

**The association between parenting behaviour and somatisation in adolescents explained  
by physiological responses in adolescents**

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### **Abstract**

**Introduction.** This study adds to knowledge on somatisation in adolescents by exploring its relation with parenting behaviour and the mediating/moderating role of physiological responses in adolescents to parenting behaviour. **Method.** Eighteen adolescents with high and eighteen adolescents with low somatisation scores and their mothers completed a discussion task, from which observed parenting behaviour scores were derived. Skin conductance in adolescents was measured before and during the discussion. **Results.** For adolescents with high levels of physiological responses, unadaptive parenting was related to a higher chance of high somatisation scores. For low physiologically responsive adolescents, the relation between parenting behaviour and somatisation was not significant. **Conclusion.** Parenting behaviour is not univocally related to somatisation in adolescents, but the association depends on physiological responses in adolescents.

*Keywords.* Parenting behaviour, Adolescents, Physiological responses, Somatisation, Interaction, Observation

## **1. Introduction**

About 15 to 25% of all adolescents report recurrent or continuous physical complaints, such as dizziness, headaches, or fatigue (Lundqvist, Clench-Aas, Hofoss, & Bartonova, 2006; Perquin et al., 2000). The majority of these complaints can be classified as physical functional complaints (PFC): physical complaints for which no straightforward medical cause is found (Campo & Frisch, 1994; Garralda, 1996). The tendency to experience and report multiple PFC is named somatisation (De Gucht & Fischler, 2002). The impact of somatisation is substantial, both for the child (e.g., physical discomfort, restricted school attendance; Campo, Comer, Jansen-McWilliams, Gardner, & Kelleher, 2002) and the child's family (e.g., family stress; Palermo & Eccleston, 2009). Insight into the aetiology of somatisation is needed to tailor efficient treatment. Although considerable aetiological research has been conducted, several domains remain understudied, such as the association between somatisation and parenting behaviour (Palermo & Chambers, 2005).

### **1.1. Parenting behaviour**

Parenting behaviours can be classified into two dimensions: warmth (parenting behaviours that show support, acceptance and understanding) and control (parenting behaviours undertaken to influence the child's behaviours) (Barber, 1996; Baumrind, 1991; Maccoby & Martin, 1983; Rollins & Thomas, 1979). The control dimension can be differentiated into behavioural control (the child's behaviour is controlled directly, e.g., through punishment) and psychological control (the child's behaviour is controlled indirectly, through control of the child's emotions and cognitions, e.g., guilt induction) (Barber, 1996). Previous studies on the link between parenting behaviour and adolescent internalising and externalising problems showed that more psychological control is mainly associated with higher levels of internalising problems, while behavioural control is related to externalising

problems (Barber, 1996). Barber (1996) explains these unique connections by stating that internalising problems predominantly flow from stifled independent expression and autonomy, typically induced by higher levels of parental psychological control. In contrast, externalising problems are more likely to flow from difficulties in self-regulation, or from behaviour which is set to test limits of acceptable behaviour, typically induced by inadequate parental behavioural regulation (e.g., more harsh punishment). Higher parental warmth was identified as a significant predictor of both more internalising and more externalizing child behaviour (Galambos, Barker & Almeida, 2003).

## **1.2. Parenting behaviour and somatisation**

Within the large theoretical framework of somatisation, cognitive and emotional functioning in adolescents have been proposed to play a key aetiological role (Campo et al., 2004; Diepenmaat, van der Wal, de Vet, & Hirasing, 2006). Since cognitive and emotional functioning in adolescents is also related to parenting behaviour, it can be assumed to (partly) explain the link between parenting and somatisation (Barber, 1996). More specific, the stress theory can be applied (Eminson, 2007; Lazarus & Folkman, 1984). Traditionally, this theory distinguishes three components: the event, a persons' immediate responses to it (emotional, cognitive, behavioural, and physiological), and the outcome. The event is believed to be related to the outcome, mediated or moderated by the immediate responses. In accordance with the stress theory, parenting behaviour can be conceived as the event, somatisation as the outcome, mediated or moderated by responses of adolescents to parenting behaviour. Generally, two assumptions have been made about the link between events, responses, and outcome (Lazarus, 1999). The first assumption states an objective stimulus-response link, or in other words that comparable events are responded to in the same way by everyone and therefore cause comparable results (e.g., adolescents who experience high amounts of

