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A Multilingual App for Studying Children's Developing Values: Introducing a New Arabic Translation of the Picture-Based Values Survey and Comparison of Palestinian and Jewish Children in Israel.

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The authors declare no conflicts of interest and agree to share de-identified raw data and analysis code. They will also provide the application to interested researchers, subject to certain use conditions. Research materials are registered at the open science repository and can be accessed using the link [https://osf.io/vp25k/?view_only=12819737a9a2449c96c548dedc1ef8fa].

A Multilingual App for Studying Children's Developing Values: Introducing a New Arabic Translation of the Picture-Based Values Survey and Comparison of Palestinian and Jewish Children in Israel.

Revised submission

Abstract

Although over 250 million people speak Arabic as their first language, only a minuscule fraction of developmental science studies Arab children. As values are a core component of culture, understanding how values develop is key to understanding development across cultures. Little is known about young Arab children's values. We developed an Arabic version of the Picture-Based Value Survey for Children (PBVS-C) and implemented it in a multilingual application, adapted for five-year-olds by recording the instructions and value item captions. We then compared the results in Arabic to those from the more established Hebrew version, with Hebrew-speaking children as a comparison group. A pilot study (N=63) provided preliminary support that the measure is working well in Arabic and Hebrew. In Study 2, 400 5-12-year-old children reported their values (50% in Arabic, 50% in Hebrew) in a preregistered study. Multidimensional Scaling analyses revealed structural patterns that closely correspond to Schwartz's (1992) theoretical structure in both languages. Replicating past findings, power values were less important than benevolence in both cultural groups, and girls ranked self-enhancement values lower than boys (but not in Hebrew speakers). We further explored age and cultural differences in value development. Value consistency increased with age in both cultures, peaking at age 9-10. Cultural comparisons revealed several differences in value importance between the two cultures, and lower value consistency and coherence in Arabic-speaking children. These results establish a tool for studying value development in Arab children, and more broadly, understanding the basic motivations driving populations that were hardly studied before.

Keywords: Values, Arab Children, Computerized Picture-Based Value Survey, Culture

Public significance statement

This study represents a first effort to measure values in Arab children as young as 5 years old, using a culturally sensitive, multilingual approach with 5-12 year old Palestinian and Jewish Israeli children. Both Arabic and Hebrew speakers demonstrated understanding of four higher-order values and there were mean cultural differences in value priorities, while value

consistency increased with age in both cultures, peaking at age 9-10. The new measure is designed to apply to children across different parts of the Arab world.

A Multilingual App for Studying Children's Developing Values: Introducing a New Arabic Translation of the Picture-Based Values Survey and Comparison of Palestinian and Jewish Children in Israel.

Understanding how values develop has become an important focal point for researchers lately (Knafo-Noam et al., 2023; Daniel et al., 2024). One reason for the growing interest in values, defined as "the broad goals that serve as guiding principles in people's lives" (e.g., Rokeach, 1973, p. 5 ; Schwartz, 1992), is their role as motivators and drivers of behavior (e.g., prosocial and antisocial behaviors, Abramson et al., 2018 ; Benish-Weisman et al., 2019), emotions (e.g., shame, guilt, and empathy; Daniel et al., 2014 ; Hirvelä & Helkama, 2011; Silfver et al., 2008), and attitudes toward unethical behaviors (e.g., lying and cheating; Feldman et al., 2015; Pulfrey et al., 2018).

Although values have been described as a core component of culture (Hofstede, 2001; Schwartz, 2001) and much research has been devoted to documenting cultural value differences in adulthood and adolescence (for reviews, see Roccas et al., 2010; Sagiv & Schwartz,2022), developmental research on the emergence of values in childhood across cultures is scarce (Daniel et al., 2023; D□ring et al., 2015). The few exceptions include a comparison of (7-11) year- old children from Western Europe (Germany and Italy), Eastern Europe (Poland and Bulgaria), the United States and New Zealand cultures (D□ring et al., 2015). Other research has reached 12 cultural groups of 6–12-year-old children (Daniel et al., 2023), and two western cultures (6–11-year-old German children, and 7–9-year-old Swiss children (D□ring et al., 2017). Although it has shown that the structure of values is similar across cultures, this research did not address the mean importance of values across cultures.

Importantly, very little is known about the development of values among Arab children, although over 250 million people in the world speak Arabic as their first language (Alotaibi & Selouani, 2009) and Arab children constitute a large part of the population of children globally. Indeed, there is a lack of good measures of children's values in Arabic. This is part of a broader

problem of lack of diversity in developmental science (Draper et al., 2022). Analysis of publications in child developmental journals revealed a bias towards WEIRD (Western, Educated, Industrial, Rich, and Democratic) samples (Nielsen et al., 2017), and extending this bias to authors and reviewers from western countries (Moriguchi, 2022). This bias and lack of diversity in publications has many consequences, for example losing a broad understanding of how children develop, specifically the role of different contexts (i.e.: ethnicity) in human development (Draper et al., 2022).

Therefore, the current study is aimed at providing a resource that will enable future work on the values of Arab children. Our investigation is focused on developing and validating a measure of values for Arab children between the ages of 5 and 12. We did this by adapting the most established and reliable measure of values for middle childhood, the Picture-Based Value Scale for Children (PBVS-C; D□ring et al., 2010) to Arabic, and developing a novel online application version of the measure to compare the values of Arabic-speaking children to those of Hebrew-speaking children, for which the value measure has already been tested (Abramson et al., 2018; Daniel et al., 2023; Uzefovsky et al., 2016).

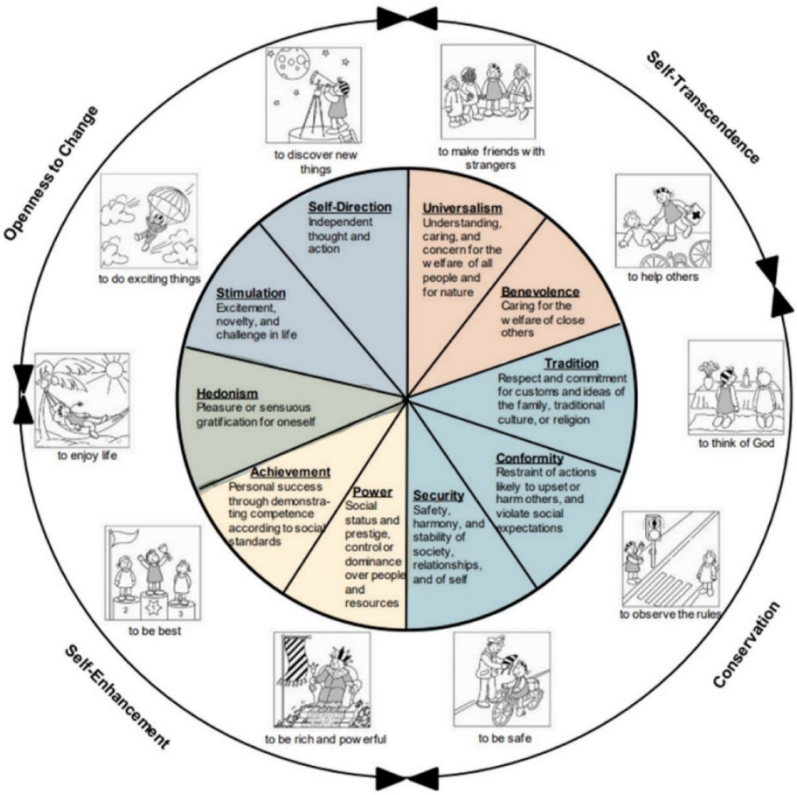
Values: Definition, Motivational Structure, and Function

