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Development of Intra-Individual Value Structures in Middle-Childhood: A Multicultural
and Longitudinal Investigation

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Abstract

Introduction

We examined changes in value inter-relations during middle-childhood. In line with the Personal Values Theory (Schwartz, 1992), we expected a value system, with individuals similarly valuing related motivations, and setting priorities between conflicting motivations (Döring et al., 2016; Schwartz, 1992). We hypothesized this system to develop dynamically during middle-childhood, as children deepen their understanding of their own values (Shachnai & Daniel, 2020).

Method

Using unfolding analysis (Borg et al., 2017; Skimina et al., 2021), we estimated intra-individual value structure coherence, i.e., the extent to which the inter-relations among a child's values are similar to the hypothesized inter-relations. Cross-Cultural Study 1 ($N=4,615$ 6-12-year-old children) included children from 12 countries. Cross-Sequential Study 2 ($N=629$, 6-10-year-old children at Time 1), included three annual measurements.

Results

In Study 1, we found a curvilinear association between age and intra-individual value structure coherence: Children's values were more coherent at ages 9-10 than before or after. Study 2 confirmed this pattern of within-individual development.

Conclusions

We propose that development in coherence with the theoretical value structure offers insight into children's understanding of values as well as changes in value priorities.

Keywords: values, value structure, middle-childhood, cross-cultural, longitudinal

Development of Intra-Individual Value Structures in Middle-Childhood: A Multicultural and Longitudinal Investigation

Human values are desirable goals that serve as guiding principles in a person's life, and, as such, have sparked researchers' interest since antiquity (Cieciuch & Schwartz, 2017). Values play a crucial role in personal identity (Hitlin & Piliavin, 2004), worldviews (Rohan, 2000), and behaviors (Bardi & Schwartz, 2003). Value transmission between generations is argued to hold the future for societal continuity (Trommsdorff, 2008), making children's development of values especially important. Yet most research into values looks at adults, not children (Döring et al., 2016).

Early theoreticians hypothesized that young children's behavior is externally motivated, but over time, children gradually develop the internal motivation that allows them to make independent behavioral choices (Piaget, 1932). Then, during adolescence, they shape their own value priorities in the process of identity formation (Erikson, 1968). However, recent theoretical and methodological advancements indicate that children as young as five years of age report meaningful values and can set them within a hierarchy of importance (Daniel et al., 2020). So far, this age group is the youngest to report meaningful values, and the nature of their personal values is therefore of substantial interest (Shachnai & Daniel, 2020).

One of the fundamental aspects of adults' values are the inter-relations among them. Values are organized along two basic dimensions, describing the compatibilities and conflicts inherent in their underlying relations (Schwartz, 1992). The organization of value priorities in line with this structure enables easy decision making in cases of conflicts, and a sense of internal coherence (e.g., Daniel & Benish-Weisman, 2019). Values of children are similarly organized along two basic dimensions (Bilsky et al., 2013; Döring et al., 2015). Yet little is known about the emergence of these underlying value inter-relations.

In two linked studies, we investigated the value systems of children between six and 11 years of age (i.e., in middle-childhood). Specifically, we examined the congruence between the inter-relations in the value system of children and the inter-relations of values in Schwartz's (1992) theory. Congruence would suggest children can resolve value conflicts and take a stance that reflects their value priorities. Incongruence will suggest lack of prioritization among values, rendering values of little use in directing behavior. In our first study, we examined the association between age and congruence within the structure of values in a cross-cultural and cross-sectional sample of children from 12 countries. In our second study, we followed the development of value congruence longitudinally in a cross-sequential sample of Polish children, studying the same children annually three times.

Values and Value Structures

The Personal Values Theory (Schwartz, 1992, 2012; Schwartz & Bilsky, 1987) is the most studied theory of human values, validated in hundreds of studies (Sagiv et al., 2017; Schwartz et al., 2012). The classic version of the model identifies ten basic values – universalism, benevolence, tradition, conformity, security, power, achievement, hedonism, stimulation, and self-direction – which can be subsumed under four higher-order values: self-transcendence, self-enhancement, conservation, and openness to change. Arguably the model's most important contribution is the description of the dynamic associations between values, represented as a circular motivational continuum (see Figure 1). Values are intrinsically motivational goals. The motivations underlying each value are inherently compatible with motivations underlying certain other values but conflict with others. As a result, pursuing one value leads to consequences that match some values but contradict others. For example, universalism values are directed toward understanding, appreciation, tolerance, and protection of the welfare of all people and nature. Children who pursue these values may recycle or support inclusion of disabled children (Vecchione et al., 2016). These actions are compatible with the pursuit of benevolence values, the aim of which is to preserve and

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enhance the welfare of those with whom one is in frequent personal contact (e.g., family and friends) and which are pursued by helping, sharing, and supporting others. In contrast, power values aim for social status and prestige *for oneself* and motivate behavior to control and dominate other people. These values conflict with the pursuit of universalism values.

Generally, the closer two values are on the circle, the more compatible their underlying motivational goals are, and the further apart two values are located, the less compatible and more conflicting they are. Hundreds of studies have confirmed the existence of the circular structure in varied samples across cultures (Sagiv et al., 2017; Schwartz et al., 2012). Support for the compatibility and conflict among values has been found in studies of reaction time, memory accessibility, and activation of brain regions to resolve conflicts (Leszkowicz et al., 2017; Maio, 2010; Pakizeh et al., 2007).

The structure of values has far-reaching implications across psychological domains. Importantly, individuals who value a specific value are more likely to behave in ways motivated by this value and less likely to behave in ways motivated by conflicting values (Bardi & Schwartz, 2003; Roccas & Sagiv, 2010; Vecchione et al., 2016). For example, individuals primed with achievement values were less likely to volunteer, as this behavior is motivated by benevolence values on the opposite side of the circle (Maio et al., 2009).

