

## The Prediction of Clinically Relevant Anxiety Symptoms in Early Adulthood: Direct and Indirect Effects of Childhood and Parental Factors

Amie L Meyer<sup>1</sup> and Birgit Kröner-Herwig<sup>1\*</sup>

Department of Clinical Psychology and Psychotherapy, Georg-Elias-Müller Institute of Psychology, University of Göttingen, Germany

### Abstract

**Objective:** Anxiety disorders are most prevalent among psychological disorders with an onset between mainly early teens and late twenties. In the frame of Barlow's triple vulnerability model (TVM) of anxiety the current prospective study examined internalizing symptoms, perceived dysfunctional parenting style and parental worry assessed in childhood as potential risk factors of anxiety in young adults. Furthermore, the mediating effects of self-efficacy and recalled dysfunctional parenting style on anxiety were investigated at early adulthood.

**Method:** A total of 1597 young adults aged 19 to 27 years ( $M=22.4$ ;  $SD=2.32$ ) of a German population-based sample were re-contacted 9 years after participating in the last survey of a series of four annual assessments (W1-W4). Information on the outcome was gathered in a follow-up examination (W5) with the 7-item General Anxiety Disorder Scale (GAD-7) measuring the severity of symptoms. According to the authors of the questionnaire. The scores were dichotomized to represent a proxy diagnosis of a general anxiety disorder. Also, the parenting style as recalled by the children and self-efficacy were assessed at this point of time. Mediation analysis was performed with Hayes' PROCESS tool for SPSS.

**Results:** Controlling for age and gender, clinically relevant anxiety in early adulthood was significantly predicted by internalizing symptoms, perceived dysfunctional parenting style and parental worry in childhood. These relations were significantly mediated by self-efficacy and recalled dysfunctional parenting style assessed at follow up.

**Conclusion:** Results suggest that childhood and parental factors, i.e. early symptoms of anxiety, shyness and depressive mood in childhood as well as perceived parenting style marked by restriction, reproach, inconsistency and worrying significantly influence the manifestation of clinically relevant anxiety in young adults. This effect is mediated by the recalled perception of the parent's behavior by the children. These findings can be utilized in psychological counseling of parents of children with internalizing symptoms in childhood or adolescence.

**Keywords:** Anxiety disorder; Internalizing; Dysfunctional parenting style; Self-efficacy; Mediation, childhood; Early adulthood; Longitudinal design

### Introduction

Many studies indicate that anxiety disorders (AD) is the most prevalent class (18,1%) of psychological disorders [1,2]. According to retrospective reports, the onset of AD is presumed to be mainly between early teens and late twenties and is more frequent in females than males [3]. In the context of the prospective longitudinal Zurich Study, an average onset at 15.6 years with a manifestation of 75% of cases before the age of 20 was determined [4].

Barlow formulated an etiology model of AD, the triple vulnerability model (TVM) and specified an interacting set of three diatheses characterized as general biological, general psychological and disorder-specific psychological vulnerabilities [5]. General biological vulnerability refers to genetically based stable disposition to experience negative emotions [6,7]. Previous research focused especially on dimensions of temperament (e.g., behavioral inhibition) as a genetically mediated contribution to develop anxiety [8] as well as shared genetic vulnerabilities [9-11]. As a second path to anxiety disorders (i.e., general psychological vulnerability), Barlow proposed early childhood experiences, such as growing up in stressful, unpredictable environments and/or experiencing specific parenting styles. This may lead to a sense of unpredictability and uncontrollability and thus threaten the development of a belief of self-efficacy [6,7]. Environmental influences account for approximately 12% to 16% of variance in anxiety and internalizing disorders in children and adolescents, as was shown by a meta-analysis [12].

A relevant aspect for adult anxiety is homotypic continuity of

anxiety symptoms over long periods of lives. Adults with AD commonly report having experienced increased anxiety and internalizing symptoms during their childhood. In the context of the New York Child Longitudinal Study the risk for early-adulthood AD was investigated. Pine and colleagues found that most disorders in adulthood were preceded by adolescent disorders. Covering a developmental phase of 11 years we examined whether the childhood status of internalizing was predictive of clinically significant anxiety at young adult age.

Dysfunctional parenting is characterized by negative, hostile feelings towards the child, inconsistent behavior, high level of criticism and reproach as well as lack of emotional warmth [13,14] which influences a child's beliefs and attribution to perceive their environment as threatening [13]. Research on the effects of dysfunctional parenting used different operationalization of the construct and found effects on later anxiety [15,16]. For one, parental behavior assessed from the parents' point of view respectively the children's' experience. We decided to examine the significance of dysfunctional parenting as

\*Corresponding author: Birgit Kröner-Herwig, Department of Clinical Psychology and Psychotherapy, Georg-Elias-Müller Institute of Psychology, University of Göttingen, Germany, Tel: 0049551393581; E-mail: [bkroene@uni-goettingen.de](mailto:bkroene@uni-goettingen.de)

Received February 02, 2017; Accepted February 07, 2017; Published February 10, 2017

**Citation:** Meyer AL, Kröner-Herwig B (2017) The Prediction of Clinically Relevant Anxiety Symptoms in Early Adulthood: Direct and Indirect Effects of Childhood and Parental Factors. J Depress Anxiety 6: 268. doi:10.4172/2167-1044.1000268

**Copyright:** © 2017 Meyer AL, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

experienced by the children during childhood as a predictor of adult clinically relevant anxiety and recalled dysfunctional parenting by the same individuals in their young adult age as a possible mediator of effects on adult anxiety.

According to Barlow, unfavorable environmental conditions as dysfunctional parenting leading to negative cognitive-emotional processing in the child result in later AD, if a disorder-specific vulnerability is present as well. This vulnerability entails learning to focus anxious apprehension on situations, objects or even internal somatic sensations, subjectively perceived as potentially dangerous [6,7], here defined by the child's internalizing way of stimulus processing is partly genetically determined, but also by environmentally influenced. We expected anxiousness and worrying in parents to be as risk factor for the development of anxiety. These parents tend to worry about diverse facets of their environment showing elevated attention towards potential threats. Furthermore, they can model avoidant behavior instead of an active problem confronting style of coping observed by their children.

Consequently, these children have less opportunity to establish their own sense of personal control and self-efficacy. Hence, these parents increase the probability of their children developing anxiety symptoms. A parenting style defined by restrictive behavior and worrying is associated with higher levels of child anxiety as a meta-analysis [14].

Self-efficacy, a conviction to effectively regulate and control inner and external events can function as a protective factor and support a positive development [17,18]. Studies show that individuals with AD with a low level of self-efficacy, experience high levels of subjective distress and approach potentially aversive situations more reluctantly, conjuring up possible injurious consequences and doubting their capabilities to solve problems [19-21]. Associations of lower self-efficacy with anxiety symptoms and disorders have been shown in several studies [22,23]. Thus, we expected a reduced sense of personal control in young children to constitute a mediator between a negative restrictive family environment, parents' worrying and subsequent negative affect and anxiety symptoms [24-36].