We encounter values in different domains of our lives. These abstract ideals accompany parents while raising their children (e.g., teaching them about helping others or saving the environment; Barni et al., 2011; Scopelliti et al., 2022), employers while managing their employees (e.g., equality; Arieli et al., 2020), teachers while raising the awareness of their students to the importance of respect for each other and so on (Barni et al., 2019). The concept of values has many different definitions (for a review, see Rohan, 2000). We follow a definition by Schwartz (1994), largely agreed upon in psychological research and inspired by Rokeach (1973): values are defined as “desirable trans-situational goals, varying in importance, that serve as guiding principles in the life of a person or other social entity” (Schwartz, 1994, p. 21).

Although there are many values, values can be grouped and organized based on their underlying motivation. According to Schwartz (1992), some values are compatible in their underlying motivations, whereas others are conflicting. Based on theory and empirical research, Schwartz demonstrated that values can be grouped into 10 motivationally distinct values that are theoretically derived from universal requirements of human life. Figure 1 presents the list of values and definitions of their underlying motivations.

Figure 1

Schwartz's model of values and exemplary items from the PBVS-C (Daniel et al., 2023)



Moreover, values are organized in a quasi-circular structure, with compatible values close together in the circle, while conflicting values are located on opposite sides of the circle. For example, the values of achievement and power are close together in the circle because they share the same underlying motivation to promote the self (termed *Self-Enhancement values)*.

Benevolence and universalism values share a focus on the welfare of others and are thus termed *self-transcendence values.* Thus, achievement and benevolence are opposing in the circle because their underlying motivations are in conflict (self-focus versus social focus). A similar rationale contrasts *Openness to change* values which focus on seeking change, new ideas, and actions (stimulation and self-direction) with *conservation values* (tradition, conformity, and security) which focus on preservation of the status quo (see Figure 1). Hedonism values share their motivation with both self-enhancement and openness to change.

Research has found that the structure of human values is similar across more than 80 countries, largely supporting the prototypical Schwartz structure with data from adults and adolescents (Bilsky et al., 2011; Liem et al., 2011; Sagiv et al., 2022; Schwartz et al., 2012). This applies also to Arab samples (e.g., Knafo et al., 2008; Sortheix et al., 2023). This structure is reflected in developmental processes of values. For example, an individual experiencing an increase with age in the importance of a certain value (e.g., self-enhancement) would tend to decrease in the importance of values at the opposite end of a value dimension (i.e., self-transcendence) (Daniel & Benish-Weisman, 2019; Daniel et al., 2023). Similarly, family variables related to a certain value (e.g., family religiosity and conservation values) tend to have opposite associations with the motivationally opposed values (in this example, openness to change values; Knafo, 2003).

Importantly, any two values adjacent in the circular structure share motivations and are thus generally related in the same direction to third variables. For example, security values, with their focus on reducing uncertainty and risk, and power values, with their focus on promoting one's self-interest, share the motivation to reduce threats to one's self or property through increasing control over resources and relationships (Schwartz, 2012). They are both positively related to negative attitudes towards immigrants (Davidov & Meuleman, 2012; Davidov et al., 2008; Ponizovskiy, 2016). Values at opposite sides of the circle tend to have opposite

associations with third variables. In the above example, universalism values are negatively related to negative attitudes towards immigrants.

The motivational content of values is related to the behaviors they are associated with (Bardi et al., 2003; Vecchione et al., 2006). For example, it has been theorized that prosocial behavior (defined as a voluntary behavior meant to benefit others; Eisenberg et al., 2015) is positively related to self-transcendence and negatively related to self-enhancement. Indeed, research among adults and adolescents has linked values to prosocial behaviors (Caprara et al., 2007; Daniel & Benish-Weisman, 2019).

Values are also linked to antisocial behaviors such as aggression (for a review, see Benish-Weisman, 2019). In a cross-cultural study with Arab and Jewish adolescents in Israel, high power, low universalism, and low conformity values were related to more self-reported violent behavior (Knafo et al., 2008). These results were replicated in later research with Jewish Israeli adolescents using peer reports as a measure for aggression (Benish-Weisman, 2015) and later with German adults (Seddig & Davidov, 2018). Recently, research has demonstrated the association between values and the behavior of children. For example, children's (age 5-12 years) self-transcendence values related positively, and their self-enhancement values related negatively, to their decision to share resources with another child (Abramson et al., 2018). In another study, 7-year-old children's delayed gratification behavior (defined as the ability to postpone an immediate gain in favor of greater and later reward; Mischel & Ebbesen, 1970), related negatively to conservation values, specifically to security and tradition, and positively to self-enhancement values, especially power and achievement (Twito et al., 2019). Similarly, values are related to antisocial behaviors such as violence, already in childhood. A study of 5-12-year-old children used peer nominations to assess children's direct aggressive and prosocial behavior. Children who assigned relatively high importance to self-transcendence and conservation values and less importance to self-enhancement values were less likely to show

direct aggression and more likely to apply prosocial behavior (Benish-Weisman et al., 2019; Daniel et al., 2020). A recent study of Israeli 5-year-olds has shown positive associations between children's self-enhancement values and their externalizing behavior (Elizarov et al., 2023), further supporting the importance of studying children's values.

Measurement of Values at Different Ages

Many instruments have been developed to measure values (an excellent review of value measures can be found in Roccas et al., 2017; for a developmental perspective, see Twito-Weingarten & Knafo-Noam, 2022). One of the earlier measures was developed by Rokeach (1967). The Rokeach Values Survey (RVS) asked respondents to rank values in each of two sets of 18 items in order of importance to them as guiding principles in life. A more common scale is the Schwartz Values Survey (SVS, Schwartz, 1992), in which participants rate the importance of 57 value items as guiding principles in their lives. As the SVS requires a high level of abstract thought, it was not appropriate to measure value importance among all adolescents. To account for this issue, Schwartz developed the Portrait Values Questionnaire (PVQ), a more concrete and less cognitively demanding measure (e.g., Schwartz & Rubel, 2005; Schwartz et al., 2001). Unlike the SVS, in the PVQ, participants compare themselves to a fictional character (matched in gender in relevant languages) described in short verbal portraits (e.g., "It is important to him/her to help the people around him/her. He/she wants to care for their well-being."). However, although the PVQ has improved the ability to study values in adolescence, and has been used with modifications with younger samples (Knafo & Spinath, 2011), a measure suitable for children was not available for a long time.