parental psychological control, will all respond to it in the same way, resulting in comparable somatisation outcome). The second assumption states that comparable events can be reacted to in different ways by different people and therefore cause different results (e.g., adolescents who experience high amounts of parental psychological control may respond to it in different ways, resulting in different somatisation outcome). In other words, while the first approach suggests that the relation between event and outcome is mediated by responses, the second approach supports moderation.

Empirical studies found that lower warmth was related to higher somatisation (Feldman, Ortega, Koinis-Mitchell, Kuo, & Canino, 2010; Kristjansdottir & Rhee, 2002; Rhee, Holditch-Davis, Miles, & Miles, 2005). Relying on the general parenting literature, one could also expect a relation between psychological control and somatisation, however we are not aware of research on this issue. A first challenge for further research, and a first goal of the current study, is to investigate the relation between both dimensions of general parenting behaviour and somatisation.

A second challenge for further research is the inclusion of possible mediators/moderators. Above, we stated that the link between parenting behaviour and somatisation might be explained by the stress theory. In that view, the relation between parenting behaviour and somatisation may be mediated or moderated by emotional, cognitive, behavioural, and physiological responses of adolescents to parenting behaviour. The second goal of this study is to assess this hypothesis, focussing on physiological responses in adolescents caused by the autonomic nervous system (ANS). The ANS controls a variety of vital organs through the reciprocally functioning sympathetic and parasympathetic branches. When higher order brain centres detect events that are possibly harmful (instead of benign or irrelevant), sympathetic activity (energizing influence on various target organs) increases and parasympathetic activity (feeding, energy storage and

reproduction) decreases (Lovallo, 2005). Research on the link between physiological responses and somatisation revealed that somatisation is related to higher amounts of sympathetic and lower amounts of parasympathetic physiological activity in reaction to a variety of external events (Dietrich et al., 2011; Dorn et al., 2003; Dufton, Dunn, Slosky, & Compas, 2011; Rief & Auer, 2001; Tak & Rosemalen, 2007; Tak & Rosemalen, 2010). We are not aware of research on the relation between parenting behaviour and physiological responses of adolescents to parenting behaviour.

### **1.3. Research questions and hypotheses**

In sum, this study addresses two knowledge gaps: the first gap concerns the relation between parenting behaviour (psychological control and warmth) and somatisation in adolescents, and the second concerns the mediation/moderation of this relation by physiological responses in adolescents. Three research questions are examined:

- 1) Are there significant independent relations between parenting behaviour (psychological control and warmth) and somatisation in adolescents?
- 2) Is the relation between parenting behaviour and somatisation in adolescents moderated by physiological responses of adolescents to parenting behaviour?
- 3) Is the relation between parenting behaviour and somatisation in adolescents mediated by physiological responses of adolescents to parenting behaviour?

Relying on the stimulus-response assumption in stress-theory, it is hypothesised that adolescents with high somatisation scores experience more parental psychological control and less warmth than adolescents with low somatisation scores, and that the relation between parental psychological control/warmth and high somatisation scores is mediated by higher levels of physiological responses to parenting behaviour. Relying on the moderation

assumption of the stress-theory, it is hypothesised that the relation between parenting and somatisation depends on the level of physiological responses to parenting behaviour.