Intra-Individual Structure of Values

Although the structure of values is a central feature of the value theory, until recently it was investigated only *between* individuals. Thus, past results establish the inter-relations between values at the sample level, indicating that if an individual values one value more than other individuals, he or she is likely to value the conflicting value less than other individuals. Based on this model, one could expect that for any individual, compatible values should be important to a similar extent, while conflicting values will be valued to a different extent. It is logical to assume that conflicting values will push individuals to behave in conflicting ways, especially as fulfilling one value will mean less fulfillment of the conflicting one. In contrast,

holding compatible values is psychologically easy, as the fulfillment of one may promote the fulfillment of the others (Borg et al., 2017; Skimina et al., 2021).

The hypothesis of a within-individual value structure was first tested by Gollan and Witte (2014). In an adult sample, they found the intra-individual structure of values is like a necklace of pearls; the distances between pairs of values grow monotonically from a minimal distance between adjacent values, until a maximal distance is reached at the opposite side of the circle. Others (Borg et al., 2017; Lee et al., 2017; Skimina et al., 2021) tested the same intra-individual structure of values using unfolding analysis. Unlike the previous technique, this analysis constructs the structure of values best describing the associations between values within individuals in a bottom-up process and does not presuppose a circular structure of values. Across studies, the unfolding analysis found the intra-individual structure of adults' values resembles the theoretical structure postulated by Schwartz: each individual is likely to value compatible values to a similar extent and conflicting values to a lesser extent (Borg et al., 2017; Skimina et al., 2021).

Values in the Context of Middle Childhood Development

In early childhood, children already direct their behaviors toward internal goals (Jennings, 2004). These often take the form of value-related goals: caring for others, exploring new options, etc. New assessment instruments include concrete, age relevant, and non-verbal prompts to allow children to report their guiding goals (e.g., Picture-Based Value Survey for Children PBVS-C, Bilsky et al., 2013; Döring, Blauensteiner, Aryus, Drögekamp, & Bilsky, 2010; Animated Value Survey AVI, Collins, Lee, Sneddon, & Döring, 2017). Interestingly, the goals they report convey understanding of and identification with all values differentiated in Schwartz's (1992) model. Children's value priorities, including gender differences in value importance, correspond with those typically found among adults (Uzefovsky et al., 2016), and several studies have reported children's values are associated with their behavior (Abramson et al., 2018; Benish-Weisman et al., 2019; Berson & Oreg,

2016; Vecchione et al., 2016). Not only that, even the inter-relations between children's values mirror those of adults. Within specific samples, children who valued a specific value more than their peers, were more likely than other children in the sample to also value compatible values, and less likely than others to prefer opposing ones (Berson & Oreg, 2016; Bilsky et al., 2013; Ciecuch et al., 2013, 2016; Collins et al., 2017; Döring et al., 2015; Uzevsky et al., 2016).

To date, only one study has investigated the intra-individual value structure of children. In this study, Australian children between the ages of five and 12 reported value priorities, confirming the circular structure of values postulated by Schwartz (1992). In other words, a child who valued a specific value, was likely to show similar preference for adjacent values and reject conflicting values. Age seemed to matter in this sample: the differentiation of the values was better among the older age groups than the youngest (5 years of age; Lee, Ye, Sneddon, Collins, & Daniel, 2017). This study joins recent studies suggesting that during middle childhood, older children are more likely to conceptualize values maturely, as abstract motivations (Shachnai & Daniel, 2020).

Development in value conceptualization may occur because understanding values and the tradeoffs they entail, hence their underlying structure, requires the ability to compare and contrast among mental constructs. Indeed, throughout middle childhood, and across social contexts, children appear to improve in their ability to identify and resolve multiplicity and complexity. For example, there is increase in children's ability to consider multiple perspectives and conflicting goals (DeGiudice, 2017), with older children more likely to understand the possibility of multiple possible perspectives (Lagattuta et al., 2010) or multiple emotional reactions (Beck et al., 2012; Lagattuta, 2005) to the same situation. Children learn to coordinate and balance moral concerns that may be conflicting, such as acknowledging the legitimacy of causing harm in order to prevent a greater harm (Jambon & Smetana, 2014). Last, during middle-childhood, children learn to compare contrasting self-descriptions,

instead of compartmentalizing them across life contexts (Harter, 2012). These advances may result from increase in executive function abilities, such as working memory (Cowan, 2016; Lensing & Elsner, 2018) and cognitive flexibility (Buttelmann & Karbach, 2017).

Given these findings, we hypothesized that in middle-childhood, older children will be better able to perceive the inherent conflicts in the value system than younger children and form a coherent and coordinated value system that balances the relative importance of opposing values; thus, value systems will be more congruent among older than younger children.

Rationale for the Present Study

The aim of the study was to investigate intra-individual value structures in middle-childhood (Lee et al., 2017). We hypothesized that, older children's value structures will fit better with the theoretical structure of values than younger children's (Daniel et al., 2020; Döring et al., 2015). We also investigated the pattern of this development, comparing the hypothesized linear pattern with a quadratic pattern. Importantly, we went beyond previous investigations to investigate the theoretical congruence of children's intra-individual value structures in a large cross-cultural sample (Study 1). Cultures provide children with aspired value priorities (Fischer & Schwartz, 2011). We investigate whether despite the differences in value priorities, children across cultures are undergoing a similar developmental process of value structure consolidation.