To assess values among children, D□ring et al. (2010) developed the PBVS-C. This measure is widely used (with data collected in 14 countries) and takes into consideration the developmentally appropriate cognitive capabilities of children (e.g., reading and writing abilities, attention span). The PBVS-C uses 20 value items, two of which represent each of Schwartz's

values. Items consist of a cartoon-like image and a caption that directs children's focus to the underlying motivational goal (see Figure 1), and values are ranked according to how important children find them in their lives.

Later on, the Animated Values Instrument (AVI) was developed to assess the values of children (Collins et al., 2017). This instrument overcame the obstacle of reading ability in children by incorporating verbal, visual, and auditory information about each value.

Importantly, both measures have yielded a structure of values similar to the prototypical Schwartz (1992) structure, portrayed in Figure 1 (Collins et al., 2017; Lee et al., 2017; Uzefovsky et al., 2016). The study by D□ring et al. (2010), which employed the PBVS-C with German children (8-12 years old), showed a value structure similar to the one found among middle and late adolescents and among adults, with a clear distinction among the four higher-order values, reflecting the two value dimensions of self-enhancement versus self-transcendence and openness to change versus conservation. Similarly, a study of 8-12-year-old Polish children showed a value structure closely corresponding to the Schwartz theoretical structure (Cieciuch et al., 2013). A cross-cultural study on three thousand children in the middle childhood stage (7-11 years old) from six cultural groups in Western Europe, Eastern Europe, the United States, and New Zealand revealed a value structure similar to that found in adults (D□ring et al., 2015), with the order of the ten values across the circle largely replicating the one reported by Schwartz for adults.

Further work on the PBVS-C has demonstrated that the value structure of children follows the prototypical structure followed by Schwartz already at age seven (Uzefovsky et al., 2016), and possibly even earlier (Tamm & Tulviste, 2022). Following a minor methodological change in the measure (splitting the 20 PBVS-C items into two sets of 10), the structure has been replicated already at the age of five (Abramson et al., 2018). Thus, although there is evidence that young children have a less mature (abstract, goal-based) understanding of values

than older children (Misgav & Daniel, 2022; Shachnai & Daniel, 2020), there is substantial evidence that already at the beginning of middle childhood, children construe their values in a way similar to the theoretical and empirical structure proposed by Schwartz (1992).

Additional advantages of the PBVS include evidence for longitudinal stability which tends to increase with age (Cieciuch et al., 2016; Daniel et al., 2023) and its predictive validity. For example, as noted, children's values, as assessed by the PBVS-C, related to their prosocial behaviors and delayed gratification (Abramson et al., 2018; Twito et al., 2019). As the PBVS-C has been shown to replicate the Schwartz (1992) structure and to be understandable to children as young as five-years old, and because of its ease of administration and evidence for its validity, we chose to focus on this measure for our study of Arab children.

Challenges of Developing an Arabic Version of the PBVS-C

In the current study, and for the first time, we measured the values of Arabic-speaking children starting from age 5 by using a novel, culture-appropriate Arabic translation of the PBVS-C. Researchers establishing methods for developmental work in Majority World contexts encounter several important challenges. First, research in the Majority World often involves Western research teams lacking suitable acquaintance of the culture to be studied. Therefore, our team included Palestinian (primarily Arabic speakers) and Jewish Israeli (primarily Hebrew speakers) research members engaged in cultural adaptation.

In addition, demonstrating cross-cultural comparability would be challenging because cultures vary in their languages, economic situation, and possibly even in their understanding of seemingly similar concepts. For example, Davidov et al., (2014) pointed that in some European countries the meaning of tradition could be understood as reflected in attending a Catholic church, whereas among Israeli Jews it means to follow the Jewish traditions. Moreover, cultural

adaptation is often challenging as most of the theories and methods are imported from WEIRD contexts.

Aware of these challenges, we sought to have a measure that would be (a) context-sensitive, (b) applicable across diverse contexts of the Arab world and (c) because we are interested in comparing children across different cultural contexts, the measure should show cross-cultural comparability. The fact that the Schwartz value theory (1992) was developed specifically with cultural sensitivity in mind, looking for values that have comparable meanings across cultures (Schwartz, 1994), facilitates the cross-cultural comparison. Similarly, the PBVS-C measure of children's values was developed with the explicit goal of enabling cross-cultural research (D□ring et al., 2010). Finally, the Arab population is a very large part of the global population (5.6%), and includes many variations in religion, culture and language (Population Division of the Department of Economics, 2024). We sought to provide a measure that could be applicable across different Arab contexts. We describe how we approached these issues in the methods section of Study 1.

The Present Research

The current investigation had two main goals. First, we sought to validate the Arabic translation of the PBVS-C. Second, having established validity of the measure, we used this first sample of Arab children's values to explore the cultural differences between Arabic and Hebrew-speaking children in Israel. Moreover, we studied children from across middle childhood to early adolescence to explore age differences in values.

Validation Hypotheses

We proposed four validation hypotheses, all preregistered (https://aspredicted.org/bq77i.pdf). Two kinds of evidence served to validate the measure. First,

we relied on two sets of findings from past work: (a) the structure of values, most notably the two dimensions of self-enhancement versus self-transcendence and openness to change versus conservation has been repeatedly demonstrated across a very wide range of cultures (Sagiv & Roccas, 2010), including in adult and adolescent Arab samples (e.g., Barni & Knafo, 2012; Daniel et al., 2012; Knafo, 2003 ;Schwartz, 2012; Schwartz et al., 2001, Schwartz, 2006a); and (b) the PBVS-C supported this structure in children from across a wide range of other cultures (Abramson et al., 2018; D□ring et al., 2010; D□ring et al., 2015; Gross & Dewaele,2018; Kapikiran & Gündoğan,2018; Tamm & Tulviste,2022; Uzefovsky et al., 2016). Therefore, a value structure resembling the theoretical Schwartz (1992) structure would provide evidence for the validity of the Arabic PBVS-C.

In light of the previously mentioned literature on values**,** we extended the results found across cultures regarding the value structure for the Arab culture. Thus, we hypothesized that **(H1): Children will show a structure similar to the prototypic one proposed by Schwartz, which reflects the compatibilities and conflicts between the underlying basic motivations of values.** Specifically, we expected the organization of values to confirm the theoretical dimensions of (1) self-transcendence (benevolence and universalism) versus self-enhancement (power and achievement) and (2) openness to change (self-direction and stimulation) versus conservation (conformity, tradition, security). Beyond looking at the preregistered hypothesis of two higher-order Schwartz dimensions, we exploratorily checked for the more refined structure, expecting values to appear in a quasi-circular manner reflecting their theoretical order (hedonism, achievement, power, security, conformity, tradition, benevolence, universalism, self-direction, and stimulation).