## 2. Material and methods

### 2.1. Participants

Parents and adolescents included in this research were participants in the JOnG1-study, a longitudinal research program on development, parenting, behaviour and health in three cohorts of Flemish children (Grietens, Hoppenbrouwers, Desoete, Wiersema, & Van Leeuwen, 2010). The eldest cohort included 1499 adolescents and their parent (mostly mothers), who filled out questionnaires in 2009 (adolescents were 12-13 years old), 2010 (13-14 years old) and 2011 (14-15 years old). Based on 2010 self report data, a total of 73 adolescents with high somatisation scores ( $> 1.5 SD$  above the mean SCL-score [ $M = 1.60$ ,  $SD = 0.54$ ], cf. infra) were invited for a face-to-face contact. In addition, 100 control adolescents were randomly selected from the group of adolescents with low somatisation scores ( $< \text{mean SCL-score}$  for both the 2009 [ $M = 1.68$ ,  $SD = 0.54$ ] and 2010 survey [ $M = 1.60$ ,  $SD = 0.54$ ], i.e. 382 adolescents). In total, 20 adolescents with high and 25 adolescents with low somatisation scores participated in 2011 in the face-to-face contact. For the current analyses, data of two adolescents with high somatisation scores were excluded due to resistance towards the discussion task and technical problems regarding the physiological measurement. In addition, 3 female and 4 male adolescents were randomly removed from the low levels of somatisation group in order to match both study samples on gender (7 males, 11 females). Included families were compared to non-included families concerning gender of adolescents, family constellation, family origin, parental occupation, parental education, and family income by means of chi-square tests. For the high levels of somatisation group, no significant differences were seen. However, in the low levels of somatisation group,

significant differences were revealed for mothers' work status (in participating families, mothers had more often paid work;  $X^2(1) = 6.68, p = 0.01$ ), and parents' education (in participating families, parents had more often a degree beyond highschool; education mother  $X^2(1) = 10.67, p = 0.01$ ; education father  $X^2(1) = 9.71, p = 0.01$ ). These variables were controlled for in the analyses. A comparison of the high and low levels of somatisation groups on the above variables revealed no significant differences. At the moment of the face-to-face contact, the final high levels of somatisation group ( $n = 18$ ) and low levels of somatisation group ( $n = 18$ ) differed significantly on self reported somatisation in adolescents (high levels of somatisation group  $M = 2.28, SD = 0.67$ ; low levels of somatisation group  $M = 1.80, SD = 0.71; t = -2.01, p < 0.05$ ). The sample included 35 mothers and one father.

## 2.2. Measures

*Somatisation* was assessed by means of the Somatic Complaint List (SCL; Jellesma, Rieffe, & Terwogt, 2007), filled out by the adolescent. The SCL contains 11 types of physical complaints (e.g., dizziness, tiredness). For each complaint, the adolescent indicated how often he/she suffered from it during the last four weeks, using a five-point Likert scale (1 = almost never to 5 = quite often). A somatisation-score was obtained by averaging all item scores. SCL Cronbach's alphas were .82 (2009 survey), .84 (2010 survey), and .74 (2011 face-to-face contact).

*Parenting behaviour (psychological control and warmth)* was measured through observation. By means of a modified version of the Issues Checklist (IC; Prinz, Foster, Kent, & O'Leary, 1979), a topic was chosen upon which mother and adolescent disagreed the most. Further, mother and child were asked to discuss the disagreement for five minutes, trying to find a solution. Videotaped discussions were coded for parenting behaviours concerning the dimensions 'warmth' and 'psychological control'. The (micro-) coding system was compiled

