**Measuring Parenting Throughout Adolescence: Measurement Invariance Across
Informants, Mean-Level and Differential Continuity**

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Abstract

This study examined the structural validity of the parenting concept throughout adolescence. First, we examined whether an established five-dimension parenting model (Janssens et al., 2015) including support, proactive control, punitive control, harsh punitive control, and psychological control, showed longitudinal invariance across time (i.e., early, middle, and late adolescence) and measurement invariance across informants (i.e., mothers, fathers, and adolescents). Second, patterns of continuity and discontinuity in these dimensions were examined from the perspective of the different informants. In a four-wave accelerated longitudinal study with 1,111 adolescents and their parents, a multi-group Structural Equation Modelling (SEM) showed partial scalar invariance across adolescence and across informants. Subsequent growth modelling indicated that parenting was relatively stable over time and that similar patterns were present for mother, father, and adolescent ratings of parenting. Future research on associations between parenting and adolescent development can build on the findings of this study, given that comparing perspectives on parenting by different informants and over time seems to be valid.

Keywords

parenting, adolescence, measurement invariance, growth modelling, differential continuity,
multiple informants, longitudinal

Parenting is considered a crucial factor in the development of adaptive and maladaptive functioning in adolescents (Lerner, Rothbaum, Boulos, & Castellino, 2002). For example, studies have shown that a lack of behavioral control, which refers to parenting practices attempting to influence and control children's behavior (Barber, Olsen, & Shagle, 1994), is associated more strongly with the development of externalizing problem behavior (Janssens et al., 2015). Psychological control, that is, the act of manipulating children's thoughts, feelings, and emotions to restrict their emotional and psychological development (Barber, 1996), is linked more strongly to internalizing problem behavior (Galambos, Barker, & Almeida, 2015; Soenens, Vansteenkiste, Luyckx, & Goossens, 2006). Concerning adaptive functioning, parenting is linked to the child's emotional regulation and overall psychosocial adjustment (Otterpohl & Wild, 2013). According to Darling and Steinberg (1993), parenting practices are specific goal-directed attempts by the parent to socialize the adolescent in a particular fashion, for instance, laying down homecoming rules to prevent rule-breaking behavior, or giving a compliment to stimulate academic achievement. Despite the acknowledgment of parenting as an environmental factor influencing adolescent development, its conceptualization and operationalization are still unclear. In empirical studies, various dimensions have been hypothesized to constitute parenting (Brown, Mounts, Lamborn, & Steinberg, 1993; Lamborn, Mounts, Steinberg, & Dornbusch, 1991; Sessa, Avenevoli, Steinberg, & Morris, 2001). However, these dimensions are operationalized in different ways and sometimes parallel concepts are labeled differently. For example, the labels nurturance and affection seem to cover more or less the same content.

In studying associations between parenting practices and adolescent outcomes, a first crucial question is whether adolescents and their parents conceive parenting dimensions in a similar way. Adolescents and parents can have different perspectives on parenting practices. For example, adolescents may think that parental supervision is too strict, whereas parents deem it only normal. Studies have not only confirmed these discrepancies between informants, but also found evidence for associations between perceived parenting differences, on the one hand, and adolescent problem behavior and the efficacy of prevention programs, on the other (Achenbach, McConaughy, & Howell, 1987; De Los Reyes et al., 2012; De Los Reyes & Kazdin, 2005; Laird & De Los Reyes, 2013). To arrive at valid conclusions about parenting when using different informants, it is important to check first of all whether

these informants rate parenting in a similar way, that is, to test measurement invariance across informants.

A second question pertains to the development of parenting throughout adolescence. Because of the physical, cognitive, and intra-individual changes in adolescents, combined with developmental transformations in their parents who are entering midlife, parent-child interactions may change (Steinberg & Silk, 2002). For example, parents could increase supervision of their adolescent's behavior, because they want to monitor the social relationships of their son or daughter or prevent rule-breaking behavior, or they could be more autonomy supporting. However, because parenting is thought of as providing a stable context in which a child develops (Darling & Steinberg, 1993), it is also possible that it is rather stable over time. A perusal of the literature revealed that surprisingly few studies have examined parenting development throughout adolescence (De Goede, Branje, & Meeus, 2009; Giles-Sims, Straus, & Sugarman, 1995). Therefore, it is difficult to arrive at conclusive statements on this matter. A preliminary requirement when examining this topic is to establish measurement invariance of the questionnaires assessing parenting across time. The current study examines whether there is a single factor structure that fits the parenting concept and its underlying dimensions across early, middle, and late adolescence, and across ratings by fathers, mothers, and adolescents.

Previous Research on Parenting as a Multidimensional Concept

In his seminal work on parenting, later supported by Baumrind's (1991) theory of parenting styles, Schaefer (1965) has provided the theoretical basis for further research with his three-dimensional framework. He referred to these dimensions as acceptance/rejection, psychological control/psychological autonomy, and firm control/lax control. In line with previous studies (Barber, Maughan, & Olsen, 2005), and for the sake of clarity and consistency, the labels *parental support*, *behavioral control*, and *psychological control* will be used in the present study. Empirical studies have moved beyond Schaefer's theoretical perspective and have shown that more than three dimensions are needed to grasp the complexity of the parenting concept. For example, Janssens et al. (2015) conducted confirmatory factor analyses on several parenting measures in a sample of 12- to 14-year old adolescents and found that five broad-band dimensions showed the best fit with the concept of parenting. These dimensions were: parental support, proactive control, punitive (non-physical) control, harsh punitive

(physical) control, and psychological control. Configural and metric invariance was established across mothers, fathers, and adolescents. Another study (Spithoven, Bijttebier, Van Leeuwen, & Goossens, 2016) replicated this structure in a sample of early adolescents and found evidence for four of these parenting dimensions, that is, parental support, psychological control, reactive control, and proactive control. The fifth dimension, that is, harsh punitive control, was not replicated due to a lack of variance for this construct.