Another potential indicator of the suitability of our version of the PBVS will be its consistency. The PBVS has two sets of items, representing each of the 10 Schwartz values. Values measured using the two sets of items have been shown to correlate positively (Abramson

et al., 2018). Consistency across the item sets would further support the use of our PBVS-C adaptation. Thus, we expected that **(H2) the order of the 10 values within each individual would correlate positively between the two sets of items.**

Second, replication of common findings from past work on value priorities and the relationship between values and demographic variables would further support the validity of the Arabic PBVS-C. Although cross-cultural research on values reveals that value priorities vary across cultures (Schwartz, 2007), there is also a degree of similarity in value hierarchies. Thus, across more than 50 countries, people rate benevolence, universalism, and self-direction as the most important, and power, tradition, and stimulation as the least important values (Schwartz and Bardi, 2001). Similarly, in the cross-cultural study of children's values described above, self-transcendence (which includes benevolence) was the most important, and self-enhancement (which includes power) was the least important across countries (although New Zealand children rated Openness to change slightly higher than self-transcendence, D□ring et al., 2015). Specifically, in an Australian study using the AVI, benevolence was rated most highly and power the least (Lee et al., 2017). These results were replicated for bi- and multilingual children (aged 8-11 years) in South Tyrol and in Jewish Israeli children (5-12 years), respectively (Gross & Dewaele,2018; Abramson et al., 2018; Daniel et al., 2023). Based on these and additional studies (Abramson et al., 2018; Daniel et al., 2020; Uzefovsky et al., 2016), we expected that **(H3) values of benevolence will be more important than values of power among children.**

Further evidence for the Arabic PBVS-C will be obtained by observing demographic effects. Specifically, across cultures, small but consistent differences in values have been observed between men and women (Schwartz & Rubel, 2005). Developmental research largely replicates these effects in adolescents (Benish-Weisman & McDonald, 2015) and children aged 5-12 (Abramson et al., 2018; D□ring et al., 2017,2018; Lee et al., 2017; Knafo et al., 2011;

Schwartz et al., 2005; Uzefovsky et al., 2016). This work finds that boys value self-enhancement values (and especially power) more than girls, and an opposite pattern is found for self-transcendence values, particularly universalism. We therefore hypothesized that **(H4) children would show gender differences. Specifically, self-transcendence values will be more important for female participants, and self-enhancement values will be more important for male participants**.

Studying Cross-Cultural and Age Differences

Establishing the validity of the Arabic PBVS-C and its appropriateness for children will enable meaningful comparisons between Arabic-speaking children and other children, as well as developmental research focusing specifically on Arab children.

The current investigation focused on two broad cultural groups**.** The first includes Arabic speakers (who are Arabs of Palestinian descent), residing in Israel, who constitute about a quarter of the children in Israel in the age range of the current study (5-12 years) (Israel central of Bureau for Statistics, 2023). Arabs in Israel are a very diverse group, characterized by a common language (Arabic) and shared heritage. This group includes Arab citizens of Israel (making up 21.2% of Israeli Population), as well as non-citizens who are Palestinian residents of East Jerusalem. On average, Arabs have lower socioeconomic status than majority Israelis. According to the Israeli Central Bureau of Statistics (2017), a much higher proportion of Arab localities rank in Israel's lowest socioeconomic clusters, as compared to Jewish localities. In the population of 5-12-year-old Arab children in Israel, 88% are Muslim, 6% are Christian, and 6 % are Druze (Israel central of Bureau of Statistics, 2022). The second group includes Hebrew speakers (who are typically of Jewish-Israeli descent), representing the majority in Israel. They are typically (though not exclusively) of Jewish heritage, and are citizens of Israel. They constitute 75.6% of 5-12-year-olds in Israel (Israel Central Bureau of Statistics, 2022). This group is very diverse as well, including Ultra-Orthodox Jewish children, as well as children of

relatively recent immigrants, mainly from Ethiopia and the former Soviet Union. Variability within each group notwithstanding, as a major goal of this study is to validate an Arab version of the PBVS-C, for current purposes it is possible to refer to the first group of children as Arabic-speaking, and to the second group as Hebrew-speaking.

Although there is meaningful variability in values within each culture, there are also meaningful cross-cultural differences in the importance of values (Liem et al., 2011; Schwartz et al., 2001; Schwartz & Rubel, 2005). For example, conformity and tradition values are more emphasized in East Asian and African countries, while greater focus on benevolence and universalism values is found in West European countries (Schwartz & Bardi, 2001). Research showed that the importance of values for children varies across cultures (for a review, see D□ring et al., 2015). Applied to the Israeli context, Arabic-speaking individuals have been shown to be higher in conformity and tradition, and lower in openness, than Hebrew-speaking individuals (Daniel & Benish-Weisman,2019; Knafo et al., 2008; Schwartz & Sagiv 1995). As there is no evidence regarding the age at which such differences emerge (see Twito-Weingarten & Knafo-Noam, 2022, for review), we did not propose specific hypotheses. However, we planned to explore cultural differences as they interact with age in predicting values.

While there is no strong evidence for age changes in value importance across cultures in middle childhood to adolescence, there are additional developmental processes that occur during this period. For example, values become increasingly stable, increasingly abstract, and more strongly tied to behavior (for a review, see Knafo-Noam et al., 2023). Two further changes occurring during this period (Knafo-Noam et al., 2023) can be explored in the current study. Children's values become increasingly coherent and more consistent in this period. Value coherence can be defined as the degree to which an individual is likely to prioritize compatible values similarly while considering conflicting values as different in importance (Daniel et al., 2024).The *coherence* construct reflects the motivational associations between values, as a

measure of fit of the individual's value system to the value structure described by Schwartz (1992). Coherence of values is indicated if the structure of values exists within individuals (Borg et al., 2017; Lee et al., 2017). Previous findings (Daniel et al., 2023) have shown that value coherence increases during middle childhood, with some evidence for a drop in coherence towards the transition to adolescence. In addition, the incoherence of value structure predicts value change over time (Daniel et al., 2024). Value *consistency* refers to the degree to which an individual considers the same values as important, across different opportunities and contexts (Daniel et al., 2012). Values have also been shown to become increasingly consistent during middle childhood, although there is some evidence for a decrease in consistency as children approach adolescence (Knafo-Noam et al., 2023).

Recently, scholars have pointed to the importance of studying and developing different measures for consistency and coherence (Collins et al., 2017). For example, some scholars used a multi-sensory instrument which facilitates assessments of consistency and coherence measurements (Collins et al., 2017). They assessed consistency by calculating the frequency of the most and least important for each child, while coherence was assessed by comparing the fit of intra-individual values profile with circumplex model of Schwartz (1992). Other scholars used unfolding analysis for coherence measuring (Daniel et al., 2022, Daniel et al.,2024). In the present investigation, coherence is indicated by the degree to which an individual participant's values reflect the conflicts and compatibilities among values, while consistency is indicated by the degree to which the values within each individual correlate positively between the two sets of value items (which can be also seen as an index of internal reliability). In this study, we relied on a sample of children from two cultural settings and a broad age range to explore these developmental differences from a cross-cultural perspective.