Thus, within the conceptual model of the TVM, the aim of the current study was to examine a predictive model of adult anxiety including internalizing symptoms in childhood, dysfunctional parenting style as perceived by the child and as recalled by the child at a later time, parental worry as a habitual trait as reported by the parents during childhood time of their son or daughter and self-efficacy of the children [33]. Most studies on the significance of these variables for the manifestation of anxiety had some weaknesses regarding limitations in the operationalization of constructs, their cross-sectional study design or retrospectively assessed data [34,37]. The current study included therefore parental worrying and dysfunctional parenting, in the sense of restrictive behavior as well as reproach and inconsistent behavior and the latter assessed as perceived and recalled behavior of the parents estimated by the child. Furthermore, self-efficacy possibly functioning as an important mediator of clinical relevant anxiety [38] was included in the above described model to predict clinically relevant anxiety in young adults.

## Method

### Study design

In the context of a large longitudinal epidemiologic study on health in children and adolescents a survey of initially four waves (W1-W4)

was conducted in four consecutive years between 2003 and 2008. An additional follow-up (W5) with the former children of the survey was implemented in 2015. Initially, 8800 households with at least one child aged 7-14 years were randomly selected from community registries located in southern Lower Saxony (four districts) and the city of Hannover. The respondents of the first wave were contacted to participate in the survey the following years (W2-W5). Comprehensive questionnaires addressing parents and children, including questions on health and psychosocial affairs, were sent via postal services to the families. Children's self-report on these domains was gathered from children aged 9 and older. To prevent potential language difficulties, families with migration background were excluded.

Further exclusion was based on uncertain identity of the child and questionnaires with  $\geq 50\%$  of missing data. For detailed information regarding the questionnaire development, conduct of the study and initial data collection [33].

The general procedure for the follow-up in 2015 was in alignment with the previous survey implementation. To increase the incentive to participate, a lottery to win prizes (gift certificates) was implemented. 5542 questionnaires were sent to the parents' addresses, with an initially low response rate of 29% ( $n=1625$ ). Therefore, an additional version of the questionnaire was available to fill out online ( $n=230$ ).

The Ethical Committee of the German Association of Psychology approved the study, as well as data safety procedures by the data protection representative of the University of Göttingen [33].

The present research is based on data collected with the second and the fifth wave. Since a broad range of variables were examined, only aspects relevant for the current study are presented in the following Participants.

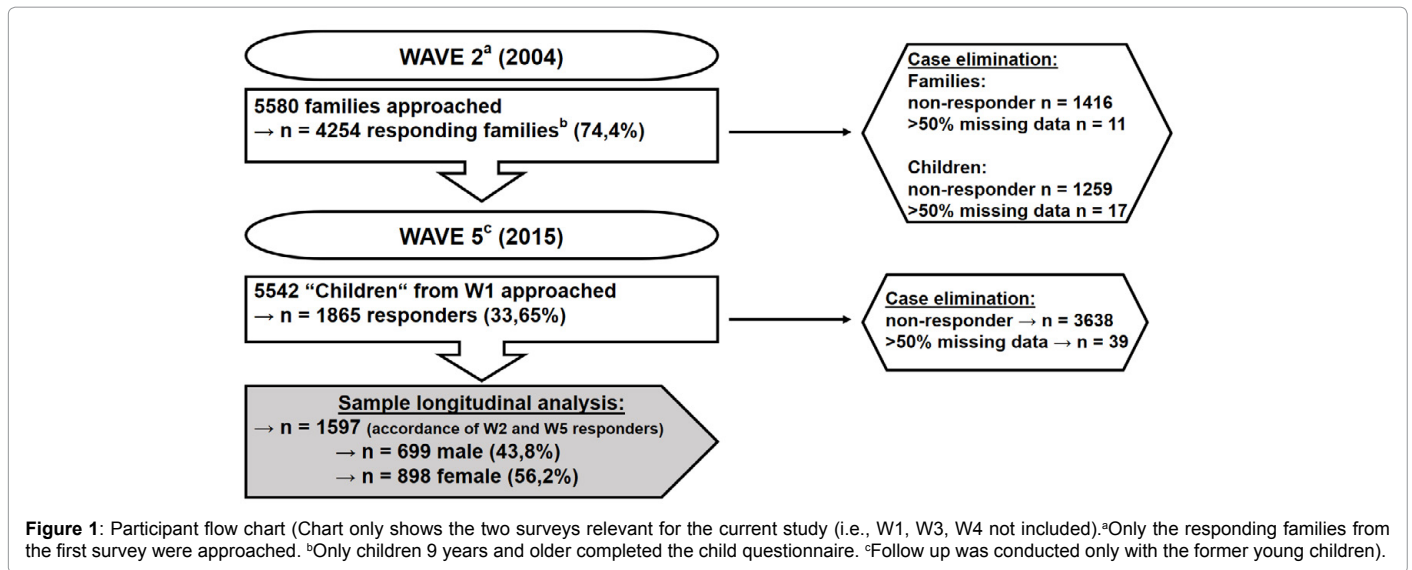
In the second wave, 5580 families (having responded in wave 1) were approached and 4153 participated. The mean age of the children supplying questionnaires was 11.9 ( $SD=2.03$ ) years with a range from 9 to 16 years. Out of the 5542 questionnaires sent out for the follow-up in W5, a total of 1865 of the former children returned valid questionnaires. For a detailed outline view (Figure 1). The sample analyzed consisted of respondents from W5, who had participated in W2 and whose parents' questionnaires of W2 were also available ( $n=1597$ ). A filter was used to ensure accordance of participants (W2 with W5). The mean age of this sample size was 22.4 years ( $SD=2.32$ ) with a range from 19 to 27 years and comprised of 56.2% females due to a higher percentage of male non-responders in W5.

### Measures

The complete questionnaires were comprehensive in their volume, in order to cover a wide range of health-related and personal aspects. Hence, complete psychometric tests often could not be applied. A subset of items from a variety of validated instruments was selected based on largest item-scale correlation coefficients or largest factor loadings [33].

### Predictor variables

**Internalizing symptoms:** This predictor, assessed in W2, was measured with eight items of the syndrome scale anxious/depressive from the Youth Self Report (YSR) [39] and three items from the Revised Children's Manifest Anxiety Scale (RCMAS) [40]. The German self-report version was issued [41]. Originally, the responses for the YSR items are scaled on a 3-point rating scale. For more differentiated responses and to adapt to the majority of the questionnaire items, the range of the response scale was modified to a 5-point scale (1=never



to 5=always) [33]. The eleven items selected were answered by the children regarding the past 3 months (item example: "I feel too guilty"). The internal consistency of this variable was good with a Cronbach's alpha of  $\alpha=0.87$ .