In this section, we discuss previous research on each of these five dimensions with a focus on early, middle, and late adolescence (i.e., ages 12 to 14, 15 to 16, and 17 to 18, respectively). *Parental support* refers to involvement, acceptance, emotional availability, and responsiveness, which will assist a child in developing a sense of individuality and the capacity to self-regulate (Janssens et al., 2015). Although parental support remains important throughout adolescence, mean levels do not always seem stable. A study by De Goede, Branje, and Meeus (2009) showed that over a four-year period, adolescents perceived a decline in parental support from early to middle adolescence. The same study suggested a gender difference in the transition from middle to late adolescence, with girls reporting an increase in support, and boys perceiving support as stable (De Goede et al., 2009). The extent to which adolescents feel supported by their parents predicts a broad array of developmental outcomes (Bronstein, Fox, Kamon, & Knolls, 2007; Tang & Davis-Kean, 2015). For example, studies have found that parental support at age 11 positively predicts the sense of morality in late adolescence (Bronstein et al., 2007), and a warm and supportive home environment is related to better academic performance (Tang & Davis-Kean, 2015). A lack of parental warmth, by contrast, has been shown to predict depressive symptoms, test anxiety, and diminished self-confidence (Ringeisen & Raufelder, 2015; Wang, Chan, Lin, & Li, 2015).

Proactive control is a preventive technique to anticipate undesirable child behavior by providing a structured environment through rule setting and monitoring (Janssens et al., 2015). This technique predicts more favorable developmental outcomes than reactive forms of behavioral control (e.g., time-out from an enjoyable activity or slapping; (Bender, Allen, Boykin, et al., 2007; Chang, Schwartz, Dodge, & McBride-chang, 2003; Galambos et al., 2015a; Gray & Steinberg, 1999; Grolnick & Pomerantz, 2009). More proactive control is associated with less externalizing problem behavior in early

adolescence (Barber, Olsen, & Shagle, 1994; Galambos et al., 2015; Mason, Cauce, Gonzales, & Hiraga, 1996). Furthermore, proactive control is also associated with positive development in the domains of academic performance in early adolescence and peer relations in middle to late adolescence (Gray & Steinberg, 1999; Krevans & Gibbs, 1996).

Punitive (non-physical) control is a type of controlling behavior characterized by using non-physical punishments, such as a time-out, lecturing, or grounding. It is a reactive form of parenting following unwanted child behavior, and can be distinguished from another reactive form, that is, harsh physical punitive control. The latter form of control includes a crucial physical aspect (Janssens et al., 2015). Effects of non-physical punishments in adolescence have received rather limited research attention. One study (Tang & Davis-Kean, 2015) indicated that non-physical punitive strategies in middle adolescence were associated with a diminished academic performance five years later.

Harsh (physical) punitive control denotes physical punishment (e.g., spanking), following unwanted behavior. Physical punishment declines in early adolescence (Giles-Sims et al., 1995). Studies have shown that early and middle adolescents who have experienced physical punishment reported higher levels of externalizing problem behavior and depression (Bender, Allen, Boykin, et al., 2007; Lansford et al., 2011). A recent meta-analysis (Gershoff & Grogan-Kaylor, 2016) on the effects of parental spanking to correct misbehavior supported these findings, because it showed associations between this punishment technique and detrimental child and adolescent outcomes, such as externalizing and internalizing problems, and lower moral internalization and self-esteem, with no moderating effect of age group. More spanking was also related to a larger risk of physical abuse by parents, and spanking and physical abuse seemed to have similar associations with child outcomes (Gershoff & Grogan-Kaylor, 2016). Externalizing problems and physical punishment may trigger each other alternately, and this vicious cycle can have detrimental effects in the long term (Wang & Kenny, 2014). The mechanism may be comparable to Patterson's coercion theory (1982), which states that caregiver's inadequate responses (e.g., giving in, hostile, and harsh reactions) to difficult child behaviors (e.g., resistance to a request) result through a process of mutual reinforcement in escalating child aversive and aggressive behaviors. However, various additional factors should be considered concerning the effects of childhood physical punishment on developmental outcomes, such as the perceived intentions of the punishment

and genetic vulnerabilities (Boutwell, Franklin, Barnes, & Beaver, 2011; MacKinnon-Lewis, Lindsey, Frabutt, & Campbell Chambers, 2014).

Psychological control includes intentional, strategic parental behavior that manipulates or dominates the child, for example, by invalidating expressed feelings, constraining verbal expression, or using love withdrawal and guilt induction (Barber, 1996; Barber, Xia, Olsen, McNeely, & Bose, 2012). Given the intrusive nature of this parenting practice, it is negatively associated with adequate adolescent development. In most studies, adolescent-reported measures of psychological control are used. In early to middle adolescence, this parenting practice predicts internalizing and, to a lesser extent, externalizing problems (Barber et al., 1994; Pettit, Laird, Dodge, Bates, & Criss, 2001). The negative effects of this parenting technique are also noticeable in lower satisfaction with peer relationships (Tuggle, Kerpelman, & Pittman, 2014), and in some studies even hampered overall emotional functioning (Wang, Pomerantz, & Chen, 2015).

A detailed picture of multiple parenting dimensions as they unfold over time, from the perspective of both parents and adolescents, is not available today. However, if we want to investigate the role of parenting dimensions in adolescent developmental outcomes such as externalizing and internalizing problems, we first need to know whether or not the structure of parenting is invariant across time and informants. When this is established, it is possible to examine how parenting dimensions covary with developmental outcomes. For example, a fluctuating course of a parenting dimension may show a stronger association with an outcome variable than a stable course.

The Present Study

The present study had three objectives. First, we investigate the validity of a five-factor model of parenting that was suggested earlier by Janssens and colleagues (2015) for the age range 12 to 14 years. The current study uses data from the same longitudinal project that Janssens et al. (2015) relied on, but expands on the findings of that study by investigating measurement invariance and stability of parenting across the entire range of adolescence (i.e., 12 to 18 years) in a longitudinal design and across mothers, fathers, and adolescents as informants. Measurement invariance is a basic condition for all further analyses. Second, if such invariance is established, the developmental course for all of the dimensions identified will be systematically described through analyses of mean-level continuity. Third,

analyses on differential continuity will provide information on the stability of inter-individual differences between successive ages. This type of stability entails that an individual who scores high at one point in time, also scores high at the next time point. Such associations can be expressed through correlations. All analyses will be conducted on data from four annual waves of parenting questionnaires that were completed by adolescents, fathers, and mothers separately.