Study 1: Pilot

Study 1 served as a pilot study that had two main goals: first, to translate and adapt the measure of children's values into Arabic. Second, to develop an app for the measure, and test its applicability to young children. This applicability was investigated by observing the structure of values among Arabic-speaking and Hebrew-speaking children.

Methods

Instrument

Values: To assess children's values, we used the PBVS-C (D□ring et al., 2010). The PBVS-C is essentially a Q-sort measure in which participants are required to sort the items representing various values according to their importance. Specifically, children are asked to think about their goals and things that are important to them. Then they are presented with cartoon images featuring the same character (see *Figure 1* for exemplary items). In each image, the protagonist performs an action relevant to one of the values from Schwartz's (1992) circle. For example, the action "to obey the rules," highlights the motivational goal of conformity values, that focus on following social norms. This action is embodied by a cartoon in which the protagonist is standing in front of a red traffic light. The action "to be safe," which is relevant to the value of security, is embodied by a cartoon in which the protagonist is wearing a safety helmet while riding the bicycle. As presented in Supplementary Figure S1, Children are presented with the images and asked to rank them on five levels of importance. The children are asked to choose the pictures according to the following order: first, selecting the most important values; next, selecting the least important values; then, selecting the second most important values; next, selecting the second to least important values. Finally, the remaining images are automatically relegated to the intermediate importance level. Thus, each item receives a score on a scale of 1 to 5 according to assigned importance.

Adaptation of PBVS-C to Arabic

Cultural Adaptation: Items, including both captions and images, were assessed for cultural relevance. For example, in the Hebrew version, we used the original translation of Uzefovsky et al. (2016) and the updated version of Abramson et al. (2018), which made changes to fit the language and culture of Hebrew-speaking children. Thus, the item “thinking of God“ was changed to ”praying to God” to better reflect the Jewish Israeli religious context.

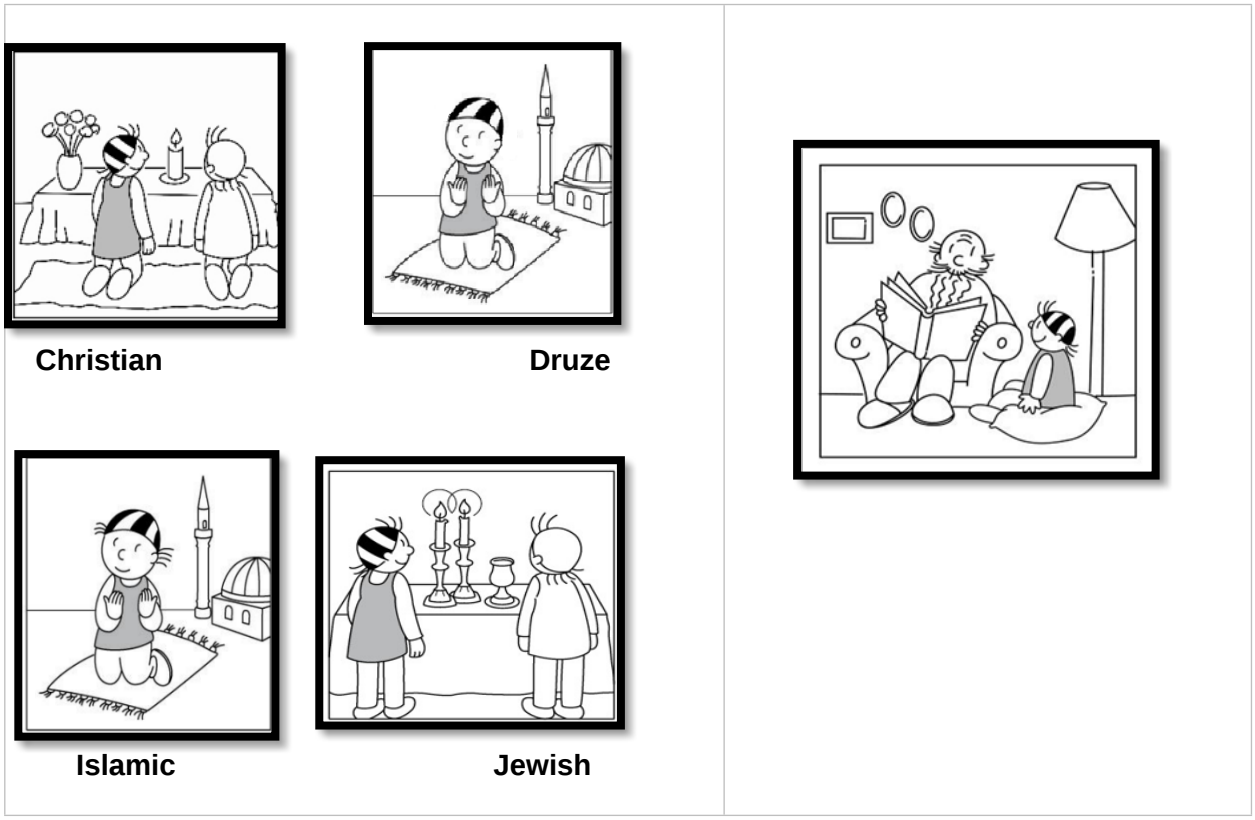
We also checked that the images are culturally appropriate, following D□ring’s protocol (2018). For example, as Palestinian and Arabic-speaking children in Israel could be from a religious background that is either Muslim, Christian, or Druze, we had to make religion-specific variations on the original (Christian-context) images. For the tradition item "praying to God," we used for Christian children the original image of D□ring’s measure. However, for Muslim children, we used the image developed for the Turkish version (Kapikiran et al., 2018), and for the Druze version, we updated the same image of Muslims by removing the hair outside the hat (as indicated by Druze religion). (See Figure 2, Panel A).

Translation to Arabic*:* The focus in translation was on using a vocabulary which is not only suitable for children, but which also clearly reflects the translated motifs and makes a close connection to their images. The syntactic dimension was also considered, employing a simple and idiomatic structure which explicitly conveys the ideas. The translation to Arabic was done based on the original German and English labels of the items (D□ring et al., 2010) while also consulting the Hebrew translation (Abramson et al., 2018). Bilingual individuals who speak both the source language (English/German) and the target language (Arabic) performed the translation, and back-translation to Hebrew of the image captions and the task instructions. Translations were then compared also to the German and English versions for further refinement. As Arabic is a gendered language, translation involved the development of male and female versions of the accompanying text (images are designed to be unisex).

Figure 2

Images assessing tradition values.