out of existing coding schemes, supplemented with measurement of parenting aspects that are considered important in current parenting research (Barber, 1996; Caron, Harris, & Weiss, 1999; Holmbeck, Belvedere, Gorgey-Ferguson, & Shneider, 1995; Mills & Rubin, 1998; Straus & Fauchier, 2007; Van Leeuwen, Straus, & Fauchier, 2012). This combination was necessary as none of the coding schemes available for this age covered all aspects of parenting behaviour. The final coding scheme entailed five behaviours for warmth (e.g., the parent invites the child to express his/her thoughts or emotions), six behaviours for psychological control (e.g., mother makes the child feel guilty), and several other parental behaviours not adopted in this study. The video fragments were micro-coded (one parenting behaviour was assigned to each second) by two coders who were intensively trained in the use of the coding system. Two-way mixed intraclass correlations (ICCs) with absolute agreement were calculated for the video fragments of nine participants. The ICCs for parenting behaviours concerning warmth lay between .62 and .89. For behaviours concerning psychological control, ICCs varied between .66 and .76 (except for one behaviour for which the ICC rose to .67 after the deletion of one fragment). For this study, composite scores were calculated for psychological control and warmth, representing the proportion in which the respective parenting behaviours were present during the discussion. ICCs for these composite scores were .69 (psychological control) and .85 (warmth). The correlation between both constructs was high ( $r = .82$ ), and principal component analyses with direct oblimin rotation indicated unidimensionality. Therefore, in this study a second order composite score was used for parenting behaviour, operationalized by the mean proportion of warmth and (reverse scored) psychological control. Based on previous research (Barber, 1996; Galambos, Barker, & Almeida, 2003), one can state that higher scores on this parenting behaviour construct represent more positive (adaptive) and less negative (unadaptive) parenting behaviour, while lower scores represent less positive and more negative parenting behaviour.

*Physiological responses of adolescents to parenting behaviour* were operationalized by electrodermal activity (skin conductance), a valid measure of sympathetic activity which is not biased by speech (Lovullo, 2005).

*The control variables* mother's work status and parents' education were assessed by means of self developed questions. Work status was operationalized as whether or not the parent had paid work. Education was coded into low education (no high school diploma), middle education (highest diploma is that of high school) and high education (diploma higher than high school).

### **2.3. Procedure**

Participants of the JOnG!-study were recruited using a conditional random sampling plan. In a first phase (2008), eight Flemish regions were chosen based on diversity (Hermans et al., 2008). In a second phase (2009), all families with a child born in 1996 were by post informed about the study and invited to participate. Adolescents and one of their parents who agreed to participate completed an informed consent form and subsequently filled out separate questionnaires. Follow-up questionnaires were sent at 1- and 2-years post-participation to those adolescents and parents who consented to participate. Between the second and the third enquiry, those families selected for a face-to-face contact received a new information letter and informed consent. Families of which both parent and child agreed to participate, were called by a researcher to schedule a face-to-face contact. At this contact, after an introduction, parent and child filled out separate questionnaires. While completing the questionnaire, the child adapted to the physiological measurement device attached to the body (10 to 15 minutes). Subsequently, a baseline physiological measurement was conducted for which the adolescent was asked to rest for five minutes. Next, the discussion task was carried out, during which additional physiological measurements were taken. Skin

conductance was measured by an electrodermal system developed by Medatec sprl, a Brussels based company, for use in its dream ambulatory sleep-EEG recorder. It has amongst others been used in the Enhancing Activity through Sleep Improvement project, a large government funded research program on the influence of environmental factors on sleep quality. It uses exosomatic recording and operates with a pulsed direct current, constant current excitation. Constant current magnitude is periodically adapted depending on measured base impedance to optimize resolution:  $1\mu\text{A}$  for impedances exceeding  $500\text{k}\Omega$ ,  $5\mu\text{A}$  for impedances between  $100\text{k}$  and  $500\text{k}\Omega$ ,  $25\mu\text{A}$  below  $100\text{k}\Omega$ . Two electrodes were attached to the middle and pointer finger of the non-dominant hand (digits II and III; medial phalanges). We used ARBO ECG electrodes (H93SG foam hydrogel snap monitoring;  $42\text{ mm} \times 24\text{ mm}$ ; © Kendall tm) and Spectra 360 electrolyte (salt free and hypoallergenic; © Parker laboratories inc). Research was performed at a centre for pupil guidance close to the adolescent's homes. The study protocol was approved by the Medical Ethics Committees of the universities of Leuven and Ghent.