**Parental worry:** Data was obtained with the parents' questionnaire in the second survey. Parents answered three modified items from the Kinder Angsttest (KAT) [42] and three items from the German version of the Penn State Worry Questionnaire (PSWQ) [43], which were merged into a mean score of parental worry ( $\alpha=0.79$ ). In contrast to the original KAT, the items were formulated from parents' point of view (e.g., "I worry more about my child than other parents") and the range of the response scale was modified to a 5-point scale (1=not at all typical of me to 5=very typical of me). The PSWQ measures excessive, unrealistic worries [43] on a 5-point response scale as well (e.g., "I am always worrying about something").

**Perceived dysfunctional parenting style:** To assess negative parenting style perceived from children's and adolescents' point of view, six items from a German parenting style inventory, the Erziehungsstil Inventar (ESI) [44], were included into the child-questionnaire in wave 2. This predictor consisted of two items from the restriction scale (e.g., "When I do something wrong while I'm helping my mother/my father, she/he sends me away."), two items from the reproach scale (e.g., "My mother/my father gets angry, when I don't fulfill my duties.") and two items from the inconsistency scale (e.g., "I have been disciplined by my mother/my father without reason."). The scale was extended to a 5-point rating scale (1=never to 5=always). The items were merged into a mean score with an acceptable Cronbach's alpha of  $\alpha=0.71$ .

## Mediator Variables

### Recalled dysfunctional parenting style

The same items from the ESI were included in the questionnaire in W5 ( $\alpha=0.75$ ). They were modified to assess how the participants recalled parental rearing behavior throughout their childhood and adolescence.

### Self-efficacy

As a further mediator, self-efficacy was obtained during the follow-up survey with the young adults using the Allgemeine Selbstwirksamkeit

Kurzskala (ASKU) [45]. It is a validated short self-report measure assessing general self-efficacy on a 5-point response scale (1=doesn't apply at all to 5=applies completely). The scale consists of three items merged into a total mean score of self-efficacy (e.g., "I can rely on my own abilities in difficult situations."). The original scale demonstrated sufficient reliability with McDonald's  $\omega$  between 0.81 and 0.86., which can be interpreted in analogy to Cronbach's alpha [45]. Internal consistency of the current study was good ( $\alpha=0.83$ ).

## Outcomes

### Clinical anxiety

The outcome was assessed in W5 by asking the young adults whether they had experienced any anxiety problems during the last two weeks using the 7-item General Anxiety Disorder Scale (GAD-7) [46]. The screening covers the most prominent diagnostic features of DSM-IV diagnostic criteria for generalized anxiety disorder [47] (e.g., "Feeling nervous, anxious or on edge" or "Not being able to stop or control worrying"). According to Spitzer and colleagues [46], the screening was designed to primarily measure for GAD, but it seems to also act as a proxy measure of panic disorders, social anxiety disorders or posttraumatic stress disorder. Response options range originally from 0 (not at all) to 3 (nearly every day), but were modified to range from 1 to 4 instead. The data was recoded according to the original evaluation of the screening (0 to 3) and merged into a total score ranging from 0 to 21. A higher GAD-7 score indicates increased severity of anxiety symptoms.

According to the manual scores of  $\geq 5$ ,  $\geq 10$  and  $\geq 15$  represent cutoffs for mild, moderate and severe anxiety symptomology [46]. A score of 10 or more is an essential cut-off point for further diagnostic evaluation, suggesting that a clinically significant anxiety disorder may exist. In this study, the GAD-7 scores were dichotomized into a binary variable to represent a proxy diagnosis of an anxiety disorder with a total score of 10 or greater [46-48]. Cronbach's alpha of the current study was good with  $\alpha=0.85$ .

**Covariates:** According to studies, females tend to have twice as likely an anxiety disorder in comparison to males [e.g.,3], therefore gender was applied as a covariate to statistically control for possible gender effects. Age was included as a further covariate in the analysis.

Variables	Range	M (SD)	N#
Age W5	19 – 27	22.4 (2.32)	1597
Age W2	9 – 16	11.9 (2.03)	1335
Clinical Anxiety	0 – 21	4.08 (3.73)	1582
Internal. Symptoms	1 – 5	1.65 (0.53)	1325
Dysf. Parenting Style	1 – 5	1.92 (.054)	1336
Parental Worry	1 – 5	2.21 (0.68)	1543
Self-Efficacy	1 – 5	3.90 (0.61)	1585
Recalled Dysf. PS	1 – 5	1.94 (0.53)	1589
Gender			1597 ♀: 898 (56.2%) ♂: 699 (34.88%)

Note: M = Mean, SD = Standard Deviation, ♀ = Female, ♂ = Male. Sample size variation due to item-specific missing.

Table 1: Descriptive statistics of predictors, mediators and outcomes.

Variables	Clinical Anxiety (W5)	Intern	DysPS	PW	SE	RDysPS	Age
Intern (W2)	0.14**	-	-	-	-	-	-
DysPS (W2)	0.10**	0.38**	-	-	-	-	-
PW (W2)	0.09**	0.17**	0.12**	-	-	-	-
SE (W5)	-0.24**	-0.12**	-0.05*	-0.06*	-	-	-
RDysPS (W5)	0.21**	0.18**	0.36**	0.08**	-0.18**	-	-
Age (W5)	0.06*	0.21**	0.16**	0.02*	0.04	0.01	-
Gender	0.05*	0.19**	-0.02	0.02*	-0.09**	0.03	0.01

Note: Intern = Internalizing Symptoms; DysPS = Dysfunctional Parenting Style; PW = Parental Worry; SE = Self-Efficacy; RDysPS = Recalled Dysfunctional Parenting Style; N = 1324–1596, Variation due to items-specific missing.  
\*p<0.05 and \*\*p<0.01.

Table 2: Results of the correlation analysis of predictors, mediators and outcomes.

## Statistical analysis

The complete statistical analysis was executed using IBM SPSS Statistics 23.0. Descriptive statistics were compiled for all variables. To determine associations between variables, Pearson's correlation analysis was conducted, since it is relatively robust towards deviation from assumptions of normality [49]. In accordance with Field's [50] recommendation, the mediation analysis to examine direct, indirect and total effects to verify the hypotheses was conducted with Hayes [51] PROCESS tool for SPSS.