A. Tradition Item 1 with religion-specific versions ***B. Tradition Item 2***



Note. Panel A represents the adapted images for the first tradition item, across 4 religions. Panel B represents the image used as the second item of tradition values; we replaced the caption “learning about things that happened a long time ago” (Study 1) with “Hearing about what happened in the past” (Study 2).

Dialect Selection. One important consideration for the Arabic translation was whether to use spoken Arabic or standard Arabic. Arabic can be divided into different dialects. Some of these dialects are similar to each other in the written form, but their pronunciation is incomprehensible even to native speakers of Arabic. The typical official language for reading

and writing in schools is Modern Standard Arabic (MSA). MSA also features in much of the formal media, such as the news, and it is the main language of narrative fiction, children's literature, and schoolbooks. Thus, the benefits of using the MSA outweigh the need to accommodate local varieties of Arabic. Therefore, we considered MSA as a representative version of Arabic for speakers across the Arab world.

Application Development. In addition to the translation and cultural adaptation, we made two main adaptations to the original PBVS-C: First, following Abramson et al. (2018), whereas the original scale required children to rank 20 images, we split them into two lists of 10 to reduce the cognitive load on the children. Thus, after children ranked the first set of 10 value items, the value selection procedure was repeated using another set of 10 different images that represent the same values. Second, following Lee's AVI (Lee et al., 2017), we computerized the instrument, enabling children to respond to the PBVS-C on a smartphone or tablet screen.

Computerizing the Hebrew and Arabic PBVS-C version enabled *inter alia* recordings of the instructions and statements and using a touchscreen to facilitate use by young children. This was done to standardize administration across children and reduce children's need to rely on adults, reading or memory when ranking their values. We prepared recordings for the picture captions (20 in total) and an additional recording of the task instructions. As in the original, standard PBVS-C, the instructions included an explanation of values as a goal and what you want to be in the future. Recordings were specifically designed for children (e.g., we used a child-friendly voice, pace, and tone). Overall, we created separate versions according to religion, language, and gender. For example, in Israel, we had Muslim, Christian and Druze versions (Arabic) and a Jewish version (Hebrew), and for each religion, we had two versions—one for male participants and one for female participants (both Arabic and Hebrew are gendered languages). As children are more used to female instructors in many social contexts, recordings were in a woman's voice. The computerized PBVS-C was designed in the Angular software and is available upon request

from the authors. A protocol for developing new versions in new languages is forthcoming (Maslamani et al., under preparation).

***Cross-cultural Research Team*.** The collaborative effort to adapt the application to Arabic involved a diverse and highly qualified team, all of them Palestinians who covered different dialects prevalent in the country (North, Center, and Jerusalem). Two Palestinian Arab authors, representing different religious backgrounds (Christian and Muslim), worked together on the translation. One author is an expert in Arabic literature who is fluent in Arabic, German, English, and Hebrew. The other is a doctoral student in cognitive studies, fluent in Arabic, English, and Hebrew. This collaboration ensured a culturally sensitive and linguistically accurate translation, drawing on their extensive knowledge of the Arabic language and literature. To verify the accuracy and consistency of the translated content, two individuals with master's degrees in psychology, fluent in both Arabic and Hebrew, performed the back translation. The application was computerized by two specialized programmers—one a Hebrew speaker and the other an Arabic speaker—ensuring that the technical aspects were properly implemented for both language versions. Additionally, a theatre-studies student with a child-friendly voice recorded the audio components, enhancing the application's appeal and accessibility for children.

The implementation of the Arabic version of the application was led by one of the authors, supported by three research assistants. This team consisted of native Arabic speakers, with the majority being graduate students in psychology and one undergraduate student. All team members had prior experience administering the non- computerized PBVS to both Hebrew- and Arabic-speaking children, demonstrating their ability to handle cultural diversity professionally. To mitigate potential method bias (He et al., 2012), particularly administration bias, the authors provided comprehensive training and supervision to the research assistants. This training included clear instructions on how to run the application, guidelines for appropriate levels of intervention in explanations, and strategies to manage factors such as administrator-respondent interactions, dialect differences, and data collection modes. This preparation ensured

consistency in application administration across diverse participant groups, enhancing the reliability and validity of the data collected.

Procedure

Children were invited to participate in a “Living Lab” study as part of a visit to the local science museum, the Bloomfield Science Museum of Jerusalem. Research assistants administered the application to children. In addition, we reached the rest of the participants by sending a link of the application through social media to parents’ groups (https://bit.ly/ApplicationofValues). Informed consent was obtained for each child by his or her parent. Task instructions explained to children the purposes of the task, and children provided assent by pressing a button, taking them forward in the application. The research protocol was approved by the Ethics Committee, at the Hebrew University of Jerusalem.

Participants

Sixty-three children participated (*n* = 29 in Arabic [21 Muslim, 6 Christians, 2 Druze]), and *n* = 34 in Hebrew; boys, *n* = 30, girls, *n* = 33). Their average age was 8.15 years, *SD* = 2.27 (age data were missing for four children as a result of technical problems). Twenty-six children participated as part of their visit at the museum open lab (9 Arabic, 17 Hebrew), and 37 children were reached through parents’ social media groups (20 Arabic, 17 Hebrew). In general, the application worked smoothly. No critical problems were found during the running of application, and children appeared to understand the procedure and enjoy it. On average, it took a child 12 minutes to complete the task.

Analysis

To investigate the fit of the overall value structure to the theoretical structure of Schwartz (1992), we used confirmatory Multidimensional Scaling (MDS) analysis, a technique that has been used
extensively for this purpose (Borg & Groenen, 2005). This method has been successfully applied to data collected using the Picture-Based Value Survey for Children (PBVS-C), as demonstrated in the work of Döring and colleagues in 2010. This approach allows researchers

to visually represent and analyze the relationships between different human values in a way that is grounded in the established theory of Schwartz (1992). It begins by placing each PBVS-C item as a point within a two-dimensional space based on Schwartz's theoretical model. It then progressed through multiple iterations, with the goal of depicting the correlation patterns among items as relative spatial distances. The fit of the MDS to the theoretical Schwartz (1992) structure is indicated by the Stress 1 statistic, which ranges between 0 and 1, with lower values indicating a better fit (e.g., Stress 1 lower than 0.300 for 20 items in a 2-dimensional space indicates a good fit; see Borg & Groenen, 2005).

Transparency and Openness

Sample size was set at about 30 participants in each language, for pilot purposes. Data handling and other statistical analyses were completed using The R Project for Statistical Computing version 4.0.0 (R Core Team, 2020). The confirmatory MDS was performed using the PROXSCAL routine in SPSS 22. Analyses concerning value coherence were also computed using SPSS. All data, analysis code, and research materials are registered at the open science repository and can be accessed using the link [https://osf.io/vp25k/?view_only=12819737a9a2449c96c548dedc1ef8fa].