Concerning the developmental course of the parenting dimensions throughout adolescence, some hypotheses can be formulated. We expect that, on average, parental support will decrease from early to middle adolescence, with a stable course from middle to late adolescence based on results by De Goede et al. (2009). The course of the behavioral control dimensions (i.e., proactive control, punitive, and harsh punitive control) is hypothesized to decline from early over middle to late adolescence. This course was already established for harsh punitive control in previous research (Giles-Sims et al., 1995). In line with our hypotheses for behavioral control, we expect psychological control to decrease throughout adolescence. In general, both behavioral and psychological control are expected to decrease, because the adolescent is gaining more autonomy with advancing age. Concerning possible gender differences, that is, whether parenting takes on a different form for boys and girls over the course of adolescence, we expected that adolescent gender is not significantly associated with differences in the trajectories of the parenting dimensions. This hypothesis is based on previous research that there are some gender differences in parenting (e.g., slightly more controlling parenting for boys), but that their effect size is negligible (Endendijk et al., 2016). Furthermore, earlier work did not find a gender effect concerning autonomy-supportive parenting (Endendijk et al., 2016). Concerning inter-individual stability, we expect high stability over time, given that Loeber and colleagues (2000) found high relative stability of family interactions from middle childhood through late adolescence.

Method

Participants and Procedure

Data were collected within the STRATEGIES project (i.e., Studying Transactions in Adolescence: Testing Genes in Interaction With Environments), a longitudinal study with annual measurements and conducted in Flanders, the Dutch-speaking part of Belgium. A randomized multistage sampling approach was used. First, Flemish secondary schools were invited to take part in

the research project. In order to include students from the general, technical and vocational tracks, the schools were stratified by educational track. Second, from the nine schools that participated in the study, 121 classes in the seventh, eighth, and ninth grade were selected. Within these classes, all students and their mothers and fathers were invited to participate and to provide active consent. Adolescents filled out the questionnaires at school under supervision of a researcher and when extra time was needed, they finished it at home within two weeks. Parents completed questionnaires at home, either online using a personal link through email, or using a paper-and-pencil version which they returned in a closed envelope via regular mail.

This approach resulted in a sample at Wave 1 of 1,116 adolescents ($M_{\text{age}} = 13.79$, $SD = 0.93$, 51% boys), 747 mothers ($M_{\text{age}} = 43.59$, $SD = 4.45$) and 645 fathers ($M_{\text{age}} = 45.32$, $SD = 4.69$). The retention rate was 89% for adolescents, 75% for mothers, and 72% for fathers in the second wave. In the third wave, the retention rate for adolescents fell to 79%, with a retention rate of 66% for mothers and 63% for fathers. In the fourth wave, the retention rates were 45%, 38%, and 40%, respectively (N adolescent = 498, N mother = 322, N father = 288). Family characteristics of the sample were representative for the general population, but bachelor degrees and active employees were slightly overrepresented regarding socio-economic status (Janssens et al., 2015).

The STRATEGIES project used an accelerated longitudinal design. The main benefit of this design is its ability to span a wider age range than would be possible with a regular longitudinal design. The underlying concept is that in every wave a particular age range is covered, which will overlap with the age range of the next wave. This way, the total age range will expand faster than a regular longitudinal design. This allows us to study an age range of six years, that is, from 12 to 18 years old, using data from four waves. In Wave 1, Grades 7, 8, and 9 were included. In Wave 2, Grades 8, 9, and 10 were included. Wave 3 used a sample that comprised Grades 9, 10, and 11, whereas Wave 4 included Grades 10, 11, and 12. The study design is represented in Table 1.

Measures

Parenting behavior. Parenting was rated by mothers, fathers, and adolescents using a total of 64 items from 10 subscales from multiple questionnaires. These questionnaires and respective subscales were selected based on their availability in Dutch (i.e., participants' native language), theoretical

relevance, adequate psychometric properties, and use in previous parenting research. A confirmatory factor analysis (CFA) on these questionnaires resulted in the five parenting dimensions mentioned earlier (Janssens et al., 2015). Cronbach's alpha's of the subscales in the current study are presented below.

The dimension *Parental Support* comprised three parenting measures: (a) the Positive Parenting subscale (8 items, Cronbach's α from .85 to .88; e.g., "If I want to tell something, my parents take their time for listening to me") from the Parental Behavior Scale- Short Form (PBS-S; Van Leeuwen et al., 2013), (b) the Responsivity subscale (7 items, α from .83 to .89; e.g., "My parents can make me feel better when I am feeling upset") from the Louvain Adolescent Perceived Parenting Scale (LAPPS; Delhaye, Beyers, Klimstra, Linkowski, & Goossens, 2012), which is an adaptation of a subscale of the Child Report of Parental Behavior Inventory (CRPBI; Schludermann & Schludermann, 1988), and (c) the Autonomy Support scale (8 items, α from .81 to .84; e.g., "My parents take into account my opinion on affairs that concern me"), based on the Perceptions of Parents Scale (POPS; Grolnick, Ryan, & Deci, 1991) and the Research Assessment Package for Schools (RAPS; Institute for Research and Reform in Education, 1998).

The dimension *Proactive Control* consisted of two measures, that is, the subscale Setting Parental Expectations for Behavior (6 items, α from .78 to .82; e.g., "My parents expect me to behave in a certain manner") and Parental Monitoring of Behavior (6 items, α from .66 to .72; e.g., "My parents remind me of the rules they made"). They were selected from the Parental Regulation Scale (PRS-YSR; Barber, 2002), which was translated in Dutch by Soenens, Vansteenkiste, Luyckx, and Goossens (2006).

The dimension *Punitive control* consisted of the punishment subscale (4 items, α from .86 to .88; e.g. "If I do something I was not supposed to, my parent punish me") from the Parental Behavior Scale – Short Form (PBS-S; Van Leeuwen et al., 2013).

The dimension *Harsh Punitive Control* was measured through the subscale Harsh Punishment (5 items, α from .78 to .88 e.g., "My parents hit me in the face when I misbehave myself") from the Parental Behavior Scale – Short Form (PBS-S; Van Leeuwen et al., 2013).