Benefits of using PROCESS are higher power, adjusting for control variables and testing the significance of the indirect effect. Since the model consisted of continuous mediators and a dichotomous outcome, a combination of linear and binary logistic regression was executed. Age and gender were inserted as covariates in all mediation analyses. According to Preacher and Hayes [52], bootstrap as a non-parametric resampling procedure was used to estimate the indirect effect and conduct biased corrected bootstrap confidence intervals, by which the significance of the mediation effect can be assessed (i.e., if the 95% biased-corrected confidence interval for the parameter estimate does not contain zero). Bootstrapping involves repeatedly resampling observations with replacement from the data set. With an increase in power, maintaining reasonable control over type I error rate and being distribution-independent it has advantages over the commonly applied Sobel Test [53]. In this analysis bootstrap was set to 10000. The level of significance was set to p<0.05.

## Results

### Descriptive statistics

An overall of N=1582 (99.1%) filled out the GAD-7 screening with 0.09% missing (N=15). The mean score amounted to 4.08 (SD=3.73). A number of 145 (9.1%) participants scored a 10 or higher on the GAD-7 screening and therefore compiled the sample of subjects with

a clinical significant level of anxiety symptoms. Of the 145 participants 95 (65.5%) were female. The sample size varies across variables due to item-specific missings. The mean score of internalizing symptoms, dysfunctional parenting style in W2 as well as W5 was on the lower end. For a complete overview of descriptive statistics (Table 1).

### Correlation analysis

To test for collinearity and examine associations between all variables included in the analysis, Pearson's correlation analysis was conducted. By default, SPSS analyses point-biserial correlations of dichotomous variables with the Pearson correlation analysis command [50]. The results indicated small to modest significant correlations among the included variables. An overview of the results can be seen in (Table 2). Altogether these findings indicated a few variables might share some common variance, nevertheless they represent a set of relatively independent constructs. According to Field [50], since none of the correlations between these variables exceeded r=0.8, the relationships did not pose problems for the logistic regression analysis included in the mediation analysis.

### Mediation analysis

The covariates age and gender were included in all mediation models. As predicted, the mediation analysis revealed a significant total effect (path c) of internalizing symptoms on anxiety (b=0.72, z=4.54, p<0.001, Nagelkerke=0.04). Including self-efficacy as a mediator in the model, the significant total effect was reduced (path c'; b=0.59, z=3.62, p<0.001). The Nagelkerke value increased, indicating that approximately 14% of the variance in the outcome had been explained (Table 3). There was a significant indirect effect (a\*b) of internalizing symptoms on anxiety through self-efficacy (b=0.16, BCa CI [0.08, 0.27], OR=1.18; (Figure 2). The odds ratio being close to 1 represented a small effect, nevertheless indicating internalizing symptoms to increase the probability of clinical anxiety through lower self-efficacy.

IV	Path <sup>a</sup>	b	95% CI	t / z	Nagelkerke	BCa CI	OR	N <sup>b</sup>
Intern	a	-0.14***	[-0.19, -0.07]	-4.16				1470
	b	-1.19***	[-1.49, -0.91]	-8.05				
	c'	0.59***	[0.27, 0.92]	3.62	0.14			
	c	0.72***	[0.41, 1.03]	4.54	0.04			
	a*b	0.16				[0.08, 0.27]	1.18	
dysfPS	a	-0.07***	[-0.14, -0.01]	-2.40				1327
	b	-1.21***	[-1.49, -0.92]	-8.16				
	c'	0.50**	[0.17, 0.83]	2.97	0.13			
	c	0.55***	[0.23, 0.86]	3.37	0.03			
	a*b	0.09				[0.01, 0.18]	1.09	
ParWorry	a	-0.06**	[-0.10, -0.01]	-2.45				1531
	b	-1.22***	[-1.49, -0.95]	-8.66				
	c'	0.38**	[0.13, 0.64]	2.92	0.14			
	c	0.41***	[0.17, 0.66]	3.33	0.03			
	a*b	0.07				[0.01, 0.13]	1.07	

Note: IV = Independent Variable, BCa CI = 95% Bootstrapped Confidence Interval, OR = Odds Ratio, Intern = Internalizing Symptoms, dysfPS = Dysfunctional Parenting Style, ParWorry = Parental Worry,

<sup>a</sup>Path in the mediation model according to Preacher and Hayes (2008).

<sup>b</sup>Sample size variation due to item-specific missings.

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

Table 3: Results of the mediation analysis with self-efficacy as mediator.