Results

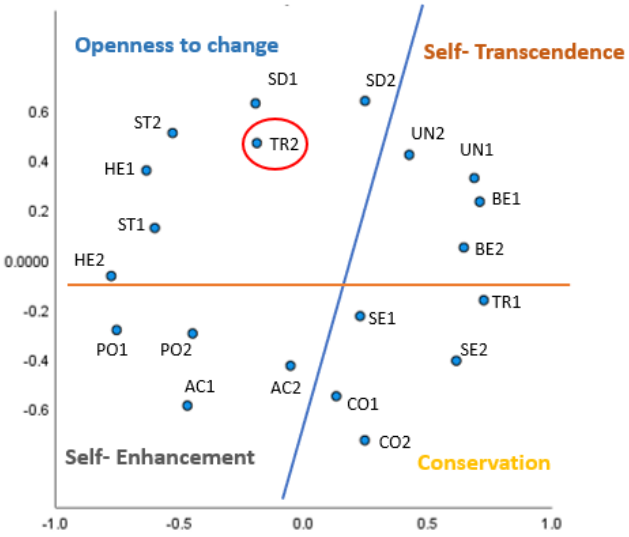
Multidimensional Scaling (MDS)

Figure 3 demonstrates how the Multidimensional Scaling (MDS) technique is used to visualize the relationships between value items in a two-dimensional space. Each value item is represented as a point on a 2D plot, with the distance between any two points representing how closely related they are: when points are located close to each other this indicates a strong association between those value items. The "theory-based MDS" approach starts by placing each item at its ideal position based on Schwartz's 1992 model of human values. This provides a theoretically informed starting point for the optimization process.

Figure 3 presents the results of confirmatory MDS (Stress1 = 0.247) of the 20 value items across the children from the two subgroups. Overall, the value structure largely confirmed the prototypical one by Schwartz (1992), supporting Hypothesis 1. Thus, despite the relatively small sample size, the structure clearly distinguished between openness to change values and conservation values and between self-enhancement versus self-transcendence values. As shown by Schwartz (1992), hedonism values appeared close to both openness to change and self-enhancement values. The only exception to this support of the two dimensions concerns one of the tradition items, which emerged among openness to change values.

Figure 3

Confirmatory MDS for all pilot data



Note. MDS (Stress 1 = 0.247, N=63) Showing the structure of the PBVS-C Items (each value was measured by two items, for example self-direction values are indicated by SD1 and SD2). UN=Universalism, BE=Benevolence, TR=Tradition, CO=Conformity, SE=Security, PO=Power, AC=Achievement, HE=Hedonism, ST=Stimulation, SD=Self-direction. TR2, the second tradition item, deviated from its theoretical location.

Regarding the order of variables around the value circle, the order of security and conformity was overturned, as were achievement and power. These interchanges in the location

of adjacent values were small deviations: the spearman correlation between the prototypical order of values (from hedonism to stimulation, going counterclockwise) and the empirical MDS order was rho=.98, p< 0.001.

To further test our first hypothesis, we performed confirmatory MDS analysis separately for the two cultural groups. Because of the smaller sample sizes, we ran the MDS on the 10 values rather than the 20 items, averaging the score of each pair of items measuring each value. The Stress 1 was adequate (0.158 for Arabic, 0.197 for Hebrew speakers), considerably lower than the Stress for a comparable number of items in a random configuration (0.225) (Spence & Ogilvie, 1973). The MDS configurations are presented in Supplementary Figure S2, showing the distinction among values based on the two dimensions. However, the self-direction and tradition values are misplaced and appear close to each other, in contrast to what would be expected based on the theory of Schwartz (1992). Nevertheless, Study 1 results largely demonstrated the presence of the value structure as proposed by Schwartz across the two cultures, in support of Hypothesis 1.

Although the general pattern was supportive of the Schwartz' structure, we further explored the structure of values in the two groups to understand if there were meaningful deviations from the order. While for Arabic speakers the order was overall close to the theoretical one, tradition was closer to openness to change rather than to conservation values. In the Hebrew sample, self-direction was close to tradition within conservation values. This led us to reevaluate the translation of specific items. One of the tradition items' captions, "learning about things that happened a long time ago", may have had connotative meanings similar to self-direction values, as the latter emphasize curiosity and openness to ideas (Abramson et al., 2018), thereby linking tradition and self-direction despite their inherently opposed motivations of, respectively, conservation and openness to change. Another explanation may be that this deviation in the Hebrew version originates from a technical mistake by using the wrong translation for the first self-direction item. We used "To learn new things alone" instead of "To

discover new things alone" (note that in Hebrew, the word □□□ ("alone") can be used informally by children to mean "independently".)

Performing the MDS without the two items improved the structure (Stress 1 =0.222) (see Figure S3 in the Supplementary). Therefore, we decided to replace, in Study 2, the caption "learning about things that happened a long time ago" with a more suitable one, "Hearing about what happened in the past" (see Figure 2, Panel B). See Supplementary Table 1 for further information about the measure, cultural, and gender differences in the pilot sample.

Study 2

Study 2 had three main purposes: (1) to further validate the PBVS-C among Arabic-speaking children starting from age 5, (2) to explore cultural differences between Arabic and Hebrew speakers in Israel and (3) to explore developmental patterns as indicated by age differences from middle childhood to early adolescence. Study 2 used the same methods used in Study 1, after the change to the tradition and self-direction items described above. Another difference was that we preregistered our hypotheses for Study 2 (https://aspredicted.org/bq77i.pdf) and defined a criterion to exclude participants who incorrectly answered at least 2 of our three attention check questions.

Methods

Procedure

We reached Arabic and Hebrew-speaking children's parents through a commercial survey panel company, seeking parents with children in the age range of the current study (5-12 years). Parents were sent a link to the app through the panel platform and after agreeing to their children's participation asked their children to use the app. We compensated the participants (around 4 $ for 15 minutes), in addition to their compensation from the panel company (1.5 $ per participant). It was impossible to reach a substantial sample in the Arab community through

the panel, as multiple panel companies we contacted had few Arab participants. We therefore chose an additional approach to reach Arab children, namely, to collect data at school. We did this in an East Jerusalem school, typical of other public Arab schools in the city in terms of the demographics (e.g., economic situation and level of religiosity).

In the panel sample, informed consent was obtained by parents, and children provided assent by pressing the forward button. In the Arab school subsample, we obtained passive approval from parents of school students who were informed of the study in advance, following approval of the Ministry of Education. At school, data were collected in the presence of research assistants, who explained the instructions and helped with technical issues, but children used the app on tablets and with earphones, by themselves. Each student received an educational toy for their participation. The research protocol was approved by the Ethics Committee, at the Hebrew University of Jerusalem.