The dimension *Psychological Control* consisted of two subscales. The subscale Psychological Control (8 items, α from .73 to .79; e.g., "My parents do not talk to me when I disappointed them until

I please them again”) was taken from the translated version of Barber’s Psychological Control Scale (Barber, 1996; Soenens et al., 2006). One additional item for this subscale was based on a study by Soenens, Sierens, Vansteenkiste, Dochy, and Goossens (2012). The subscale Hostility (6 items, α from .77 to .85; e.g., “My parents yell at me when I misbehave”) was based on the Verbal Hostility Scale (Nelson & Crick, 2002), which was developed to assess intrusive parenting alongside corporal punishment.

All items were rated by mothers, fathers, and adolescents on a 5-point scale ranging from 1 = (*almost*) *never* to 5 = (*almost*) *always*. The adolescent version of the questionnaires was adapted to reflect their perspective (e.g., “I” was replaced with “My parents”). Mothers and fathers reported on their own respective parenting behavior, whereas the adolescent reported on parenting in general, with no differentiation made between maternal and paternal parenting. This decision was made to limit the number of questions – on the already extensive questionnaires – for the adolescent and is justified by previous research suggesting that children’s ratings of mother’s and father’s Positive Parenting ($r = .74$) and Negative Control ($r = .70$) are highly correlated (Van Leeuwen, Mervielde, Braet, & Bosmans, 2004).

Analysis Strategy

All analyses were carried out in MPlus Version 7 (Muthén & Muthén, 2012). Due to dropout throughout this longitudinal study, sample size varied across time points. This dropout was recorded as missing values and was handled in MPlus through Full Information Maximum Likelihood (FIML).

Measurement Invariance (MI) Analysis

Measurement invariance analysis was used to examine whether the same factor structure fitted the parenting concept across informants and time, respectively. More specifically, the subscales described above were included in the analyses to investigate invariance of the respective parenting dimensions. This approach consisted of stepwise multi-group confirmatory factor analyses (CFAs) which tested three nested models from which an increasing number of parameters were constrained gradually (Meredith, 1993). These three nested models reflected three levels of measurement invariance, that is configural, metric, and scalar invariance. First, configural invariance is the most lenient form of invariance (Meredith, 1993). At this level, one tests whether the same number and pattern of latent

factors (i.e., parenting dimensions) underlie a given concept across informants and time. This is accomplished by fitting a model with the same factors for each informant or for each time moment, but factor loadings may depend on the informant or time point. A good model fit indicates that parenting is conceptualized in the same manner across informants or across time. Second, metric invariance implies that factor loadings are held equal across informants or across time, whereas the item intercepts are allowed to differ (Meredith, 1993). If the model fit does not significantly worsen compared to the previous model that was used to assess the configural level, metric invariance is established. This means that the latent dimensions are measured in the same way across informants or across time and that score differences reflect actual differences in responses which cannot be attributed to measurement error. Third, scalar invariance represents the highest level of measurement invariance (Meredith, 1993). In order to test for this type of invariance, both the item factor loadings and intercepts are held equal across informants or across time. If the model fit again does not significantly worsen compared to the fit of the previous model, it is meaningful to compare the scores, or means, across informants or across time. Being able to compare across contexts provides the broadest amount of information and assists in mapping out the concept of parenting. However, full scalar invariance represents a very stringent demand and is far from self-evident. When this demand is not met, it is possible to test for partial scalar invariance, which also allows researchers to compare parenting scores across informants or across time points (Byrne, Shavelson, & Muthén, 1989). In the case of partial invariance, at least two indicators per factor need to be invariant (Steenkamp & Baumgartner, 1998). Our model has a limited number of indicators per construct, and, as such, the possibilities to relax constrained parameters are limited. Nevertheless, partial scalar invariance will be tested if full scalar invariance is unattainable.

Across informants analyses. Measurement invariance (MI) was tested across informants for each time point separately. The data were analysed for the three groups of informants simultaneously (i.e., three-group MI), as well as for the respective dyads, that is mother-father, mother-adolescent, and father-adolescent at each of the six time points. The analyses concerning the dyads were conducted to provide a more detailed overview of the situation across informants. Also, in the case of non-invariance, these analyses can provide more information on where the invariance or lack thereof is situated. This approach led to a total of 4 x 6 or 24 MI analyses. Dependency within families was accounted for by

clustering the data of parents and adolescents from the same family.

Across age analyses. The same type of analysis was carried out to assess whether the parenting measures employed were invariant across age for each informant separately. Six time points per informant were included and that covered early, middle, and late adolescence. One analysis for the whole time span per informant was conducted to assess invariance across time, which resulted in three MI analyses.

Multiple criteria were used to assess model fit for the simple reason that every criterion captures different aspects of the model specification. Using a larger number of criteria provides more information and leads to a well-advised decision concerning model acceptance or rejection (Vandenberg & Lance, 2000). Chen et al. (2008) suggested three widely used model fit criteria, that is, the comparative fit index (CFI), the root mean square error of approximation (RMSEA), and the standardized root mean squared residual error (SRMR). Concerning the CFI, a value above .95 is deemed a good fit. The cut-off value for the RMSEA is .08, but below .05 is preferred. Finally, the value of the SRMR should not exceed .08 (Browne & Cudeck, 1992; Hu & Bentler, 1999). When testing for metric invariance, model fit should not be significantly worse compared to the configural level. Specific cut-off values are used to assess these differences in fit criteria between successive levels of measurement invariance. Such differences should not exceed .010 for the CFI ($\Delta\text{CFI} < .010$), .015 for the RMSEA ($\Delta\text{RMSEA} < .015$), and .030 for the SRMR ($\Delta\text{SRMR} < .030$) (Chen, 2007). For the fit differences between the metric and scalar level, these values are .010, .015 and .010 respectively (i.e., $\Delta\text{CFI} < .010$, $\Delta\text{RMSEA} < .015$, and $\Delta\text{SRMR} < .010$) (Chen, 2007). In case of inconsistency across the three fit indexes, we based our decision on the two criteria that pointed in the same direction.