We also extended upon previous studies to investigate the development of congruence in children's intra-individual value structures longitudinally, in a cross-sequential sample (Study 2), and investigate the association between age and gender and children's intra-individual value structure (Studies 1 and 2). Past studies have investigated fit of the overall value structure to the theoretical structure (Borg et al., 2017; Lee et al., 2017). We take it further to predict the fit of each individual to the value theory.

Study 1

Method

Participants. The study included $N = 4,615$ children. We used country as a proxy for culture, and included children from 12 countries: Australia, Bulgaria, France, Germany, Israel, Italy, New Zealand, Poland, Turkey, Ukraine, the United Kingdom (UK), and the United States (US), chosen on the basis of accessibility. The samples ranged in size from $n = 65$ (US) to $n = 1,167$ (Germany). Children were between six and 12 years of age, $Mean = 9.09$, $SD = 1.41$. Of the participants, 51% were female. Descriptive information about the participants in each sample is provided in Supplemental Material (SM) 1.

Value importance. Children's values were measured using the PBVS-C (Picture Based Value Survey for Children (Bilsky et al., 2013; Döring et al., 2010)). The PBVS-C employs two pictures to represent each of the ten Schwartz values. All pictures include a leading character performing a value-related action and are accompanied by a short caption that highlights the underlying motivational goal. After being introduced to the topic of values ("what is important to you in your life?"), children are requested to sort the 20 pictures in a predefined Q-sort format according to how important they find these values in their life. The PBVS-C was adapted for use in each country using translation and back-translation procedures, and pictures were adapted to the appropriate religious setting in the country (Döring et al., 2015). Equivalence of the value structure across genders and age groups was analyzed using a 20-item Multi-Dimensional Scaling analysis (MDS), and presented in SM 2.

Procedure. Children completed the value surveys in their native tongue. In most samples, recruitment was conducted in primary schools, where children were approached upon parental permission. Data were collected within the school classes by trained research assistants in a group setting. The questionnaire was distributed to every student whose parents consented to participation. Each picture was presented on a large poster, and the caption was read aloud by the research assistant. Then, each child completed the task independently. The assistants helped young children read the captions when they had reading difficulties. In the

UK, the questionnaire was distributed individually during a university science festival. In Israel, the questionnaire was distributed individually to children in their homes, reached through a snowball technique. In both cases, trained research assistants instructed children and answered questions when needed. We received ethical permission from the local ethics bureau and followed the ethics guidelines of each country.

Analysis Plan. We first applied a theory based ordinal MDS and generated a two-dimensional representation of the associations across the ten values. This analysis represents the correlations between participants' ranking of value items as distances in a two-dimensional space. Correlations are high when individuals likely to rank one item highly, are likely to rank another value highly. In the case of such correlations, and when the correlations of these items with all other items are similar, the items will be located close in space. We specified a theory-based starting configuration to increase chances of an optimal solution (Borg & Groenen, 2010).

As a second step, we estimated the intra-individual structure of values using unfolding analysis (Borg et al., 2017), a technique only recently implemented in the context of values, based on Coombs (1964) unfolding theory of preferential choice. In this analysis, we model each individual's value system, investigating whether the individual prefers theoretically compatible values similarly and opposing values differently.

We used the alienation coefficient K , an index of misfit of individuals to the value structure. This measure estimates how divergent an individual's value structure is from the emergent value circle within the specific sample. Individuals high in the alienation coefficient do not fit the value structure well. Thus, they do not prioritize theoretically compatible values similarly, and theoretically conflicting values differently. These analyses were conducted in R, using the smacof package (de Leeuw & Mair, 2009). Fit of the resulting solution to the data was conducted on the basis of a permutations tests and analysis of compatibility of individuals and values to the solution (Mair et al., 2016)

Last, we tested the associations between age and K using zero order correlations within each culture. Next, we estimated the cross-cultural patterns in these associations using a two-level fixed effect model. The multilevel model differentiates the residual variance in K across individual and country level to account for the nesting of individuals within countries. First, we centered age on the grand mean. Then, we regressed K on age and gender, to investigate two possible patterns of associations between age and K , a linear and quadratic association. The multilevel model thus investigates the association at the individual level, within a country, and then estimates the average association, across countries. The percentage of missing data ranged from 0 to 0.1%. To account for missing values, we used Full Information Maximum Likelihood in Mplus 8. FIML is recommended as a method that eliminates bias in estimation with missing data (Graham, 2009). Data and scripts to reproduce all analyses can be found here:

https://osf.io/dkf5a/?view_only=4f287139e1d7435db44c5e1dd9da920f. For further details of the analysis see SM 3.

Results and Discussion.

The estimated MDS model fit the data well ($Stress-1 = .078$), according to the criteria for model fit (Spence & Ogilvie, 2010). The configuration was similar to the theoretical structure (Schwartz, 1992), albeit with small adjustments, with power and achievement, and tradition and benevolence, exchanging places. The estimation at each country is presented in SM 4.

The unfolding analysis exhibited the expected circular structure for the values. In Figure 2, the person points are displayed as open circles, one for each participant. The value points are displayed as closed dots. The circular arrangement of the value points corresponds to the theoretical structure of the four higher order values (Schwartz, 1992), with benevolence before tradition, and tradition before security and conformity. Moreover, and as expected, the person points are located within the value circle. The normalized stress value of the solution is .263, which is significantly lower than the norm based on a 500 permutations test (average

permutations stress = .336, 5% quantile = .336, $p < .01$). This indicates that children, as a rule, report values that adhere to the compatibilities and conflicts postulated by the value theory. The analysis in each culture is presented in the SM, including Unfolding Stress and permutation tests (SM 4), charts for contribution of values and individuals to stress (SM 5), a table to summarize contribution of values to stress (SM 6), and a table to summarize the distribution of alienation coefficients K (SM 7). All analyses were also conducted at the 20 item level, rather than 10 values, thus testing whether children's reports of importance of 20 value items hold the same inter-relations as theoretically expected (SM 8).