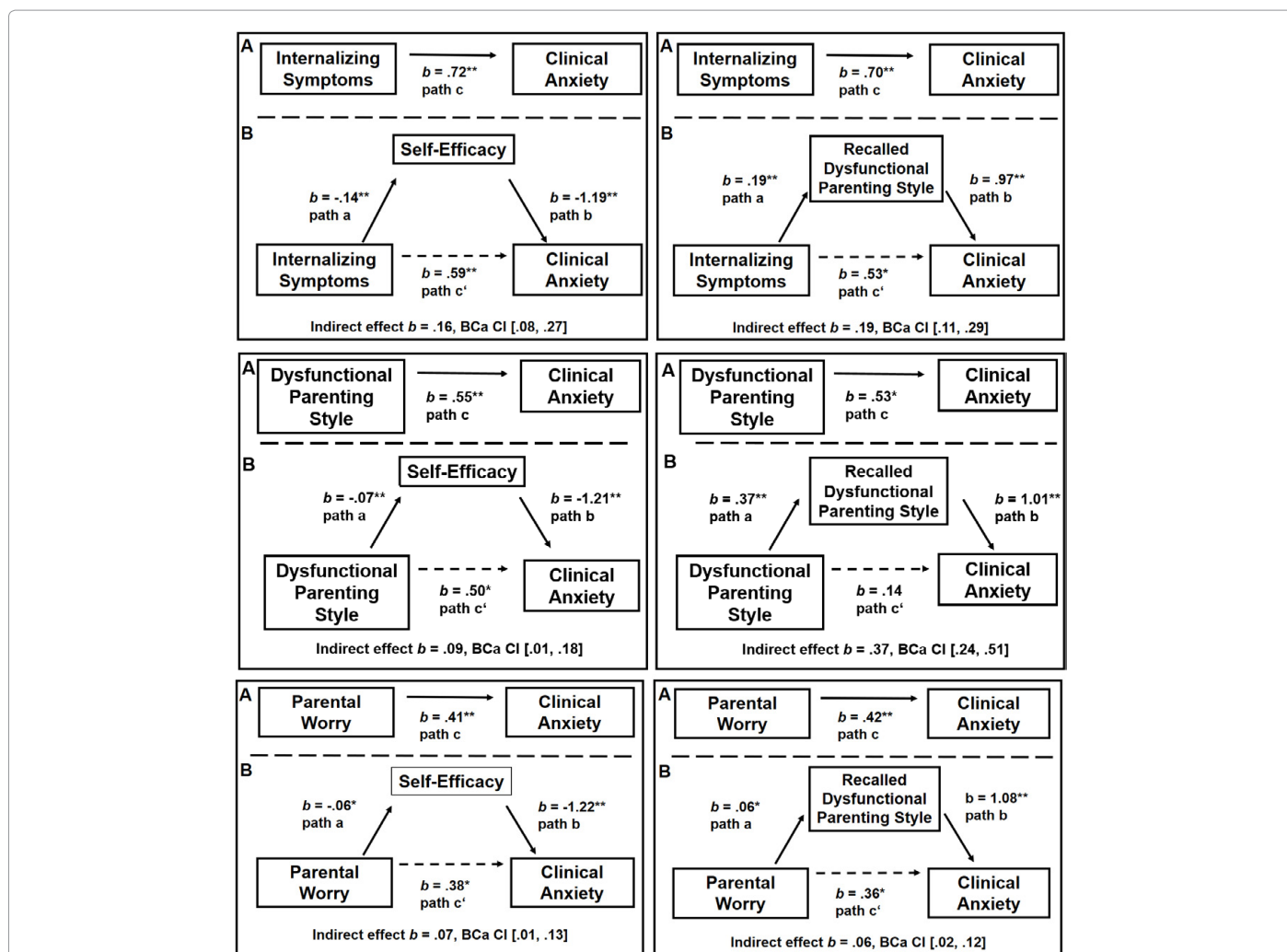


Figure 2: Mediation models with total effects, direct effects and indirect effects (BCa CI = bootstrapped confidence interval (bootstrap set to 10 000) A) total effect of predictors on anxiety. B) Mediation model with direct effect (path c') of predictor on outcome, path a, path b and indirect effect (figure according to Preacher & Hayes [53]). \*  $p < 0.01$ . \*\*  $p < 0.001$ .

IV	Path <sup>a</sup>	<i>b</i>	95% CI	<i>t</i> / <i>z</i>	Nagel kerke	BCa CI	OR	N <sup>b</sup>
Intern	a	0.19***	[0.14, 0.25]	6.95				1318
	b	0.97***	[0.66, 1.29]	6.06				
	c'	0.53**	[0.20, 0.85]	3.18	0.10			
	c	0.70***	[0.39, 1.01]	4.44	0.04			
	a*b	0.19				[0.11, 0.29]	1.20	
DysfPS	a	0.37***	[0.32, 0.42]	14.65				1329
	b	1.01***	[0.68, 1.34]	6.01				
	c'	0.14	[-0.21, 0.49]	0.79	0.08			
	c	0.53**	[0.22, 0.85]	3.29	0.03			
	a*b	0.37				[0.24, 0.51]	1.45	
ParWorry	a	0.06**	[0.02, 0.10]	2.94				1536
	b	1.08***	[0.79, 1.37]	7.26				
	c'	0.36**	[0.11, 0.61]	2.80	0.10			
	c	0.42***	[0.17, 0.66]	2.04	0.03			
	a*b	0.06				[0.02, 0.12]	1.07	

Note: IV = Independent Variable, BCa CI = 95% Bootstrapped Confidence Interval, OR = Odds Ratio, Intern = Internalizing Symptoms, dysfPS = Dysfunctional Parenting Style, ParWorry = Parental Worry

<sup>a</sup>Path in the mediation model according to Preacher and Hayes (2008).

<sup>b</sup>Sample size variation due to item-specific missings.

\**p*<0.05. \*\**p*<0.01. \*\*\**p*<0.001.

**Table 4:** Results of the mediation analysis with recalled dysfunctional parenting style as mediator.

However, this effect should be interpreted cautiously, since there were no confidence intervals computed for the odds ratio due to the binary outcome. For the variable dysfunctional parenting style, the total effect (path *c*) on anxiety was significant (*b*=0.55, *z*=3.37, *p* <0.001) as well as the direct effect (path *c'*) with self-efficacy in the model (*b*=0.50, *z*=2.29, *p* <.01, (Figure 2). By including self-efficacy in the model, the Nagelkerke increased from 0.03 to 0.13 (not including mediators). In line with the hypothesis, the effect of mediation (*b*=0.09, BCa CI [.01, 0.18]) was statistically significant as evidenced by the bias-corrected confidence interval not including zero. However, the effect with an OR of 1.09 is marginal and due to the lack of confidence intervals should be interpreted cautiously. Nevertheless, the result suggests increased perceived dysfunctional parenting style increased the probability of clinical anxiety through lower self-efficacy. As hypothesized, parental worry predicted anxiety with a significant total effect (path *c*; *b*=0.41, *z*=3.33, *p* <.0001). The variance explained increased from Nagelkerke=0.03 to Nagelkerke=0.14 after including self-efficacy in the model (Table 3). The mediation effect via self-efficacy was statistically significant with an OR of 1.07 (*b*=0.06, BCa CI [1,13]; (Figure 2). Age as a covariate was significantly associated with self-efficacy, revealing that older subjects felt more efficacious than younger. Only in the mediation model including parental worry age effects (*p*<0.05) on anxiety became evident. Gender effects were significant in the model of the total effect, but disappear when the mediators were included.

When recalled dysfunctional parenting style was included as a mediator, a significant direct effect (path *c'*) of internalizing symptoms on clinical anxiety was observed (*b* =.53, *z*=3.18, *p* <.01, (Figure 2) and explained approximately 10% of variance of the outcome. This effect was reduced in comparison to the total effect without the mediator in the model (*b*=0.70, *z*=4.44, *p*<.001). The indirect effect (*a*\**b*) was significant with an odds ratio of 1.20 (*b*=0.19, BCa CI [11,29], (Table 4). Therefore, internalizing symptoms increased the probability of recalled dysfunctional parenting style which predicted anxiety. However, as with the previous results this effect should be interpreted cautiously since it was small and a confidence interval for the OR was not computed. As hypothesized, the total effect (path *c*) of perceived dysfunctional parenting style on clinical anxiety was significant (*b*=0.53, *z*=3.29, *p* <.01) and explained about 3% of the variance. Including the mediator recalled dysfunctional parenting style in the model (path *c'*), the

direct effect was reduced and not significant (Table 4), therefore the relationship between dysfunctional parenting style with anxiety seems to have been completely mediated by recalled dysfunctional parenting style with a significant indirect effect (*b*=0.37, BCa CI [0.24, 0.51], OR=1.45; (Figure 2).

Parental worry significantly predicted anxiety with a total effect of *b*=0.42, *z*=2.04, *p*<0.001 and explained about 3% of the variance (Figure 2). Including the mediator in the model reduced the direct effect somewhat (Table 4). The value of the Nagelkerke increased and explained approximately 11% of variance in the outcome. In line with the hypothesis, there was a statistically significant mediation effect with an OR of 1.07 (Table 4). Age was significantly associated with self-efficacy, revealing that younger subjects recalled parental rearing behavior as being more dysfunctional. Only in the mediation model with parental worry effects of age on anxiety became significant (*p*<0.05). The effect of gender was significant regarding direct effects but not after including the mediator in the model.

