occurrence of childhood worry (Ellis & Hudson, 2010). There is evidence that fears and worries are mediated by children's level of cognitive maturation, and also that worry is more common in older children (Muris, Merckelbach, Gadet, & Moulaert, 2000b). In line with these findings, Carr and Szabo (2015) demonstrated that for older children worry is more closely related to thought processes than fear, whereas the opposite relation is true for younger children. In order to explain the relationship between age and worry, Muris, Merckelbach, Meesters and van den Brand (2002a) proposed a model in which age and subsequent cognitive development lead to an enhanced capacity to elaborate on potential negative outcomes that, ultimately, increase the possibility of worry to emerge. Furthermore, age not only influences the frequency of worries but also shapes their content, with younger children reporting more physical concerns compared to older children, among whom abstract worries (e.g., social evaluation) are more common (Vasey, 1993).

Summary of evidence

Despite evidence sustaining the transdiagnostic role of worry in internalizing disorders, research investigating its etiology in children is rather scarce. The few studies that have investigated worry in young people have revealed data on the prevalence of worry, differences between normal and clinical populations, age groups and gender, and associated parenting factors. But so far little is known about how worry develops. A viable hypothesis could be that worry is transmitted from parents to children by means of verbal information transfer, modeling and reinforcement (Fisak & Grills-Taquechel, 2007). Thus, via these parenting behaviors, children may internalize their parents' interpretation biases (Remmerswaal et al., 2015; Muris & Field, 2010), which, in turn, may influence their worry levels (Suarez & Bell-Dolan, 2001; Muris et al., 2013). A similar pattern has observed for the intergenerational transmission of anxiety, where children's cognitive vulnerabilities were found to mediate the relationship between maternal trait anxiety and child anxiety (Pereira, Barros, Mendonça, & Muris, 2013). To our knowledge, there is no study documenting the

intergenerational transmission of worry. However, such a connection between generations is likely, because (1) worry is the cognitive component of anxiety (Borkovec, Robinson, Pruzinsky, & DePree, 1983), and (2) parents and children share similar information processing styles, such as interpretation biases (Creswell et al., 2005, 2006).

The current study

This study aimed to investigate mechanisms through which worry might be transmitted from mothers to children. Based on the evidence linking children's GAD symptoms with parental worry, we expected a positive relationship between maternal worry and children's worry. Similarly, given the evidence associating maternal cognitive processing to children's patterns of thinking, we expected a positive relationship between mothers' and children's interpretation biases. We expected mothers' expectancies of children's interpretations to mediate the relationship between mothers' interpretation biases and mothers' worry. Then, as children learn to interpret ambiguous situations according to their mothers' previous interpretations, we explored the relationships between mothers' interpretation biases, mothers' expectancies of children's interpretations, and children's interpretation biases. More specifically, we wanted to investigate which of the two variables related to maternal interpretation biases (e.g., mothers' interpretation biases or mothers' expectancies of children's interpretations) was a proximal predictor of children's interpretation biases. Finally, we hypothesized that children's interpretation biases will be a significant predictor of children's worry, acting as a mediator between mothers' expectancies of children's interpretations and children's worry and between mothers' interpretation biases and children's worry, as it is more proximal to children's worry. A similar relationship was found between maternal anxiety and child anxiety (Affrunti & Ginsburg, 2012).

Putting all of the above mentioned variables together, we aimed to test a complex model in a path analysis approach, with mothers' interpretation biases as predictor, mothers' expectancies of children's interpretation biases, maternal worry and children's interpretation biases as mediators, and children's worry as criterion variable. By doing this, we aimed to discover unique paths through which worry might be transmitted across generations. In addition, as there is evidence that age is a significant correlate of worry (Carr & Szabó, 2015; Ellis & Hudson, 2010; Muris et al., 2000b, 2002a, 2002b; Vasey, 1993), we explored how age might influence children's worry in this model.

Method

Participants

Participants were recruited from seven Romanian public schools. Approximately 80% from participants who were invited to participate agreed to take part in the study. The sample consisted of 477 children and adolescents ($M_{age\_}$ = 13.18; SD = 1.62, age range *9-17*) (from here on referred to as children) and their biological mothers (M_{age} = 40.17, SD = 5.56, age range *21-67*). Forty percent (*n* = 188) of the children were boys and sixty percent (*n* = 289) were girls; 18.4% had rural residency (*n* = 88). Ethic distribution of the sample was: Romanian (88.7%), Hungarian (2.1%), Rroma (.9%) and other (.2%). Eight precent of the sample did not report data regarding their ethnic background. Mothers' education level was: middle school completion and under (12.9%), high school completion (32.9%), vocational education (16.4%) and university degree (28.6%). Forty-four mothers did not offer information regarding their education (9.2%).