Age and the value structure across countries. Across countries, we found a significant negative correlation between age and the alienation coefficient K , indicating that older children report values that better fit with the theoretical model (Table 1). No correlation was found between gender and the alienation coefficient K .

The proportion of variance in K between countries relative to total variance is called the intra-class correlation (ICC). We estimated ICC in an unconditional model, without any predictors. An ICC of .033 indicated that 3.3% of the variance in K could be attributed to the country. This ICC is low, indicating that most variance resides at the individual level.

Table 2 displays the results of the multilevel model. As the table shows, gender was negatively associated with congruence with the value structure, with girls less congruent with the value structure than boys. In line with the hypotheses, the average association between age and K was negative. However, we also found a positively associated quadratic slope. The results, presented in Figure 3, indicated that older children were more congruent with the value structure, but this trend was reversed in later ages, as older children became less congruent. The same pattern of associations was found when considering fit of children's reports of importance of their 20 value items to the value structure (SM 8).

The results indicate that during middle-childhood, children increase in their fit to the value structure. They are more likely to value congruent aims to a similar extent and

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incongruent aims to a varying extent. This trend of increased congruence is attenuated toward late childhood. Although we found variability in the pattern of associations across countries, the average effect suggests the process of development may be similar in different contexts. Such similarities in value development have been found by others (Daniel & Benish-Weisman, 2019; Döring et al., 2015). Thus, although cultures may vary in the importance they place on certain values, they may have similar processes of value structure formation.

As an added analysis, we correlated average country fit to the value structure with country characteristics, including Hofstede's (2021) Individualism – Collectivism scores as well as the United Nation's (2020) Human Development Index (HDI). Cultures in the current investigation were mostly high in both individualism and HDI measures. While there was no significant correlation between MDS *Stress 1* values and Individualism ($r = .24, p = .456$) or HDI ($r = .11, p = .737$), we found significant correlations between the Unfolding Stress and Individualism ($r = -.80, p = .002$) and HDI ($r = -.58, p = .047$). The results suggest that individuals fit the value structure better the more individualistic the country and the higher the country's HDI.

Study 1 compared children in different age groups to investigate their fit to the theoretical value structure. As this study did not follow the same children over time, it did not describe within-individual development, and differences between children could be attributed to cohort effects. Therefore, in Study 2, we followed children longitudinally, in a cross-sequential design.

Study 2

Method

Participants. The study included $N = 801$ children from urban and rural areas in Poland, studied three times, with a one-year interval between measurements (2010, 2011, 2012). The data were used previously to investigate the development of value importance over time (omitted for blind review). Children's ages ranged from seven to 11 years at time 1, and nine

to 13 years at time 3. For comparability with Study 1, at time 1, we only included children between seven and 10 years of age, so that children at the third time point were up to 12 years of age. As a result, our final sample comprised 629 children. Table 3 includes sample sizes for every age group, as well as gender composition. Attrition was minimal and related mostly to students' absence during measurement.

Measures. Children's values were measured using the PBVS-C (Picture Based Value Survey for Children), as described in Study 1. Incongruence with the structure was again measured using the alienation coefficient K (Borg et al., 2017). Equivalence of values with the theoretical structure was reported in the previous investigation (omitted for blind review).

Procedure. Data were collected in school classes by trained research assistants. The procedure was similar to the group administration of the PBVS-C described in Study 1.

Analysis Plan. Again, we conducted an unfolding analysis, as explained in Study 1 and SM 3 for the entire sample. The percentage of missing data ranged from 1.2% at time 1 to 22.8% at time 2 and 28.3% at time 3. Little's MCAR test was significant, $\chi^2(9) = 21.671, p < .01$. Thus, data were not missing completely at random. To account for missing values, we used Full Information Maximum Likelihood (FIML) in Mplus 8. FIML is recommended as a method that eliminates bias in estimation with missing data (Graham, 2009). We estimated patterns of intra-individual value structure change between time 1 and time 3, using latent growth curve models in Mplus 8 (Muthén & Muthén, 2017). Latent growth curves estimate trajectories of change in preferences for each individual. This individual trajectory is represented by the initial level of preference (intercept) and the change over time (slope). The model estimate includes the average of intercept and slope across individuals, thus the mean at the group level (Cieciuch et al., 2016). We estimated a multigroup model, in which every cohort was a separate group. We compared a model in which the slopes were free to vary across groups with a nested model in which the slope means were equated across groups. A significant χ^2 difference using the Satorra-Bentler scaled χ^2 would signify that the slopes are

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significantly different across groups. Models resulting in comparative fit index $CFI > .95$, standardized root mean square residuals $SRMR < .06$ (Hu & Bentler, 1999), and root mean square error of approximation $RMSEA < .06$ (Kline, 2011), were deemed an excellent fit.

Results and Discussion

The unfolding analysis exhibited the expected circular structure of the values. In Figure 2, again the person points are displayed as open circles, one for each participant. The value points are displayed as closed dots. The circular arrangement of the value points corresponds to the theoretical structure of four higher order values (Schwartz, 1992), with power and achievement switching places, and security and conformity switching places. Again, as hypothesized by the value theory, the person points are located within the value circle. The Stress-1 value of the solution is .249, which is significant based on a 500 permutations test (average permutations stress = .328, 5% quantile = .327, $p < .01$). Again, these results indicate that across time, each child is likely to value compatible values to a similar extent and conflicting values to different extent. SM 9-11 include contributions of values and individuals to solution stress. SM 12 includes the analysis at the 20 item level, rather than the 10 value level, again testing whether children's reports of importance of the 20 value items correspond with the theoretical value structure.