## Discussion

The purpose of this study was to investigate potential childhood predictors of anxiety in young adults considering possible mediation effects in a German community based sample. In accordance with the TVM, it was hypothesized that internalizing symptoms, perceived dysfunctional parenting style and parental worry during childhood were associated with increased anxiety in early adulthood. Furthermore, this study examined if these relationships were mediated by recalled dysfunctional parenting style and self-efficacy.

As hypothesized, the selected variables significantly predicted clinical relevant anxiety symptoms in young adults. The effect of the three predictors were partially mediated by self-efficacy and recalled dysfunctional behavior, i.e. low self-efficacy and a high level of recalled dysfunctional parenting behavior increased the probability of the presence of a clinically relevant level of anxiety symptoms in young adults. Perceived dysfunctional behavior was fully mediated by recalled dysfunctional behavior in young adults more than 10 years later. However, it should be emphasized that only small amounts of variance could be explained by the regression model.

As hypothesized, increased internalizing symptoms during childhood/adolescence predicted anxiety in early adulthood. This result is consistent with other studies that examined the same issue [31,54,55]. These longitudinal studies mostly examined the effect from childhood into adolescence, while the current study demonstrated that the effect was persistent into early adulthood. As expected, the association between internalizing symptoms and anxiety was partially mediated by the proposed mediators, underlining previous research [56]. According to Rubin and Mills [57], parents of children with internalizing symptoms tend to ascribe maladaptive behavior rather to their child's disposition instead to their mode of parenting. They reported that mothers of anxious/withdrawn children showed a complex mix of conflicting emotions of anger, disappointment, guilt and embarrassment when their children displayed anxious behavior. Furthermore, these parents were more likely to resort to ineffective, harsh and punitive discipline techniques [58]. Therefore, our data suggest that children with internalizing symptoms find themselves as the objective of their parents' unfavorable behavior. Consequently, children may display increased internalizing symptoms and elicit further unresponsive parenting – resulting in a negative feedback loop [58]. The current study supports this line of thought by significantly predicting recalled dysfunctional behavior by increased internalizing symptoms in childhood. So, anxious children might receive and therefore perceive more negative parenting which seems to have an impact well into adulthood.

As described, dysfunctional parenting style perceived by the children in childhood was linked to anxiety in early adulthood. This relation was partially mediated by low self-efficacy and fully mediated by recalled dysfunctional parenting style. The results of this study support that by experiencing inconsistent punishment or reproach as well as high levels of parental criticism and inconsistency, children's sense of uncertainty about their environment and own ability to cope with challenges and problems increase over time, resulting in lower self-efficacy [19]. This may lead to dysfunctional coping strategies in stressful and emotional situations such as avoidant coping and this may result in a further increase the risk of anxiety symptoms [59]. This association was also found in earlier studies [14,60].

The findings of the current study support the validity of the effect of negative parenting styles on anxiety described by earlier studies [13,15,36]. Parenting style was assessed retrospectively from children's perspective. Perceived parenting style might not necessarily be congruent with actual parenting [59]. This could be an explanation as to why the relationship of perceived dysfunctional parenting style in childhood with anxiety in early adulthood was fully mediated by the offspring's recollection of their parents parenting style. Data may be affected by recall bias, since memories of childrearing reflect an assortment of subtle, subjective recollections [13]. Therefore, it is debatable if rearing behavior perceived by children is more important in the development and maintenance of psychopathology than actual parenting behavior.

In this study parental worry in childhood significantly predicted anxiety in early adulthood. This supports most findings of earlier studies that also documented parental worry and overprotection to predict child-reported anxiety symptoms [61] or social phobia in offspring [15]. One study however suggested increased worrying and associated overprotection lead to less anxiety in children [62], contradicting most previous research. An important aspect may be children's perception of parental worry and anxious rearing [63], since anxious rearing practices might have different effects on anxious children than non-

anxious children [27]. Unfortunately, the children's perception of their parent's worrying - originally assessed in W2 - could not be included in this analysis due to the poor internal consistency of the scale ( $\alpha = 0.58$ ). This should be incorporated into future research.

The current study features several limitations worth mentioning. Internalizing symptoms, perceived and recalled dysfunctional parenting style as well as parental worry were examined with only a few items instead of the complete instrument. Therefore, the content validity and also reliability can be questioned. Following the same line of reasoning, anxiety was assessed with the GAD-7 which is a screening instrument primarily focusing on GAD symptoms and not designed as a clinical tool for diagnosing anxiety disorders. Even though studies revealed it's potential to detect different anxiety disorders in individuals with scores of 10 or higher, it does not assure a clinically valid diagnosis of anxiety disorders [48]. Hence, a standardized diagnostic instrument to assess anxiety disorders would have provided a superior assessment of the outcome.

This analysis incorporated only a small selection of potential risk factors. If Barlow's TVM is considered [6,7], factors regarding general biological vulnerability were not included, even though they exert a strong influence on the psychopathology of anxiety disorders [2,8,10]. This is why future studies should focus on interdisciplinary research and include factors from all three vulnerabilities (general biological, general psychological, disorder-specific psychological) presented in the TVM.

The variables in this study were not obtained by both possible informants, the children and the parents [14]. Future research could include data from both informants and possibly extend to different reporters. As well as further aspects possibly affecting the outcome (e.g., counselling, critical life events).

One proposition that gains increased acceptance for detailed data elicitation would be using cell phone software (apps) for smartphones and tablets [64]. Even among health care providers in the field the use of apps has increased over the years [65] to assess symptoms and behaviors and track them over a longer period of time [64]. Furthermore, the participation and compliance can be increased with regular alerts and reminders sent out via app or text message.

## Conclusion

In conclusion, the results of the present study assert that childhood internalizing, perceived negative childrearing and lower self-efficacy predict the anxiety in young adults as proclaimed by Barlow's TVM and are in line with previous research [14,15, 36, 35]. Even though these findings underline the importance of different interacting factors involved in the development of anxiety disorders [6,7], only a small amount of variance of the anxiety symptoms could be explained and the statistically significant effects were rather small. Through using mediation analysis, this study extends existing research in showing how low self-efficacy and dysfunctional parenting style recalled in adulthood increase the risk of developing anxiety disorders and influence the relationship of childhood risk factors. By including age and gender as covariates in the analysis, this study revealed that significant gender effects became not significant after including the mediators into the models. Therefore, possible gender effects reported in studies [3] might represent underlying effects of other influential factors.