Mean-Level Continuity

To examine the continuity of the five dimensions that underlie parenting, growth curve modelling was used. These growth curves were also plotted to visually inspect the stability of the means of each parenting dimension per informant. Gender was taken into account as a covariate to assess its effect on the growth parameters (i.e., intercept and slope of the growth curve). This allowed us to explore whether parenting differs for boys and girls over the course of adolescence. These analyses were carried out for each of the dimensions per informant separately (i.e., 5 dimensions x 3 informants).

Differential Continuity

A third and last type of analysis was meant to provide information about the continuity or lack thereof between two successive time points, that is, differential continuity. Whether and how Time point k is linked with Time point $k + 1$ was assessed per dimension and per informant between successive time points by autoregressing Time point $k + 1$ on Time point k .

Results

Measurement Invariance Analyses

The mean scores and standard deviations of the parenting dimensions per informant and per time point are presented in Table 2. In order to assess whether comparisons between informants are allowed, MI analyses were conducted, for each time point, across the three groups of informants simultaneously and between dyads. Results are shown in Tables 3a and 3b. Across the three informants, full scalar invariance held at T5 and T6, whereas partial scalar invariance was established at T1 and T4. Metric invariance was found at T2 and T3. Concerning the Mother-Father dyad, full scalar invariance was found at T5, whereas partial scalar invariance was established at T1, T2, T3, and T4. A remarkable observation was that at T6, none of the forms of invariance held, including the simplest form, configural invariance. Concerning the Mother-Adolescent dyad, we concluded that full scalar invariance held at T5 and T6, whereas partial scalar invariance held at T1, T3, and T4. Metric invariance was found at T2. Concerning the Father-Adolescent dyad, full scalar invariance held at T5, and T6, whereas partial scalar invariance was established at T1, T3, and T4. Metric invariance held at T1 and T2. There was no distinct pattern in the results of MI analyses across informants. The dyads showed at least partial scalar invariance at the majority of the time points, which allows researchers to compare these dyads at these time points.

The longitudinal invariance of the five-dimension model was tested per informant across six time points. Results are summarized in Table 4. Using the criteria discussed in the Method section, we concluded that full scalar measurement invariance was established for mothers, fathers, and adolescents, respectively, across the six time points. This means that meaningful comparisons can be made for each informant across adolescence.

Mean-Level Continuity

The trajectories of the five parenting dimensions as reported by mothers, fathers, and adolescents are visualized in Figures 1a to 1c, respectively. The general course of the dimensions appeared to be similar across informants. The support and the proactive control dimensions showed the highest mean scores and seemed to show a similar course. Both trajectories were relatively flat across the six years, with a small decline in proactive control at T6. Punitive control showed a declining trend from Time point 1 to Time point 6 in all three informants. Psychological control and harsh punitive control showed a stable course throughout adolescence with consistently low scores (Harsh punitive control: scores ranging between 1 to 1.5 on a 5-point scale; Psychological control: scores ranging from 1.5 to 2.5 on a 5-point scale) for both dimensions.

Results of the analyses with adolescent gender as a covariate are shown in Table 5. Gender appeared to only significantly interact with the intercept of the trajectories, which meant that boys and girls had different values at T1, but that linear development of the dimensions (i.e., slope) was similar. For mother reports, there was a significant gender effect on the intercept, indicating that on average, mothers reported less proactive control ($\beta = -0.093$; $p = .026$), less punitive control ($\beta = -0.315$; $p < .001$) and, at a trend level, less harsh punitive control ($\beta = -0.028$; $p = .086$) for girls than for boys at T1. For father reports, a significant gender effect was found for the intercept of punitive control ($\beta = -0.199$; $p = .010$) and, at a trend level, less psychological control ($\beta = -0.068$; $p = .069$). Adolescents reported more support ($\beta = 0.134$; $p = .001$), less punitive control ($\beta = -0.224$; $p = .001$), less harsh punitive control ($\beta = -0.085$; $p = .010$), and, at a trend level, less psychological control ($\beta = -0.084$; $p = .053$) for girls than boys at T1.

Differential Continuity

Autoregressive coefficients (see Table 6) between parenting dimensions at two time points with a one-year interval were calculated to assess differential continuity. For mother reports, autoregressive coefficients for support, proactive, punitive and psychological control were all significant ($p < .001$) and standardized coefficients ranged from 0.132 to 0.947. For harsh punitive control, all autoregressions were significant at the .001 level, except for the autoregression of T6 at T5, which was still significant, but only at the .05 level. It should be noted that the autoregressive coefficient for the latter analysis was

remarkable smaller (0.057), compared to the aforementioned range. For father reports, autoregressions for support, proactive and psychological control were significant at the .001 level and standardized coefficients ranged from 0.747 to 0.918. Autoregressions of punitive and harsh punitive control were significant at the .001 level, except for punitive control T2 at T1 (significant at .05 level) and harsh punitive control T6 at T5 (not significant). Together with the similar finding for the mother reports, this seems to indicate that individual differences in harsh punitive control reported by parents are relatively stable, but this stability diminishes over time. For adolescent reports, autoregressive coefficients were all significant at the .001 level and standardized coefficients ranged from 0.235 (Harsh punitive control T6 on T5) to 0.977 (Harsh punitive control T5 on T4). These findings indicated that the individual differences in perspectives on parenting practices as reported by adolescents seem stable throughout adolescence.

Discussion

For four years, a large sample of adolescents from seventh to ninth grade and their parents were invited annually to fill out questionnaires on parenting. This study (a) assessed whether latent parenting constructs were valid across informants and across adolescence (Grades 7 to 12), (b) determined the average course of these dimensions per informant, (c) and checked whether or not individual differences remained stable or not throughout adolescence.