Intra-individual changes in value importance. Table 4 includes means, standard deviations, and zero order correlations between the study variables. For the young participants entering the study at age 7 and 8, we found no associations between the alienation coefficients K at different time points. However, for the older participants, we found positive associations between the alienation coefficients K at adjacent time points. The results suggest that the congruence of the value structure becomes increasingly intra-individually stable during middle-childhood.

The Satorra-Bentler scaled χ^2 difference test was significant $\Delta TR(3) = 36.444, p < .001$. Thus, the slopes were significantly different, and the free model is reported (Table 5, Figure

4). The model fit the data excellently, as indicated by $RMSEA = .047$, $CFI = .952$, $SRMR = .033$. As hypothesized, the growth models showed increased congruence for the youngest age group (7-year-olds at time 1), stability for the middle age group (8- and 9-year-olds at time 1), and decreased congruence for the older age group (10-year-olds at time 1). Thus, the results replicated the cross-sectional and cross-cultural results of Study 1 of a U shaped curve, of increased congruence with the value structure at young ages, and decreased congruence at older ages. The results were replicated when considering fit of children's 20 value items to the value structure, with one exception, as 8-year old's incongruence with the value structure decreased with age.

Study 2 extended Study 1 by following the same children over time. The longitudinal sample contributes to our understanding by suggesting that intra-individual shifts in value understanding, not cohort differences, underlie the results.

General Discussion

Our studies represent the first attempt to investigate correlates of congruence with the intra-individual value structure in general and within a developmental framework specifically. In Study 1, we conducted a cross-cultural investigation (children from 12 countries), with a diverse age range across middle-childhood. In Study 2, we replicated the results in a cross-sequential sample, following children's development over two years and three measurement points. We hypothesized that older children's values would fit the theoretical structure of personal values (Schwartz, 1992) better than values of younger children. The results confirmed our hypotheses in the early stages of middle-childhood in both samples, attesting to the robustness of the effect.

Middle-childhood is a time of substantial cognitive change, as children's executive functions consolidate. Working memory expands in capacity (Cowan, 2016; Cowan et al., 2011; Lensing & Elsner, 2018; Riggs et al., 2011), the ability to inhibit an unwanted response consolidates (Best & Miller, 2010; Rollins & Riggins, 2017), the attention span increases

(Slobodin et al., 2015; Suades-González et al., 2017), as is cognitive flexibility (Buttelmann & Karbach, 2017). These cognitive gains may be at the root of important social and moral changes that take place during this developmental time. Specifically, children compare complex systems of self-concepts to determine which they prefer, and detect inconsistencies (Harter, 2012). In the moral sphere, they become more proficient in coordinating and balancing conflicting moral concerns (Jambon & Smetana, 2014). Their emotional knowledge extends to the understanding of mixed emotions (Beck et al., 2012), and they expand their ability to consider a phenomenon from multiple perspectives (Hansen Lagattuta et al., 2014). In all these aspects, children improve in their ability to detect and balance complex, sometimes contradictory ideas. These skills may become useful in forming a coherent value system, including prioritization between conflicting goals. Future research may directly assess the associations between cognitive gains and advances in children's understanding of value conflicts.

The improvement in the coherence of the value system may support children in their quest to regulate their behaviors in line with internalized goals. All values are important, yet adults prioritize between them in order to make decisions within specific situations (Bardi & Schwartz, 2003). Thus, children who value conflicting goals, such as care for close others and dominance equally, will be at a loss when faced with a moral dilemma. To form a coherent system, children should understand the consequences of both goals, and make a choice as to their relative importance. This process may become easier with cognitive development during middle-childhood. Future studies should directly test the role of cognitive development in value structure changes.

A surprising effect found in the current study is the decrease in value system coherence in the later stages of middle-childhood. These results were replicated in the two studies. We suggest that the results may mark value importance changes that take place as children approach adolescence. Identity formation is an integral part of adolescence (Meeus, 2018).

Adolescents gradually separate from their parents in their bid to become autonomous (Koepke & Denissen, 2012), make decisions on private matters (Smetana, 2011), and explore new, sometimes risky, behavioral options (Braams et al., 2015). This identity formation often involves shifts in value importance (Daniel & Benish-Weisman, 2019; Vecchione et al., 2019).

Value shifts partly occur in late childhood, as indicated in two studies that investigated value importance over time among individuals in middle-childhood. In the first, in a sample of Australian children, value profiles were organized in line with Schwartz's value system; the study found that children became increasingly oriented toward social and growth goals over the course of a two years (Daniel, Benish-Weisman, Sneddon, & Lee, 2020). In the second study, a cross-sequential study of Polish children between seven and 13 (using the data reported here in Study 2), value change was documented in all four value types: self-transcendence values decreased in importance between ten and 12, while self-enhancement values decreased between eight and nine or ten and increased thereafter until 12 years of age; conservation values decreased after the age of nine, while openness to change values increased after the age of eight (omitted for blind review). The current investigation suggests that value importance changes may create incoherence in value systems.

It is important to note that the effects of change in value structure appear to be small. The results suggest that already at the beginning of middle childhood, children do report values that mostly align with the compatibilities and conflicts of hypothesized in the Schwartz Theory of Personal Values (Schwartz, 1992). The results stand in line with a recent study investigating profiles of children, who value different value combinations. Children were likely to combine compatible, and not contrasting values, and a small group, decreasing in frequency over time, did not differentiate between their values (Daniel et al., 2020).