Procedure

The study was approved by the Babeş-Bolyai University Ethics Committee and by school boards. Parents and children voluntarily agreed to participate in the study and provided written informed consent prior to completing assessment. The only inclusion criteria that were established for children and their mothers were: to understand Romanian language as all the assessment instruments were completed in Romanian language and to be able to read the scales alone. Children completed the questionnaires in their classrooms at school, in the presence of nonparticipating children and research assistant that provided instructions and responded to any questions. Mothers also filled in the instruments at school, individually, in a quiet and separate room. Children received material rewards (candies) from the team members when they finished completing the scales.

Measures

Demographics. Participants, both children and mothers completed first a demographic questionnaire regarding their age, gender, ethnicity, residency and number of years of education completed.

Interpretation bias. We adapted The Ambiguous Scenarios Questionnaire (ASQ; Lester et al., 2010) in order to assess interpretation biases in children and their mothers.

Each questionnaire consisted of 12 ambiguous scenarios involving either only the child (ASQ-C), the mother (ASQ-M) or asking mothers to report how they expect their child would think in ambiguous hypothetical situations (ASQ-EM). Children completed ASQ-C as a measure of their interpretation biases, while mothers completed ASQ-M as a measure of their own interpretation biases and ASQ-EM as a measure of their expectations of their children's interpretation biases. Each respondent read in turn every scenario, and then he/she was asked to choose between two possible interpretations of the given scenario: one neutral interpretation, and one negative interpretation. We coded the neutral interpretation with zero, and the negative one with 1. Scores range between 0 and 12, with higher scores reflecting more interpretation biases. Cronbach's alpha for the present study were .51 for ASQ-C, .62 for ASQ-M and .52 for ASQ-EM, respectively.

Worry. To assess worry in children, we used the Romanian version of the Penn State Worry Questionnaire for Children (PSWQ-C) (Chorpita, Tracey, Brown, Collica, & Barlow, 1997), a self-report measure assessing young people's tendency to worry excessively and uncontrollably. PSWQ-C contains 14 items ("My worries really bother me", "I am always worrying about something", "I never worry about anything") with four reverse items. Scores can range between 0 and 42, with higher scores reflecting a stronger tendency to worry. Responses are rated on a 4-point Likert scale (0 – "*Not at all true",* 3 – "*Always true"*). This instrument was translated and adapted in Romanian language (Păsărelu et al., 2016). In the present study this scale showed adequate internal consistency (Cronbach's alpha = .85).

To assess worry in mothers, we used the Penn State Worry Questionnaire (PSWQ) (Meyer, Miller, Metzger, & Borkovec, 1990) for adults. The scale consists of 16-items out of which five are reverse items rated on a 5-point Likert scale (1- "*Not at all typical of me*", 5 – "*Very typical of me*"). Sample items from this scale are: "If I do not have enough time to do everything, I do not worry about it.", "Once I start worrying, I cannot stop.", or "As soon as I finish one task, I start to worry about everything else I have to do". Scores can range between 16 and 80. In our sample this scale also showed good internal consistency (Cronbach's alpha = .84).

Translation process

Romanian adaptations of the interpretation bias scales were done according to International Test Comission guidelines for translating and adapting tests (Muñiz, Elosua, & Hambleton, 2013). First the scales were translated from

English into Romanian and then back translated in English using dyads of translators. Translators were clinical psychologists with English language competences.

Data analysis

Path analysis was used to test the hypothesized model. Uni- and bivariate descriptive statistical indicators were computed using Statistical Package for Social Sciences (IBM SPSS 21). Model was tested with in Mplus 7.1 with full information maximum likelihood estimation and maximum likelihood robust standard errors (Muthén & Muthén, 2012). Prior to running the analyses, skewness and kurtosis statistics, and statistical bivariate graphics of all observed measures were inspected in order to detect any violations of normality, linearity and homoscedasticity assumptions, bi- and multivariate outliers. For all variables the absolute values of skewness and kurtosis were below 8.0 and 3.0 indicating that the data did not violate the assumption of normality (Kline, 2005).

In order to test goodness-of-fit of the model, several indices were used: (a) chi-square statistic, a significant value means that there are significant discrepancies between the initial and the reproduced correlation matrices; (b) the General Fit Index (GFI) and Comparative Fit Index (CFI), for which values greater than .90 indicate reasonably good fit; (c) the Root Mean Square Error of Approximation (RMSEA) and Standardized Root Mean square Residual (SRMS), which require values less than 0.08 for an acceptable fit (Hu & Bentler, 1999). Beyond global fit, local fit was also assessed by analyzing the sign, magnitude and statistical significance of direct and (total and specific) indirect effect. There are several studies indicating a significant correlation between age and children's worry, and as a consequence all direct and indirect effects were estimated taking this demographic variable into account as a covariate. Bootstrap standard errors of the model parameter estimates were computed using Mplus.