Nevertheless, long term effects of childhood factors on the etiology of anxiety disorders are emphasized. With this knowledge, preventive measures in childhood, for example parenting trainings or early

interventions can incorporate addressing potential risk factors and therefore decrease the risk of anxiety disorders later on in life. However, there is still reasonable latitude for future research which should include more factors and how they are associated with each other to maximize the understanding of how anxiety disorder develop and subsequently how they can be prevented.

### Acknowledgments

We would like to thank Anastasia Gorbunova for her support and contribution in data management and statistical analysis.

### References

1. Kessler RC, Chiu WT, Demler O, Walters EE (2005) Prevalence, severity, and comorbidity of 12-month DSM-IV disorders in the National Comorbidity Survey Replication. *Arch Gen Psychiatry* 62: 617-627.
2. Künster AK, Ziegenhain U, Schulze U, Buchheim A, Wietersheim VH, et al. (2012) Transgenerationale Effekte mütterlicher Angs. *Monatsschrift Kinderheilkunde* 160: 982-987.
3. Rapee RM, Schniering CA, Hudson JL (2009) Anxiety disorders during childhood and adolescence: Origins and treatment. *Annu Rev Clin Psychol* 5: 311-341.
4. Angst J, Gamma A, Baldwin DS, Ajdacic GV, Rössler W (2009). The generalized anxiety spectrum: prevalence, onset, course and outcome. *Eur Arch Psychiatry Clin Neurosci* 259: 37-45.
5. Wittchen HU, Hoyer J (2011) *Klinische Psychologie und Psychotherapie*. Springer Berlin Heidelberg.
6. Barlow DH (2000) Unraveling the mysteries of anxiety and its disorders from the perspective of emotion theory. *Am Psychol* 55: 1247-1263.
7. Barlow, DH (2002). *Anxiety and its disorders. The nature and treatment of anxiety and panic* (2nd edn.) New York: Guilford Press.
8. Brown TA, Naragon GK (2013) Evaluation of the unique and specific contributions of dimensions of the triple vulnerability model to the prediction of DSM-IV anxiety and mood disorder constructs. *Behav Ther* 44: 277-292.
9. Schreier A, Wittchen HU, Höfler M, Lieb R (2008) Anxiety disorders in mothers and their children: prospective longitudinal community study. *Br J Psychiatry* 192: 308-309.
10. Hettema JM, Neale MC, Kendler KS (2001) A review and meta-analysis of the genetic epidemiology of anxiety disorders. *Am J Psychiatry* 158: 1568-1578.
11. Hettema JM, Prescott CA, Myers JM, Neale MC, Kendler KS (2005). The structure of genetic and environmental risk factors for anxiety disorders in men and women. *Arch Gen Psychiatry* 62: 182-189.
12. Burt SA (2009) Rethinking environmental contributions to child and adolescent psychopathology: a meta-analysis of shared environmental influences. *Psychol Bull* 135: 608-637.
13. Rapee RM (1997) Potential role of childrearing practices in the development of anxiety and depression. *Clin Psychol Rev* 17: 47-67.
14. McLeod BD, Wood JJ, Weisz JR (2007) Examining the association between parenting and childhood anxiety: A meta-analysis. *Clin Psychol Rev* 27: 155-172.
15. Lieb R, Wittchen HU, Höfler M, Fuetsch M, Stein MB, et al. (2000) Parental psychopathology, parenting styles, and the risk of social phobia in offspring: a prospective-longitudinal community study. *Arch Gen Psychiatry* 57: 859-866.
16. Bögels SM, Oosten VA, Muris P, Smolders D (2001) Familial correlates of social anxiety in children and adolescents. *Behav Res Ther* 39: 273-287.
17. Bandura A (1982) The assessment and predictive generality of self-percepts of efficacy. *J Behav Ther Exp Psychiatry* 13: 195-199.
18. Masten AS, Best KM, Garmezy N (1990) Resilience and development: Contributions from the study of children who overcome adversity. *Development and Psychopathology* 2: 425-444.
19. Bandura A (1994). Self-efficacy. *Encyclopedia of Human Behavior* (Vol. 4, pp. 71-81). New York: Academic Press. In V.S. Ramachandran (Ed.), (Reprinted in H. Friedman [Ed.], *Encyclopedia of Mental Health*. Academic Press, 1998, San Diego.
20. Hofmann SG, Moscovitch DA, Kim HJ, Taylor AN (2004) Changes in self-perception during treatment of social phobia. *J Consult Clin Psychol* 72: 588-596.
21. Goldin PR, Ziv M, Jazaieri H, Werner K, Kraemer H, et al. (2012) Cognitive reappraisal self-efficacy mediates the effects of individual cognitive-behavioral therapy for social anxiety disorder. *J Consult Clin Psychol* 80: 1034-1040.
22. Bouchard S, Gauthier J, Nouwen A, Ivers H, Vallières A, et al. (2007) Temporal relationship between dysfunctional beliefs, self-efficacy and panic apprehension in the treatment of panic disorder with agoraphobia. *J Behav Ther Exp Psychiatry* 38: 275-292.
23. Thomasson P, Psouni E (2010) Social anxiety and related social impairment are linked to self-efficacy and dysfunctional coping. *Scand J Psychol* 51: 171-178.
24. Chorpita BF, Brown TA, Barlow DH (1998) Perceived control as a mediator of family environment in etiological models of childhood anxiety. *Behav Ther* 29: 457-476.
25. Wood JJ, McLeod BD, Sigman M, Hwang WC, Chu BC (2003) Parenting and childhood anxiety: Theory, empirical findings, and future directions. *J Child Psychol Psychiatry* 44: 134-151.
26. Bögels SM, Brechman ML (2006) Family issues in child anxiety: Attachment, family functioning, parental rearing and beliefs. *Clin Psychol Rev* 26: 834-856.
27. Brakel AM, Muris P, Bögels SM, Thomassen C (2006). A multifactorial model for the etiology of anxiety in non-clinical adolescents: Main and interactive effects of behavioral inhibition, attachment and parental rearing. *Journal of Child and Family Studies* 15: 568-578.
28. Grüner K, Muris P, Merckelbach H (1999) The relationship between anxious rearing behaviours and anxiety disorders symptomatology in normal children. *J Behav Ther Exp Psychiatry* 30: 27-35.
29. Gregory AM, Caspi A, Moffitt TE, Koenen K, Eley TC, et al. (2007) Juvenile mental health histories of adults with anxiety disorders. *Am J Psychiatry* 164: 301-308.
30. Verhulst FC, Van Der Ende J (1992) Six-year developmental course of internalizing and externalizing problem behaviors. *J Am Acad Child Adolesc Psychiatry* 31: 924-931.
31. Stanger C, McConaughy SH, Achenbach TM (1992) Three-year course of behavioral/emotional problems in a national sample of 4- to 16-year-olds: II. Predictors of Syndromes. *Journal of the American Academy of Child & Adolescent Psychiatry* 31: 941-950.
32. Pine DS, Cohen P, Gurley D, Brook J, Ma Y (1998) The risk for early-adulthood anxiety and depressive disorders in adolescents with anxiety and depressive disorders. *Arch Gen Psychiatry* 55: 56-64.
33. Kröner-Herwig B, Heinrich M, Morris L (2007) Headache in German children and adolescents: a population-based epidemiological study. *Cephalalgia*, 27: 519-527.
34. Bittner A, Egger HL, Erkanli A, Costello EJ, Foley DL, et al. (2007) What do childhood anxiety disorders predict? *J Child Psychol Psychiatry* 48: 1174-1183.
35. Woodward LJ, Fergusson DM (2001) Life course outcomes of young people with anxiety disorders in adolescence. *J Am Acad Child Adolesc Psychiatry* 40: 1086-1093.
36. Johnson JG, Cohen P, Kasen S, Smailes E, Brook JS (2002) Maladaptive parenting and the association between parental and offspring psychiatric disorders. *Z Psychosom Med Psychother* 48: 396-410.
37. Nanda MM, Kotchick BA, Grover RL (2012) Parental psychological control and childhood anxiety: The mediating role of perceived lack of control. *Journal of Child and Family Studies* 21: 637-645.
38. Muris P (2002) Relationships between self-efficacy and symptoms of anxiety disorders and depression in a normal adolescent sample. *Personality and Individual Differences*, 32(2), 337-348.
39. Achenbach TM (1991) *Manual for the youth self-report and 1991 profile*. Burlington, VT: Department of Psychiatry, University of Vermont.
40. Reynolds CR, Richmond BO (1985) *Revised children's manifest anxiety scale*. Los Angeles: Western Psychological Services.
41. Döpfner M, Plück J, Bölte S, Lenz K, Melchers P, et al. (1998). Arbeitsgruppe Deutsche Child Behavior Checklist. Elternfragebogen über das Verhalten von Kindern und Jugendlichen 4-18.