The implications of our study go beyond the development of values during childhood to shed interesting light on processes of value change. Past theories see values as stable

individual constructs, but we now know they change as a result of maturational processes, as well as life events (Bardi et al., 2014; Bardi & Goodwin, 2011; Daniel et al., 2021). We also know that value change follows the theoretical structure of human values: as values at one side of the circle increase in importance, values at the opposite side tend to decrease (Bardi et al., 2014; Bardi & Goodwin, 2011; Daniel & Benish-Weisman, 2019). Our study suggests that as children change their value importance, their values may become incoherent, creating tension and internal conflict. For example, as a child begins to stress openness to change values, his or her wish for independence may conflict with prior values of stability and safety, forming an incoherent value system. The psychological tension caused by internal value conflict may reduce well-being (Daniel et al., 2016) and make decision-making more difficult. As a result, the child may gradually reduce the importance of conservation values to form a coherent value system once more. The current results may be the first to document such process as it happens. Future studies may investigate changes in the intra-individual value structure of adults who undergo value-altering life changes, to learn whether they involve temporary value incoherence.

Strengths, Limitations, and Implications

The two studies have several notable strengths. First, we employed a well-validated theory and measure of values (Bilsky et al., 2013; Döring et al., 2010; Schwartz, 1992, 2012). Second, results were replicated across two very distinct samples. One sample was cross-cultural, enabling generalization to a wide variety of populations. The other was longitudinal, increasing the internal validity of the within-individual developmental conclusions. Third, we used a statistical technique that had only recently used with the value paradigm to measure within-individual value structure.

At the same time, some limitations should be acknowledged. First, the studies utilized self-report data, creating the possibility of social desirability bias. However, self-reports, to date, are the most reliable source of information on values. Moreover, social desirability has

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been shown to be a personality trait meaningfully related to value importance, not a bias in the reporting of values (Schwartz et al., 1997). Second, in Study 1, the samples within each country were of varying sizes, making some samples more likely to represent the population than others. By using multilevel analysis, the overall results were not biased by the size of the larger samples, and the results are more likely to be stable. In addition, we replicated the results in two studies, to increase robustness. At the same time, future studies should utilize larger samples in all countries. Third, the longitudinal sample in Study 2 was limited in time, with four age cohorts measured over two years. Future studies should follow children over the entire age range to fully rule out cohort effects on value structure development. Study 2 also included a small sample in the youngest age cohort. Although small samples were found suitable to model latent growth curves (Shi et al., 2021), future studies should replicate the result. Fourth, we used the alienation coefficient in a novel way, to investigate individual differences in congruence with the value structure. Future studies should go beyond the scope of this investigation to investigate associations between value congruence and variables such as well-being and self-esteem (Daniel et al., 2016) or behavior. Last, gender was studied here as a control variable. Future studies can focus on gender differences in value structure and development

In conclusion, we investigated the intra-individual value structure of children during middle-childhood. We found a non-linear effect, with children increasing in structure coherence at the beginning of middle-childhood and decreasing during late childhood. The results suggest developmental changes are non-deterministic and dynamic, alternating between equilibrium and imbalance.

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Table 1.

Means, standard deviations, and correlations between the study variables, Study 1

Variables	Mean	SD	Correlations	
			1	2
1. Alienation coefficient <i>K</i>	.24	.07		
2. Gender			-.15**	
3. Age	9.09	1.41	-.05**	.002

Note. * $p < .05$; ** $p < .01$

Table 2.

Multilevel, fixed-effects models estimating the associations between gender, age, and alienation coefficient *K* in Study 1, estimates and confidence intervals

Variables	<i>Estimate</i>	<i>SE</i>	<i>CI</i>
<i>Fixed effects</i>			
Within level			
Gender	-.020**	.002	-.024, -.016
Age linear effect	-.056**	.013	-.081, -.030
Age quadratic effect	.003**	.001	.002, .004
Between level			
Alienation coefficient <i>K</i>	.249**	.003	.242, .255
<i>Random effects</i>			
Within level residual variance	.004	.000	.004, .004
Between level residual variance	.000	.000	.000, .000

Note. * $p < .05$; ** $p < .01$. CI = Confidence Interval

Table 3.

Sample sizes and gender composition across ages, Study 2

Age group	Sample Size	% Females
7	65	59
8	165	45
9	169	46
10	230	54

Table 4.

Means, standard deviations, and correlations between the study variables, Study 2

Age group	Variable	Mean	SD	Correlations	
				K Time 1	K Time 2
7	K Time 1	.264	.065		
	K Time 2	.232	.059	.161	
	K Time 3	.217	.061	-.102	-.009
8	K Time 1	.248	.067		
	K Time 2	.233	.069	.058	
	K Time 3	.235	.073	-.073	.153
9	K Time 1	.224	.071		
	K Time 2	.225	.064	.297**	

	K Time 3	.233	.063	.140	.364**
10	K Time 1	.221	.064		
	K Time 2	.242	.062	.148 [†]	
	K Time 3	.246	.070	.116	.230**

Note. * $p < .05$; ** $p < .01$

Table 5.