Results

Correlations and descriptive statistics

Means, standard deviations and range for all measures as well as bivariate correlations among the study variables are presented in *Table 1*. As expected, significant positive correlations were found between mothers' interpretation biases, mothers' expectancies of children's interpretations and children's interpretation biases. Furthermore, mothers' interpretation biases significantly and positively correlated with mothers' worry; however, there was no significant

association between mothers' interpretation biases and children's worry levels. Mothers' expectancies of children's interpretations were significantly associated with children's interpretation biases and with both children and mothers' worry. Interpretation biases were significantly associated with worry, both in children and parents. Finally, as expected, maternal worry positively correlated with children's worry.

Table 1. Means, standard deviations, range and bivariate correlations between variables (N=477).

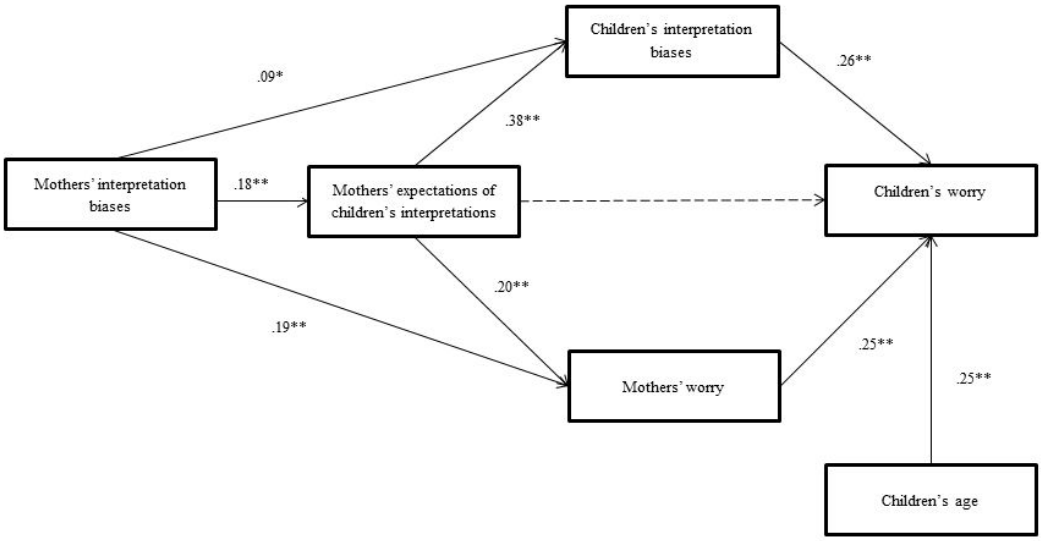
	Measures	*M*	*SD*	*Range*	1	2	3	4	5
1	Mothers' interpretation biases	5.28	2.16	0-10	-	.17**	.16**	.22**	.00
2	Mothers' expectations of children's interpretations	3.75	2.01	0-9		-	.40**	.23**	.16**
3	Children's interpretation biases	4.20	2.18	0-12			-	.13**	.29**
4	Mother's worry	42.58	11.73	16-79				-	.30**
5	Child's worry	14.87	9.46	0-41					-

Note. M = mean, SD = standard deviation. ** $p < .001$

Path analysis

The path analysis approach allowed for the examination of the hypothesized model through which maternal interpretation biases could influence children's worry. Model fit indices for the final path model were found to be good,

$x^2(6) = 11.394$, p =.076, CFI = .97, GFI = .99, SRMR = .02, RMSEA = .04. Based on these fit indicators, we can conclude that the proposed model fit with the data is good. The hypothesized model with both significant and insignificant paths is presented in *Figure 1*.



As is shown in Figure 1, mothers' interpretation biases significantly and positively predicted children's interpretation biases, maternal worry and mothers' expectancies of children's interpretations. Mothers' expectancies of children's interpretations significantly and positively predicted children's interpretation biases and maternal worry. However, mothers' expectancies of children's interpretations (β = - .02, p = .530) did not predict children's worry. Children's interpretation biases significantly and positively predicted children's worry. Finally, maternal worry significantly and positively predicted children's worry. Age was a significantly covariate in the proposed model, influencing children's worry levels. In total, predictors in the model accounted for 20% of the total variance in children's worry scores (R^2 = .20).