#### **2.4. Data analyses**

Data were analysed using the statistical package PASWstatistics20 (IBM, Chicago, IL, USA). The first two research questions were addressed by means of a binary logistic multiple regression analysis including an interaction term, following the guidelines of Aiken and West (1991). All independent variables were standardised. For significant interactions, post hoc simple slope tests were performed, predicting somatisation from parenting scores, at the conditional values of skin conductance of  $1SD$  above and below the mean skin conductance score. For the third research question, bias-corrected bootstrap-analysis with 5000 replaced samples was performed, following guidelines of Preacher and Hayes (2004; 2008). All analyses were controlled for paid work of mothers, education of the parents, and

gender of the adolescent. Skin conductance scores were extracted per second, in microsiemens, and controlled for artefacts due to movement (data for which the hand accelerometer values occurred above 2.5 and/or for which visual data inspection showed values indicating measurement problems, i.e. constant values). A final score for physiological response of adolescents to parenting behaviour was obtained by subtracting the mean (per second) skin conductance score during baseline from the mean (per second) skin conductance score during the discussion task.

### 3. Results

Table 1 provides descriptive information on the study variables. Both variables presented sufficient variability to allow robust testing of hypotheses. Assumptions for logistic regression (linearity, independence of errors, and non-multicollinearity) were met.

< insert Table 1 >

#### **Research question 1: Independent association**

Table 2 lists the results of the logistic regression analysis. No independent associations were seen between parenting behaviour and somatisation.

#### **Research question 2: Moderated association**

None of the assumptions of binary logistic regression (Linearity, independence of errors, multicollinearity) were violated. The results of the logistic regression analysis revealed a significant interaction effect: the relation between parenting behaviour and somatisation depended on physiological responses of adolescents to parenting behaviour (Table 2). Post hoc simple slope tests indicated that for adolescents with high levels of physiological responses, higher amounts of adaptive parenting behaviour augmented the chance for low somatisation scores group membership ( $B = -1.26$ , S.E. = .86,  $p < .1$ ,  $\text{Exp}(B) =$

.28, lower bound 95% CI = .05, upper bound 95% CI = 1.53). For adolescents with low levels of physiological responses, the relation between parenting behaviour and somatisation was not significant ( $B = .65$ , S.E. = .82,  $p > .1$ ,  $\text{Exp}(B) = 1.91$ , lower bound 95% CI = .38, upper bound 95% CI = 9.55) (figure 1). ROC curve analysis demonstrated that the model had sufficient power to discriminate between cases and controls (AUC = 77%;  $p < .05$ ).

< insert Table 2 >

< insert figure 1 >

### **Research question 3: Indirect association**

Table 3 shows the output of the mediation analysis. No significant indirect association was revealed.

< insert Table 3 >

## **4. Discussion**

Insight into the aetiology of somatisation in adolescents is needed in order to tailor efficient treatment. Although numerous studies have considered the aetiology of somatisation, several domains remain understudied, such as the role of parenting behaviour and possible mediators/moderators (Palermo & Chambers, 2005). This study added to the current knowledge by exploring the link between somatisation in adolescents and adaptive parenting behaviour (more warmth, less psychological control), including physiological responses of adolescents to parenting behaviour (skin conductance) as a possible mediator/moderator.

Results showed no independent relations between parenting behaviour and somatisation. However, the link between parenting behaviour and somatisation was significantly moderated by physiological responses in adolescents. For adolescents who

responded highly to parenting behaviour, high amounts of unadaptive parenting were related to higher chances of high somatisation scores group membership. For adolescents who responded little to parenting behaviour, the relation between parenting behaviour and somatisation was not significant.