42. Thurner F, Tewes U (1975) *Der Kinder-Angst-Test: KAT; ein Fragebogen zur Erfassung des Ängstlichkeitsgrades von Kindern ab 9 Jahren*. Göttingen. Verlag für Psychologie, Hogrefe.
43. Stöber J (1995) Besorgnis: ein Vergleich dreier Inventare zur Erfassung allgemeiner Sorgen. *Zeitschrift für differentielle und diagnostische Psychologie* 16: 50-63.
44. Krohne HW, Pulsack A (1995) *Das Erziehungsstil-Inventar, Manual*. Göttingen: Beltz Test GmbH.
45. Beierlein C, Kovaleva A, Kemper CJ, Rammstedt B (2012) Ein Messinstrument zur Erfassung subjektiver Kompetenzerwartungen. *Allgemeine Selbstwirksamkeit Kurzsкала (ASKU)*.
46. Spitzer RL, Williams JBW, Kroenke K (1999) Instruction manual: Instructions for Patient Health Questionnaire (PHQ) and GAD-7 measures.
47. Löwe B, Decker O, Müller S, Brähler E, Schellberg D, et al. (2008) Validation and standardization of the Generalized Anxiety Disorder Screener (GAD-7) in the general population. *Med Care* 46: 266-274.
48. Kroenke K, Spitzer RL, Williams JB, Monahan PO, Löwe B (2007) Anxiety disorders in primary care: prevalence, impairment, comorbidity, and detection. *Ann Intern Med* 146: 317-325.
49. Havlicek LL, Peterson NL (1977) Effect of the violation of assumptions upon significance levels of the Pearson  $r$ . *Psychological Bulletin* 84: 373-377.
50. Field A (2013) *Discovering statistics using IBM SPSS statistics*. Sage Publications, UK.
51. Hayes AF (2012) PROCESS: A versatile computational tool for observed variable mediation, moderation, and conditional process modeling.
52. Preacher KJ, Hayes AF (2004) SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behav Res Methods Instrum Comput* 36: 717-731.
53. Preacher KJ, Hayes AF (2008) Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods* 40: 879-891.
54. Foley DL, Pickles A, Maes HM, Silberg JL, Eaves LJ (2004) Course and short-term outcomes of separation anxiety disorder in a community sample of twins. *J Am Acad Child Adolesc Psychiatry* 43: 1107-1114.
55. Hofstra MB, Van der Ende J, Verhulst FC (2002). Child and adolescent problems predict DSM-IV disorders in adulthood: A 14-year follow-up of a Dutch epidemiological sample. *J Am Acad Child Adolesc Psychiatry* 41: 182-189.
56. Ginsburg GS, Grover RL, Ialongo N (2005) Parenting behaviors among anxious and non-anxious mothers: Relation with concurrent and long-term child outcomes. *Child & Family Behavior Therapy*, 26: 23-41.
57. Rubin KH, Mills RS (1990) Maternal beliefs about adaptive and maladaptive social behaviors in normal, aggressive, and withdrawn preschoolers. *Journal of Abnormal Child Psychology* 18: 419-435.
58. Laskey BJ, Cartwright-Hatton S (2009) Parental discipline behaviours and beliefs about their child: associations with child internalizing and mediation relationships. *Child Care Health Dev* 35: 717-727.
59. Hudson JL, Rapee RM (2004) From anxious temperament to disorder: An etiological model. In R. Heimberg, C. Turk, & D. Mennin (Eds.) *Generalized anxiety disorder: Advances in Research and Practice* (pp. 51-74). New York, NY: Guilford Press
60. Grover RL, Ginsburg GS, Ialongo N (2005) Childhood predictors of anxiety symptoms: A longitudinal study. *Child Psychiatry Hum Dev* 36: 133-153.
61. Festa CC, Ginsburg GS (2011) Parental and peer predictors of social anxiety in youth. *Child Psychiatry Hum Dev* 42: 291-306.
62. Van Gastel W, Legerstee JS, Ferdinand RF (2009). The role of perceived parenting in familial aggregation of anxiety disorders in children. *J Anxiety Disord* 23: 46-53.
63. Waters AM, Zimmer-Gembeck MJ, Farrell LJ (2012) The relationships of child and parent factors with children's anxiety symptoms: Parental anxious rearing as a mediator. *J Anxiety Disord* 26: 737-745.
64. Luxton DD, McCann RA, Bush NE, Mishkind MC, Reger GM (2011) mHealth for mental health: Integrating smartphone technology in behavioral healthcare. *Professional Psychology: Research and Practice* 42: 505-512.
65. Franko OI, Tirrell TF (2012) Smartphone app use among medical providers in ACGME training programs. *J Med Syst* 36: 3135-3139.