We also analyzed intermediate relations identified in the model (see *Table* 2 for direct and indirect effects) and the results sustained the theoretical links implied by the full model. The indirect effect of mothers' interpretation biases on children's worry was significant across all pathways from the model (see paths 12-17 for specific indirect effects) excepting the path mothers' interpretation biases→ mothers' expectations of children's interpretations → children's worry.

Table 2. Direct and indirect effects between variables from the model (N=477).

	Direct effects	Standardized	Unstandardized	SE*	p	R^2
1	PSWQ-M → PSWQ-C	0.25	0.20	0.03	.001	0.20
2	ASQ-C → PSWQ-C	0.26	1.10	0.18	.001	
3	Child's age → PSWQ-C	0.25	1.41	0.24	.001	
4	ASQ-EM → ASQ-C	0.39	0.42	0.05	.001	0.17
5	ASQ-M → ASQ-C	0.09	0.09	0.04	.029	
6	ASQ-EM → PSWQ-M	0.20	1.15	0.26	.001	0.09
7	ASQ-M → PSWQ-M	0.19	1.02	0.24	.001	
8	ASQ-M → ASQ-EM	0.18	0.16	0.04	.001	0.03
	Indirect effects					
9	ASQ-EM → PSWQ-C	0.15	0.69	0.11	.001	-
10	ASQ-M → PSWQ-C (via PSWQ-M)	0.06	0.24	0.06	.001	-
11	ASQ-M → PSWQ-C (via ASQ-C)	0.04	0.18	0.06	.002	-
	Specific indirect effects					
12	ASQ-EM → ASQ-C → PSWQ-C	0.10	0.46	0.10	.001	-
13	ASQ-EM → PSWQ-M → PSWQ-C	0.05	0.23	0.06	.001	-
14	ASQ-M → PSWQ-M → PSWQ-C	0.05	0.20	0.06	.001	-
15	ASQ-M → ASQ-EM → PSWQ-M → PSWQ-C	0.01	0.04	0.01	.009	-
16	ASQ-M → ASQ-C → PSWQ-C	0.02	0.10	0.05	.039	-
17	ASQ-M → ASQ-EM → ASQ-C → PSWQ-C	0.02	0.08	0.02	.002	-

Note. ASQ-M = Mothers' interpretation biases; ASQ-EM = Mothers' expectations of children's interpretations; ASQ-C = Children's interpretation biases; PSWQ-M = Mother's worry; PSWQ-C = Child's worry; *standard errors were estimated using bootstrap method

Discussion

This study was aimed to empirically explore the intergenerational transmission of worry from mothers to offspring. Our findings support a model in which both direct and indirect factors influence children's worry. As hypothesized, children's interpretation biases were found have a significant direct effect on child's worry. Interestingly, mothers' interpretation biases were found to influence children's interpretation bias both directly and indirectly, via mothers' expectancies of children's interpretations. Finally, mothers' interpretation biases were associated with children's worry only indirectly, whereas maternal worry and children's worry were associated directly.

Our results were consistent with previous data showing that (1) child's own cognitive vulnerabilities are important mediators in the relation between parent anxiety and child's anxiety (Pereira et al., 2013) and (2) children may internalize their mother's biased thinking (Creswell et al., 2005, 2006), interpreting the ambiguous information as threatening, which in turn might influence worry levels (Suarez & Bell-Dolan, 2001; Muris et al., 2013). However, our results indicated that there is a direct and indirect relationship between mothers' and children's interpretation biases, suggesting that mothers' expectancies of children's interpretations could also be responsible for interpretation biases in children. This finding is not only of theoretical importance, but also of great practical relevance, as it suggests possible therapeutic strategies aimed to decrease worry prevalence in children. Most probably, worried mothers having themselves interpretation biases could verbalize their negative expectations related to children's interpretations of ambiguous situations either directly (e.g., to the child) or indirectly (e.g., to people in the child's environment), and thus model interpretation biases which, in turn, may be internalized by the child. However, this hypothesis should be tested in future studies, ideally in experimental studies so that causal inferences can be derived. If this scenario proves to be true, then specific interventions aimed to decrease worry levels in children could be designed and implemented. For example, worrying mothers who exhibit a negative interpretation bias could be trained to recognize their style of transmitting expectations and then to modify it, in order to promote in their children a more balanced view of ambiguous situations. This avenue emphasizes the possibility of improving current interventions for child disorders in which pathological worry in involved, by targeting parents' distorted cognitions, and investigates the effects of such interventions on parental worry and children's worry, as well as on children's thinking pattern. Such interventions might also