#### **4.1. Theoretical implications**

The results suggest that the link between parenting behaviour and somatisation is not univocal, but depends on physiological responses of the adolescent to parenting behaviour. The importance of children's processing of parenting behaviour has been revealed in previous studies for other outcome variables. For example, Evans, Galyer, and Smith (2001) found that children's perception of parenting behaviour's fairness was related to classroom conduct problems in boys. Erath, El-Sheikh, Hinnant, and Cummings (2010) identified that the relation between harsh punishment and externalizing problems was moderated by children's skin conductance concerning other external events.

In addition, this study supports the moderation assumption of the stress-theory, or in other words that the link between event (parenting behaviour) and outcome (somatisation) is moderated by stress-responses. Hereby it has to be taken into account that skin conductance assesses a specific type of stress-response, namely 'primary appraisal' (appraisal of something as potentially harmful), arousal or activation, attentiveness, and responsiveness (Dawson, Schell, & Filion, 2000; Lovallo, 2005; Tomaka et al., 1993). The study does not provide information about other stress-responses, such as 'secondary appraisal', or the valance of arousal (i.e., about the specific emotions accompanying the arousal, such as fear or excitement; Bradley & Lang, 2000).

## **4.2 Clinical implications**

Current somatisation treatment focuses on individual features in adolescents (e.g., cognitive-behavioural approaches for the child; Campo & Fritz, 2001; Eminson, 2001; Garralda, 1999), thereby often ignoring or not emphasising other aspects, such as family characteristics (Mullins & Olson, 1990). If family characteristics are included, practitioners often rely on the family systems theory (Mullins & Olson, 1990) or operant learning theory (Mullins & Olson, 1990; Sanders, Shepherd, Claghorn, & Woolford, 1994). Our study showed that families with somatising adolescents might benefit from other types of family support. More specifically, treatment should take into account the interaction between parenting behaviour and adolescents' physiological responses. Concerning general parenting support, interventions should be aimed at attuning parenting behaviour to needs in adolescents (Stallman & Ralph 2007). For adolescents who show limited levels of physiological responses to parenting behaviours, more psychological control, or less warmth, may not be as problematic for somatisation, compared to adolescents who show higher levels of physiological responses to parenting behaviours. In order to address this, practitioners could assess adolescents' physiological responses (skin conductance) to parenting behaviour. In clinical practice, psychological correlates as a proxy of skin conductance may be considered (e.g., because physiological measures are not easily assessed; or because psychological interventions may complement physiological interventions). As suggested above, skin conductance can be interpreted as a measure of 'primary stress appraisal'. In other words, professionals may examine to which extent the adolescent is highly activated by parenting behaviour, highly attentive to it, or highly responsive to it.

Besides attuning parenting behaviour to physiological reactions in adolescents, also physiological reactions in adolescents can be attuned to parenting behaviour (e.g. in case where parents are reluctant to treatment). For this goal, self-monitoring techniques such as

relaxation and biofeedback have been proved effective (Palermo, Eccleston, Lewandowski, Williams, & Morley, 2010), however also the psychological correlates of primary appraisal can be addressed.

#### **4.3 Limitations and recommendations further research**

A limitation of the current study is the small sample size. Due to the novelty of the research questions, combined with the workload of observing, coding, physiological data-measurement and cleaning, it was not feasible to include a larger sample at this time. Despite the small sample size, moderation results are reliable, as demonstrated by the ROC curve analysis. However, standard errors are relatively high and confidence intervals quite large. Therefore, future research should replicate the results in larger study samples. A second limitation is the cross-sectional design. Based on the stress theory as described above, we assume parenting to influence physiological responses, which in turn influence somatisation. However, also backward processes can be suggested. It is possible that somatisation stimulates physiological responses (e.g., somatising children are more aware of physiological activity, which might augment it; Kolk, Hanewald, Schagen, & Gijbers van Wijk, 2003), and parenting behaviour (Belsky, 1984; Palermo & Eccleston, 2009). Future studies should include longitudinal data to assess the direction of the links. Related to this is the remark that with a cross-sectional design only indirect connections can be considered, and not mediation and moderation (Maxwell, & Cole, 2007). However, to enhance readability we choose not to include the term indirect connections since it does not distinguish between different processes. Third, future studies should assess whether the moderation between parenting behaviour and physiological responses uniquely predicts somatisation. After all, research including other behavioural presentations shows that this might not be the case (Lawrence et al., 2005; Mathersul, McDonald, & Rushby 2013; Satterfield & Cantwell, 1974).