Linear Growth Models for different age groups, estimating change in alienation coefficient K , estimates and confidence intervals,
 Study 2

Age group	<i>Intercept</i>			<i>Slope</i>		
	<i>Estimate</i>	<i>SE</i>	<i>CI</i>	<i>Estimate</i>	<i>SE</i>	<i>CI</i>
7	.262**	.008	.247, .277	-.023**	.006	-.035, -.012
8	.246**	.005	.236, .255	-.006	.004	-.015, .002
9	.223**	.005	.213, .233	.005	.004	-.002, .012
10	.223**	.004	.215, .231	.013**	.003	.007, .019
Overall	.236**	.002	.231, .240	.000	.002	-.004, .003

Note. * $p < .05$; ** $p < .01$. CI = Confidence Interval

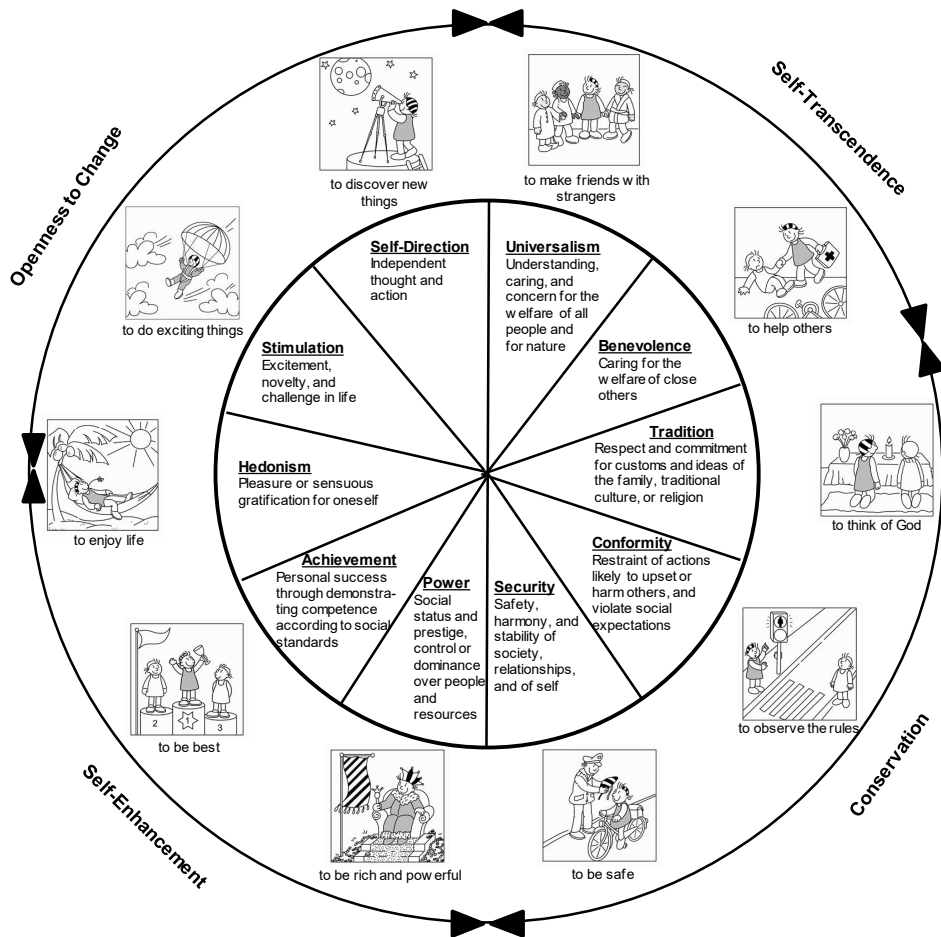
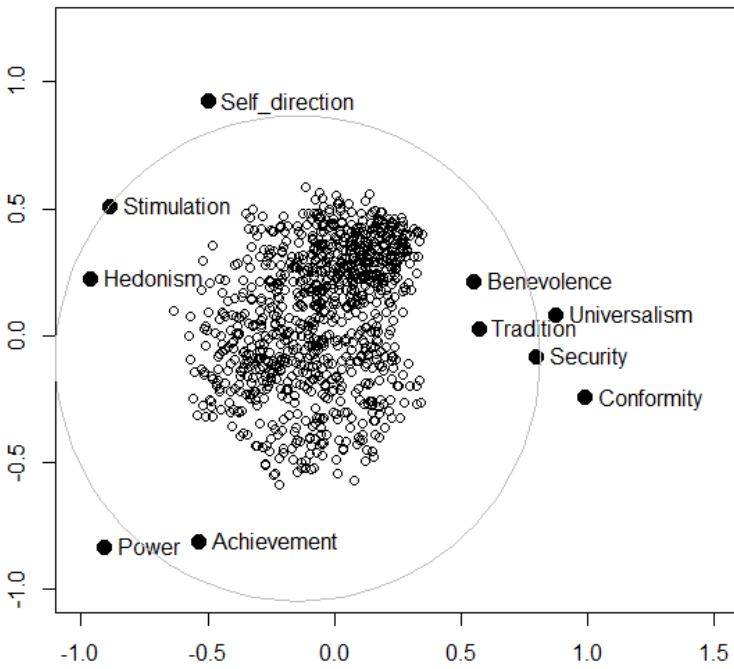


Figure 1. Schwartz's model of values and exemplary items from the PBVS-C

Panel A.



Panel B.

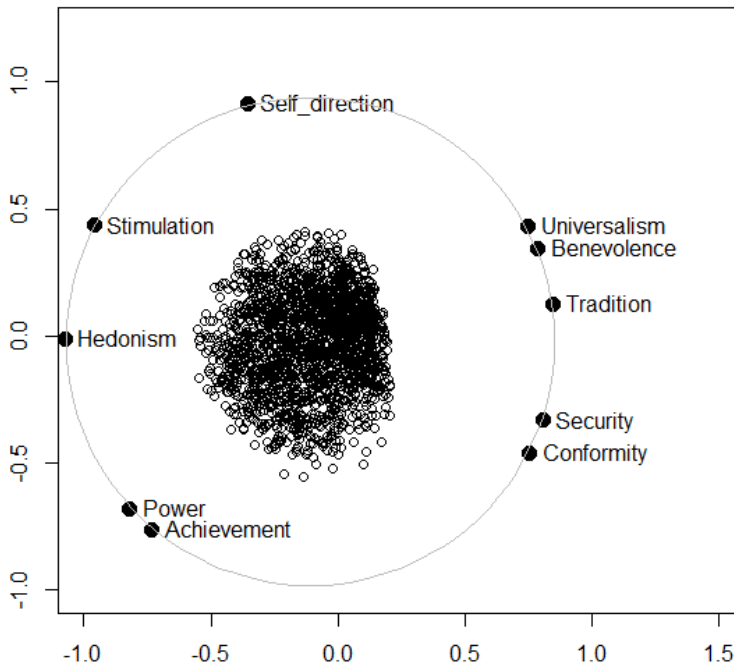


Figure 2. Unfolding solution. Panel A: Study 1. Panel B: Study 2.