Measurement Invariance

To our knowledge, the invariance of parenting dimensions across adolescence and informants was never reported on before, although this is a necessary condition to arrive at valid conclusions regarding the role of parenting in adolescent development. If measurement invariance was not established, this would indicate that the parenting concept is variable across informants and across age, which would greatly complicate this line of research. A number of factors has been suggested due to which concepts can show lack of invariance. One of these is that the concept is more differentiated in one group than the other (Chen, 2008). Our approach seems stringent, and the analyses conservative, but our results allow us to argue that, in future research on the multidimensional concept of parenting, both comparisons across informants and over time seem to be justifiable. For mothers, fathers, and adolescents full scalar invariance of a multidimensional model of parenting was found over time. In

75% of the analyses across informants at least partial scalar invariance was established, which suggests that the general concept and underlying dimensions – along with the respective associations among them – are invariant. Furthermore, the differences in scores are assumed to reflect differences in the latent factor, which makes meaningful comparisons between time scores per informant and between informants possible. Our findings may also indicate retrospectively that results of previous studies that conducted longitudinal analyses and comparisons across informants without prior checking for invariance of parenting constructs can be trusted (e.g., Barber et al., 1994; Bender, Allen, McElhaney, et al., 2007; De Goede et al., 2009; Tang & Davis-Kean, 2015).

Mean-Level Continuity

Despite the longstanding interest in the effects of parenting on a wide variety of outcomes, little is known about parenting continuity in adolescence. The mean levels of the dimensions across adolescence as reported by mothers, fathers, and adolescents show the same and stable pattern. According to previous studies, this pattern reflects a certain degree of ‘adequate’ parenting. Support and proactive control have the highest mean scores. These are parenting practices that are related to favorable developmental outcomes (Bender, Allen, Boykin, et al., 2007; Bronstein et al., 2007; Chang, Shaw, Dishion, Gardner, & Wilson, 2015; Tang & Davis-kean, 2015). Adolescent reports on parental support suggests a very stable course throughout adolescence. This finding is in contrast to previous research in which Dutch adolescents reported a decline in support from early to middle adolescence (De Goede et al., 2009). Longitudinal trends in psychological control and harsh punitive control have been reported less frequently in the literature. They are associated more negatively with developmental and academic outcomes (Barber et al., 1994; Bender, Allen, Boykin, et al., 2007; Chang et al., 2003; Pettit et al., 2001). It can be concluded that almost no harsh punitive control was reported overall, with a decrease in variance in late adolescence. These results support the findings of a previous study in an American sample (Giles-Sims et al., 1995). Punitive control seems to diminish over time with a decline between Grades 11 and 12. This could be explained by the fact that during the course of adolescence, adolescents gain more responsibility and autonomy and are less subjected to the authority of their parents. The additional information on temporal characteristics of parenting dimensions, including their overall course, can benefit future studies in that these additional aspects can provide a more detailed picture of

associations between parenting dimensions and developmental outcomes. Furthermore, in contrast to the study of Endendijk and colleagues (2016), the findings of the current study do suggest a difference in parenting for boys and girls.

Differential Continuity

Differential continuity was assessed to examine whether individual differences on the parenting dimensions are consistent throughout adolescence. For example, high continuity implies that an individual who scores higher than another individual on support at a given moment in time still scores higher at a next occasion. The results seem to indicate differential continuity for parenting as reported by mothers, fathers, and adolescents. However, there may be an indication of declining stability in harsh punitive control as reported by mothers and fathers as the adolescents get older. Future research could explore possible reasons for this pattern of differential continuity. The fact that the decline in stability is not observed for all three informants raises the question whether it reflects a real decline in adolescence or whether it results from a biased view of the parents. Future research could investigate differences in adolescent and parent perspectives because such differences may influence adolescent development and outcomes (Guion, Mrug, & Windle, 2009; Schaefer et al., 2013). It is also possible that the smaller sample size at Grades 11 and 12 has led to less reliable results.

Limitations

Despite the strengths, a number of limitations should be noted concerning this study. First, mothers and fathers reported on their own respective parenting behavior, whereas the adolescents reported on parenting in general, across mother and father. This lack of differentiation leads to the inability to investigate the perception of the adolescent on both parents separately. Generally speaking, high correlations have been observed between adolescents' reports for mothers and fathers in earlier work (Van Leeuwen et al., 2004). Still, it is possible that an adolescent has a better relationship with one of the two parents, a fact that we could not detect in the present study. This may be especially relevant when parents have separated or when parenting practices differ strongly between mothers and fathers. Future research may benefit from including separate adolescent reports regarding mothers' and fathers' parenting.

Second, in a longitudinal study the number of participants often decreases over time, as is the case in this study. This was partly due to the fact that data were collected through schools and because some students who changed school in the course of the study were no longer traceable. However, given the large sample we started out with, there was still a large number of participants in Wave 4 (N adolescents = 498, N mothers = 322, N fathers = 288).

Third, the data on parenting behavior was obtained through questionnaires, which allow researchers to examine a wide array of parenting practices. These reports have not been validated by observational data. Also, the sample in this study was recruited in Flanders, the Dutch-speaking part of Belgium. However, some studies have compared the psychometric properties of our parenting measures (i.e., the LAPPS and the PBS) in Dutch and French-speaking samples from Belgium. Delhayé and colleagues (2012) showed that the internal consistency, factor structure, and average scores on the instrument were highly similar. Meunier and Roskam (2007) replicated the factor structure of the PBS in a sample of children, adolescents, and parents and found evidence for acceptable internal consistency, interrater-reliability between children and their parents, and test-retest reliability. No significant association emerged with a measure of social desirability.

Finally, our sample was limited to predominantly Caucasian, European families. Because parenting may vary across cultures (e.g., Dwairy, 2010) we cannot generalize our results to all other cultures. Also, replication of the five-factor model of parenting across informants and time in other samples and contexts is needed in future studies.

Conclusion

This study aimed to provide a foundation for further research on parenting and a systematic description of a five-dimension parenting model throughout adolescence. The findings indicate that valid conclusions can be drawn from research across adolescence and across informants because measurement invariance holds. This invariance is an essential step in shedding light on the parenting concept in all its complexity. A second important finding is that the parenting dimensions are relatively stable over time and that their developmental course is comparable between mothers, fathers, and adolescents.