Above we stated that skin conductance operationalises physiological responses since it can be seen as a marker of sympathetic activity (Lovallo, 2005). However, this idea is contested in some other theories. For example, the individual response stereotype theory states that some individuals might react to stress with increased activation in a specific physiological system (Lacey & Lacey, 1958; Salomon, Matthews, Allen, 2000). Conversely, empirical studies do not always support the theory (McMahon, Grant, Compas, Thurm, & Ey, 2003). Further research should assess if the results are generalisable to other physiological responses and to other adolescent outcome variables.

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Table 1

*Descriptives Study Variables*

	Min	Max	<i>M(SD)</i>			
			High somatisation scores group		Low somatisation scores group	
Parenting behaviour <sup>I</sup>	- 3.46	0.94	- 0.66	(1.13)	0.66	(0.76)
Skin conductance discussion – baseline <sup>I</sup>	- 1.69	1.79	0.00	(0.91)	0.00	(1.12)
Skin conductance baseline <sup>II</sup>	3.49	34.89	12.95	(5.05)	12.59	(10.39)
Skin conductance discussion <sup>II</sup>	4.57	34.84	16.55	(6.61)	16.39	(9.74)

Note. Skin conductance was measured in micro siemens

<sup>I</sup> Z-scores as used in further analyses

<sup>II</sup> raw scores

Table 2

*Somatisation in adolescents: Independent and Moderated Links with Parenting Behaviour and Physiological Responses of Adolescents to Parenting Behaviour*

Independent Variables	Dependent Variable = Somatisation				
	<i>B</i>	( <i>SE</i> )	OR	CI	
				Lower bound	Upper bound
Parenting behaviour	- .31	.63	.74	.21	2.54
Skin conductance	- .04	.19	.96	.67	1.38
Parenting x skin conductance	- .34 <sup>c</sup>	.20	.71	.49	1.05
Gender	- 1.90 <sup>d</sup>	1.25	.15	.01	1.73
Paid work mother	- .38	1.69	.69	.03	18.61
Education mother	- .83	1.29	.44	.04	5.51
Education father	2.42 <sup>d</sup>	1.55	11.28	.55	233.31

c =  $p < .05$ ; d =  $p < .1$ ; B = non standardized Beta-coefficient; SE = Standard Error; OR =

Odds Ratio; CI = Confidence Interval; Nagelkerke R square = .31

Education was operationalized as a continuous variable, with higher scores reflecting higher degrees.

Table 3

*Somatisation in adolescents: Indirect Relation with Parenting Behaviour through Physiological Responses of Adolescents to Parenting Behaviour*

Independent Variable	Indirect Variable	Dependent Variable = Somatisation						
		Total	Direct	Indirect	95% CI		R <sup>2</sup>	
		<i>B</i>	( <i>SE</i> )	<i>B</i>	( <i>SE</i> )	Lower		Upper
Parenting behaviour	Skin conductance	-.28	.53	-.28	.54	-1.13	.77	.16

(controlled for:

- Gender
- Paid work mother
- Education mother
- Education father)

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Indirect 95% CI = 1-sided 95% confidence interval for the indirect effect

*Figure 1.* The relationship between parenting behaviour and somatisation in adolescents, moderated by physiological reactions of adolescents to parenting behaviour