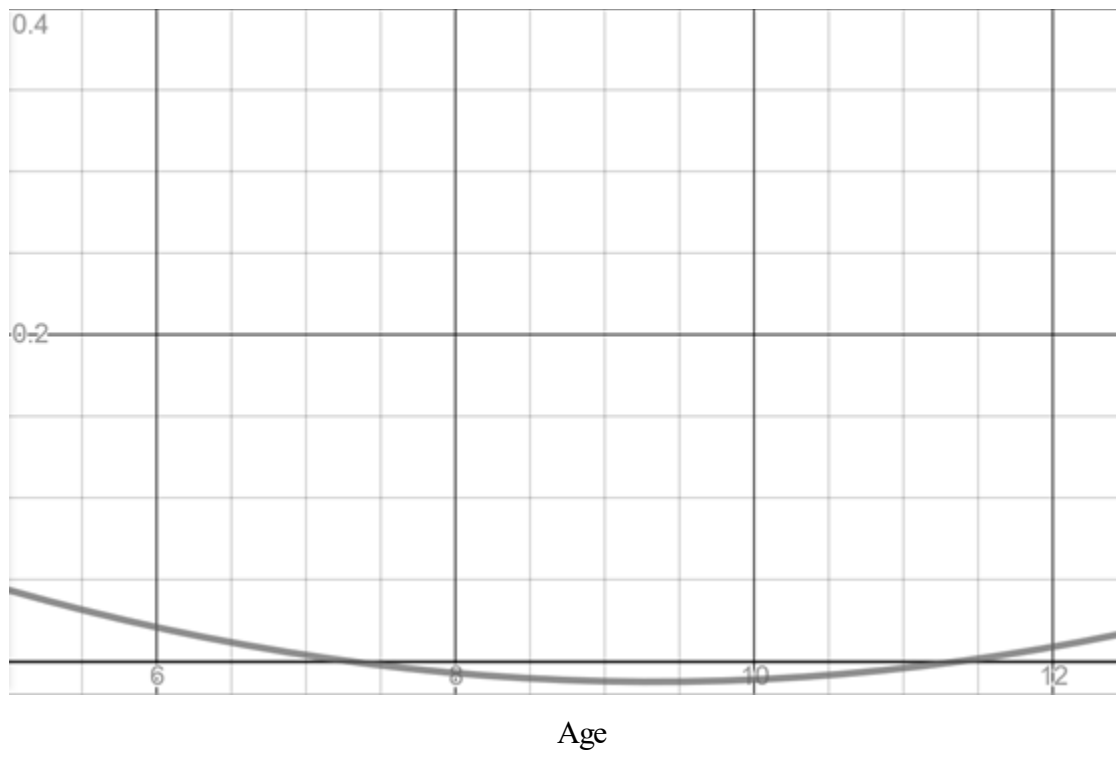


Figure 3. Association of age with alienation coefficient K in Study 1.

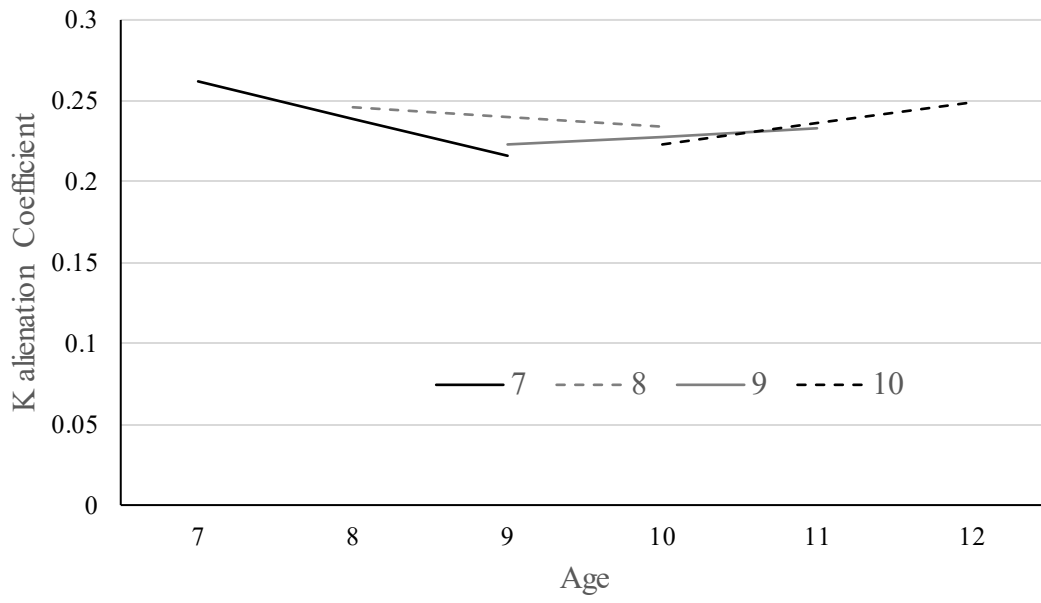


Figure 4. Association of age with alienation coefficient K in Study 2.