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Table 1

Schematic Representation of an Accelerated Longitudinal Design of Four Waves, Resulting in Six Time Points

	T1	T2	T3	T4	T5	T6
Wave 1	7	8	9			
Wave 2		8	9	10		grade
Wave 3			9	10	11	
Wave 4				10	11	12

Table 2

Means (and Standard Deviations) of the Five Parenting Dimensions per Informant at Each Time Point

	<i>Mean (SD)</i>				
	Support	Proactive control	Punitive control	Harsh punitive control	Psychological control
<i>Mother</i>					
T1	4.29 (0.40)	4.23 (0.53)	3.02 (0.97)	1.11 (0.26)	1.87 (0.51)
T2	4.28 (0.41)	4.17 (0.51)	2.93 (0.89)	1.06 (0.21)	1.82 (0.49)
T3	4.25 (0.42)	4.14 (0.50)	2.84 (0.88)	1.07 (0.24)	1.84 (0.52)
T4	4.23 (0.42)	4.09 (0.51)	2.74 (0.93)	1.05 (0.18)	1.81 (0.50)
T5	4.24 (0.43)	4.05 (0.54)	2.48 (0.91)	1.03 (0.13)	1.76 (0.49)
T6	4.20 (0.43)	3.81 (0.56)	2.14 (0.83)	1.02 (0.08)	1.58 (0.42)
<i>Father</i>					
T1	4.00 (0.54)	4.05 (0.62)	2.96 (0.90)	1.12 (0.30)	1.96 (0.52)
T2	3.97 (0.50)	4.00 (0.51)	2.83 (0.87)	1.09 (0.28)	1.91 (0.51)
T3	4.06 (0.52)	4.05 (0.54)	2.79 (0.88)	1.08 (0.30)	1.84 (0.49)
T4	4.11 (0.50)	4.04 (0.52)	2.73 (0.90)	1.05 (0.16)	1.81 (0.49)
T5	4.14 (0.46)	4.00 (0.56)	2.44 (0.89)	1.04 (0.15)	1.77 (0.50)
T6	3.91 (0.63)	3.84 (0.59)	2.25 (0.89)	1.01 (0.06)	1.75 (0.60)
<i>Adolescent</i>					
T1	3.99 (0.64)	3.72 (0.67)	2.80 (1.05)	1.33 (0.64)	1.87 (0.66)
T2	3.90 (0.65)	3.74 (0.64)	2.69 (1.00)	1.23 (0.54)	1.87 (0.64)
T3	3.82 (0.66)	3.79 (0.60)	2.64 (1.00)	1.19 (0.45)	1.95 (0.65)
T4	3.85 (0.63)	3.83 (0.58)	2.53 (1.01)	1.16 (0.43)	1.94 (0.66)
T5	3.89 (0.59)	3.89 (0.59)	2.41 (0.99)	1.09 (0.29)	1.89 (0.59)
T6	3.98 (0.56)	3.92 (0.58)	2.29 (0.94)	1.09 (0.28)	1.92 (0.61)

Table 3a

Measurement Invariance Analyses at Each Time Point

<i>Three-Group Comparisons</i>								<i>Mother-Father Comparisons</i>					
	Type	CFI	Δ CFI	RMSEA	Δ RMSEA	SRMR	Δ SRMR	CFI	Δ CFI	RMSEA	Δ RMSEA	SRMR	Δ SRMR
T1	Configural	.975		.066		.030		.985		.047		.029	
	Metric	.973	.002	.063	.003	.054	.024	.987	.002	.041	.006	.031	.002
	Scalar	.944	.029	.086	.023	.078	.024	.973	.014	.056	.015	.047	.016
	Part. scalar	.957	.016	.078	.015	.044	.010	.979	.008	.051	.010	.036	.005
T2	Configural	.977		.062		.028		.977		.057		.028	
	Metric	.977	.000	.059	.003	.044	.016	.978	.001	.053	.004	.033	.005
	Scalar	.942	.035	.087	.028	.073	.029	.961	.017	.067	.014	.052	.019
	Part. scalar	.950	.027	.083	.024	.055	.011	.965	.013	.065	.012	.042	.009
T3	Configural	.975		.064		.026		.971		.065		.028	
	Metric	.975	.000	.060	.004	.037	.011	.972	.001	.061	.004	.030	.002
	Scalar	.949	.026	.081	.021	.061	.024	.956	.016	.073	.012	.045	.015
	Part. scalar	.958	.017	.076	.016	.042	.005	.961	.011	.070	.003	.038	.008

T4	Configural	.973		.070		.029		.970		.066		.029	
	Metric	.969	.004	.071	.001	.056	.027	.970	.000	.063	.003	.039	.010
	Scalar	.947	.022	.086	.015	.075	.019	.950	.020	.078	.015	.052	.013
	Part. scalar	.954	.015	.083	.012	.064	.008	.953	.017	.077	.014	.049	.010
T5	Configural	.969		.075		.036		.962		.079		.035	
	Metric	.967	.002	.073	.002	.060	.024	.957	.005	.080	.001	.063	.028
	Scalar	.960	.007	.075	.002	.061	.001	.952	.005	.081	.001	.063	.000
T6	Configural	.956		.097		.048		.916		.137		.060	
	Metric	.968	.012	.077	.020	.060	.012						
	Scalar	.961	.007	.081	.004	.064	.004						

Note. CFI= Comparative Fit Index, RMSEA= Root Mean Square Error of Approximation, SRMR= Standardized Root Mean square Residual, Δ = Difference with the previous level.

Table 3b

Measurement Invariance Analyses at Each Time Point

<i>Father-Adolescent Comparisons</i>								<i>Mother-Adolescent Comparisons</i>					
	Type	CFI	ΔCFI	RMSEA	ΔRMSEA	SRMR	ΔSRMR	CFI	ΔCFI	RMSEA	ΔRMSEA	SRMR	ΔSRMR
T1	Configural	.971		.072		.031		.971		.074		.031	
	Metric	.969	.002	.071	.001	.060	.029	.970	.001	.071	.003	.052	.021
	Scalar	.936	.033	.098	.028	.088	.028	.958	.012	.081	.010	.058	.006
	Part. scalar	.950	.019	.089	.018	.049	.011	.964	.006	.077	.006	.036	.015
T2	Configural	.977		.064		.028		.978		.063		.028	
	Metric	.976	.001	.062	.002	.046	.018	.977	.001	.061	.002	.039	.011
	Scalar	.943	.033	.091	.029	.077	.031	.959	.018	.079	.018	.053	.014
	Part. scalar	.952	.024	.085	.023	.056	.01	.961	.016	.078	.017	.054	.015
T3	Configural	.978		.060		.025		.975		.066		.025	
	Metric	.978	.000	.058	.002	.037	.012	.975	.000	.063	.003	.034	.009
	Scalar	.954	.024	.079	.021	.062	.025	.961	.014	.075	.012	.046	.012
	Part. scalar	.963	.015	.073	.015	.039	.002	.963	.012	.074	.011	.041	.007