prove very useful as preventive strategies aimed to decrease worry-related disorders in children (especially anxiety problems, which are the most prevalent childhood mental disorders (Fisak et al., 2012) and also act as a vulnerability factor for developing additional emotional and behavioral disorders (Andlin-Sobocki, Jönsson, Wittchen, & Olesen, 2005). However, it is important to keep in mind that the predictors considered in the model only accounted for a small proportion of the variance in worry scores, suggesting that there might be other important factors for the intergenerational transmission of worry (e.g., metacognitions, intolerance of uncertainty) which have not been considered in the current model. Muris and his collaborators (2000a) pointed that the information and modeling pathways by which maternal worry could be transmitted might have a smaller contribution for the development of worry as compared to the conditioning experiences, often reported as most important in worry acquisition. Therefore, future studies should investigate additional factors potentially involved in the intergenerational transmission of worry, specifically considering the role of direct conditioning experiences, beyond explicit information processing patterns.

Limitations

Although this study highlights a number of interesting pathways for intergenerational worry transmission, results should be interpreted carefully in the context of a number of limitations. First of all, as we used a correlational, cross-sectional design, no causal inferences can be made. This means that our results remain silent about the actual etiology of worry. All we can conclude is that there seems to be multiple pathways, consisting of direct and indirect processes. Future studies using longitudinal designs and assessing bidirectional relationships between variables investigated could inform what we currently know about the etiology of child worry. The causal relationship between interpretation biases and worry remains to be tested in experimental studies. In addition, other variables, both parent- and child-related, that possibly mediate the intergenerational transmission of worry should be considered in future studies (e.g., parenting style, attachment, negative affectivity, trait/state anxiety) in order to get a more complete understanding of the mechanisms underlying the intergenerational transmission of worry.

Second, internal consistencies of the interpretation biases measures were relatively low, limiting the robustness of our findings. Low reliability seems to be a common problem of cognitive bias measures, as the same problem was evidenced with other instruments measuring other types of cognitive bias (e.g.,

dot-probe task used for measuring attention bias). We clearly need more psychometrically sound instruments to adequately measure cognitive biases. In the specific case of ASQ, several strategies could prove fruitful in increasing reliability, namely: (1) increasing the number of hypothetical scenarios used, as the internal consistency is known to be dependent on the number of items (Cronbach, 1951). The ASQ versions we used had only 12 scenarios (items); (2) using a continuous rather than a dichotomous modality of coding participant's response to items, to expand score range, as the internal consistency is known to be influenced by the scores variability (Maberly, 1967); (3) checking the personal relevance of the scenarios for the respondents, and aiming to include only scenarios with similar relevance (ideally, high relevance), as personal relevance can arguably influence the reliability of responses (Wisco & Nolen-Hoeksema, 2010). Future studies should make use of such strategies in an attempt to increase ASQ internal consistency. In addition, to get a better estimate of maternal and child negative interpretation biases, ecological situations could be used (for example, participant could be asked to make "online" interpretations while facing experimental ambiguous situations).

Another limitation of the current study is the fact that we exclusively addressed maternal worry, therefore forthcoming studies might also examine paternal worry and its relationship to worry in children, as fathers and mothers may contribute differently to child's anxiety (Bögels & Phares, 2008). We included in our study more mothers of girls than of boys and in the literature there is evidence that gender is an important factor in the intergenerational transmission (e.g., depression Quarini et al., 2016 , psychiatric symptoms in general Schleider, Chorpita, & Weisz, 2014, or attention biases Montagner et al., 2015). Mothers in the current sample were highly educated and future studies involving more heterogeneous samples regarding demographic characteristics should be conducted.

Implications for practice, application, theory, and policy

Our results provide preliminary support for the role interpretation biases play in the intergenerational transmission of worry from mothers to children, highlighting plausible pathways through which mothers' interpretation biases influence the development of their children's interpretation biases. From these findings, the message that practitioners should disseminate to parents is that worry can be transmitted across generations either directly, either through mother's own interpretation biases, mothers' expectancies of children's

interpretations or via children's interpretation biases. By identifying and adjusting their expectations of children's interpretations, parents may be able to help their children face real-life situations with healthy cognitive styles. Through modeling, information transfer and reinforcement (Fisak & Grills-Taquechel, 2007) children may learn from their parents to give more benign interpretations to ambiguous situations, and therefore to appraise a certain situation in an unbiased manner. These findings are of genuine clinical relevance, given that worry plays an important role in psychopathology. By targeting parental worry and parental expectations of child's interpretations of ambiguous situations, children's risk of developing certain psychological disorders, especially those in which worry is a major component (e.g., anxiety disorders), may be reduced.

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