T4	Configural	.974		.069		.029		.973		.074		.029	
	Metric	.972	.002	.068	.001	.051	.022	.969	.004	.076	.002	.055	.026
	Scalar	.954	.018	.083	.015	.067	.016	.959	.010	.083	.007	.067	.012
	Part. scalar	.959	.013	.080	.012	.052	.001	.963	.006	.081	.005	.065	.002
T5	Configural	.973		.069		.036		.969		.078		.037	
	Metric	.968	.005	.072	.003	.061	.025	.971	.002	.072	.006	.045	.008
	Scalar	.0965	.003	.072	.000	.063	.002	.966	.005	.076	.004	.045	.000
T6	Configural	.960		.090		.043		.975		.074		.044	
	Metric	.970	.01	.074	.016	.051	.008	.978	.003	.066	.008	.057	.013
	Scalar	.960	.01	.081	.007	.050	.001	.975	.000	.068	.002	.064	.007

Note. CFI= Comparative Fit Index, RMSEA= Root Mean Square Error of Approximation, SRMR= Standardized Root Mean square Residual, Δ = Difference with the previous level

Table 4

Measurement Invariance Analysis of the Five Factor Parenting Model Across Six Time Points (Adolescent Grade 7 to 12)

	Type	CFI	Δ CFI	RMSEA	Δ RMSEA	SRMR	Δ SRMR
Mother	Configural	.972		.063		.030	
	Metric	.975	.003	.054	.011	.046	.016
	Scalar	.969	.006	.057	.003	.052	.006
Father	Configural	.970		.071		.031	
	Metric	.973	.003	.063	.008	.045	.014
	Scalar	.969	.004	.062	.001	.048	.003
Adolescent	Configural	.976		.070		.029	
	Metric	.976	.000	.064	.006	.037	.008
	Scalar	.971	.005	.066	.002	.039	.002

Note. CFI = Comparative Fit Index, RMSEA = Root Mean Square Error of Approximation, SRMR = Standardized Root Mean square Residual, Δ = Difference of the respective index with the previous level.

Table 5

Gender Effects on the Growth Parameters of Parenting Dimensions

Gender effect on	Parameter	β	SE	<i>p</i>
<i>Mother</i>				
Support	Intercept	0.035	1.070	.284
	Slope	0.017	1.058	.290
Proactive control	Intercept	-0.093	0.042	.026
	Slope	0.014	0.020	.487
Punitive control	Intercept	-0.315	0.073	.000
	Slope	0.056	0.035	.109
Harsh punitive control	Intercept	-0.028	0.016	.086
	Slope	0.004	0.005	.406
Psychological control	Intercept	-0.042	0.040	.302
	Slope	-0.004	0.019	.847
<i>Father</i>				
Support	Intercept	0.013	0.045	.781
	Slope	0.009	0.020	.654
Proactive control	Intercept	-0.035	0.049	.475
	Slope	-0.008	0.021	.703
Punitive control	Intercept	-0.199	0.077	.010
	Slope	0.021	0.035	.550
Harsh punitive control	Intercept	-0.016	0.021	.449
	Slope	-0.002	0.006	.797
Psychological control	Intercept	-0.068	0.037	.069
	Slope	0.000	0.003	.981

Adolescent

Support	Intercept	0.134	0.042	.001
	Slope	0.007	0.019	.737
Proactive control	Intercept	0.000	0.43	.991
	Slope	0.023	0.019	.225
Punitive control	Intercept	-0.224	0.068	.001
	Slope	0.032	0.032	.317
Harsh punitive control	Intercept	-0.085	0.033	.010
	Slope	0.003	0.012	.803
Psychological control	Intercept	-0.084	0.043	.053
	Slope	0.009	0.020	.651

Table 6

Autoregressive Analyses (Standardized β) Assessing Differential Continuity Between Successive Time Points for Three Informants

	Time points	Support	Proactive control	Punitive control	Harsh punitive control	Psychological control
Mother						
	T2 on T1	0.901 ***	0.813 ***	0.907 ***	0.868 ***	0.132 ***
	T3 on T2	0.877***	0.813 ***	0.935 ***	0.955 ***	0.905 ***
	T4 on T3	0.912 ***	0.738 ***	0.924 ***	0.983***	0.947 ***
	T5 on T4	0.897 ***	0.881 ***	0.836***	0.892 ***	0.882 ***
	T6 on T5	0.985 ***	0.661 ***	0.563 ***	0.057**	0.218 ***
Father						
	T2 on T1	0.870 ***	0.918 ***	0.593 **	0.413***	0.818 ***
	T3 on T2	0.907 ***	0.800 ***	0.920 ***	0.041 **	0.771 ***
	T4 on T3	0.851 ***	0.747 ***	0.839 ***	0.955 ***	0.821 ***
	T5 on T4	0.823 ***	0.824 ***	0.602 ***	0.978 ***	0.792 ***
	T6 on T5	0.878 ***	0.893 ***	0.379***	0.007	0.850 ***
Adolescent						
	T2 on T1	0.853 ***	0.800 ***	0.811 ***	0.899 ***	0.879 ***
	T3 on T2	0.812 ***	0.741 ***	0.899 ***	0.846 ***	0.813 ***
	T4 on T3	0.805 ***	0.786 ***	0.906 ***	0.851 ***	0.827 ***
	T5 on T4	0.898 ***	0.849 ***	0.890 ***	0.977 ***	0.838 ***
	T6 on T5	0.852 ***	0.863 ***	0.604 ***	0.235 ***	0.881 ***

Note *** < .001
 ** < .01
 * < .05
 - Correlation cannot be calculated due to lack of variance