Participants

We aimed for a sample of 400 children, of which half were Arabic speakers and the rest were Hebrew speakers. Overall, we collected data from 444 participants, of which 318 were reached online and 126 participated at school. Of 232 Hebrew-speaking children collected online, we dropped the data of 32 based on exclusion criteria (24 exceeded the age limit, and 8 had to be dropped because we exceeded the preregistered sample size). Of 212 Arabic-speaking children, we dropped the data of 12 children (7 exceeded the age limit, 1 failed the attention check, and 4 were dropped due to technical problems in app administration.) The final sample included 278 children who participated online (200 Hebrew speakers, and 78 Arabic speakers), and 122 Arab children who participated at school. Among Arab children, the vast majority (94%) were Muslim, and only 3% were Christians and 3% were Druze. This is similar to the demographic distribution of this age group in the population, noted above (Israel Central Bureau of Statistics, 2024). Table 1 presents the age distribution of children in the study.

Table 1

Age distribution of Arabic-speaking and Hebrew-speaking Children (Study 2).

Age range	Arabic		Hebrew	
	Mean (SD)	**N**	**Mean (SD)**	**N**
5-6	5.54 (0.503)	52 (26 %)	5.55(0.502)	56(28 %)
7-8	7.5(0.505)	56 (28%)	7.48(0.504)	64 (32 %)
9-10	9.51(0.505)	53 (26.5 %)	9.58(0.499)	43 (21.5 %)
11-12	11.5 (0.505)	39 (19.5 %)	11.5(0.505)	37 (18.5 %)

Transparency and Openness

Our preregistered sample size was limited by available funding, enabling us to reach 400 children. In addition, we were limited by the number of participants with children in the appropriate age range in the survey panel. Information for data handling, code and statistical analyses is as described in Study 1.

Measures

PBVS-C: To assess children's values, we used again the PBVS-C app with the changes in the second tradition item and the first self-direction item as noted in Study 1.

Value Consistency*:* We computed the correlation between the two value item sets within each individual. Afterwards we transformed the correlation using a Fisher's-Z transformation, as is recommended to approach a more normal distribution.

Value Coherence: This individual-level measure of value coherence is computed by generating a score for an individual's importance given to the 10 values (averaging the two items per value) and comparing its fit with overall structure. We measured coherence by using a mathematical equation assessing the compatibility of an individual's value system with the value structure using the formula:

$$\sum_{ij}^{10} Zi * Zj * Rij$$

Where Z_i is the standardized value score of an individual on value i, and Z_j is the standardized value score of that individual on value j. The product Z_i*Z_j receives a positive sign if a person is either above average on both values, or below average on both. The product receives a negative sign if the person is low on one value and high on the other. Thus, a positive product indicates that the two values are compatible in that person's value system. The product is then multiplied by $R_{ij,}$ which is the theoretical correlation between values i,j (see Supplementary Table S2). Thus, the sign of the product is reversed if the expected correlation is negative where the observed values are compatible (and becomes positive if the expected and observed correlations are of a similar direction). Scores are then aggregated across all 45 possible combinations among the 10 values.

Results

Validation of the PBVS-C

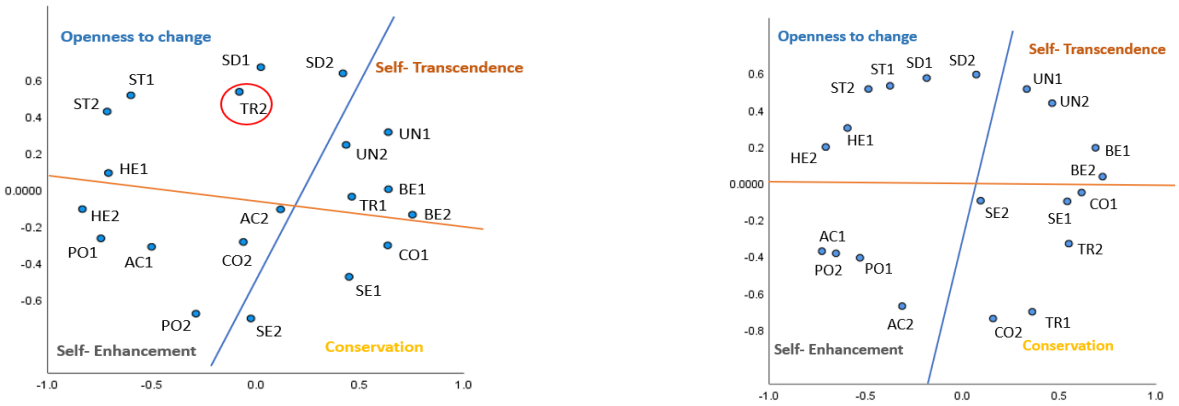
Figure 4 and the top line of Table 2 present the results of the confirmatory MDS of the 20 value items, separately for the children from the two subgroups. Overall, the value structure largely conformed with the prototypical one by Schwartz (1992), as indicated by the acceptable Stress 1 levels of the confirmatory MDS (Table 2), supporting Hypothesis 1. Specifically, the organization of values largely reflected their higher-order values, and confirmed the theoretical dimensions of self-transcendence versus self-enhancement and openness to change versus conservation (Table 2).

Moreover, as in Study 1, value order across the circle was replicated in both Arabic and Hebrew speakers (Figure 4). The order largely conformed with the prototypical one, with achievement and power intermixed in both groups, and security and conformity intermixed as well. These deviations from the prototypical structure are minor: the spearman correlation between the empirical MDS order and the prototypical order of values (from hedonism to

stimulation, going counterclockwise and using the first tradition item as indicative of the location of tradition) was very high for both Arabic, rho=0.96, p<0.001 and Hebrew speakers, rho=0.96, p<0.001. In sum, Hypothesis 1 was supported again.

Figure 4

Confirmatory MDS of value items among Arabic speakers and Hebrew speakers (Study 2)



Arabic **Hebrew**

Note. Confirmatory MDS for Arabic (Stress 1 = 0.265, N=200), and Hebrew speakers (Stress 1 = 0.231, N=200). TR2, the second tradition item, deviated from its theoretical location in the Arabic sample.

Table 2

Age	Arabic				Hebrew			
	Two value dimensions	**Stress for 10 values**	**Stress, 20 items**	**Stress, 19 items**	**Two value dimensions**	**Stress for 10 values**	**Stress, 20 items**	**Stress, 19 items**
Total sample	Yes	0.189	0.265	0.248	Yes	0.131	0.231	0.218
Ages 5-6	Yes	0.233	0.282	0.291	Yes	0.111	0.276	0.262
Ages 7-8	Yes	0.156	0.284	0.262	Yes	0.222	0.258	0.257

Ages 9-10	Yes	0.135	0.262	0.255	Yes	0.148	0.238	0.243
Ages 11-12	Yes	0.263	0.291	0.283	Yes	0.177	0.28	0.257

Summary Results of Confirmatory MDS for Arabic and Hebrew speakers by Age Groups (Study 2).

Note. The Stress 1 presented is based on 19 items after removing the second, mislocated tradition item.

Looking at the two groups, however, we note that the Stress 1 of Arabic-speaking children is higher compared to Hebrew-speaking children. Importantly, the second tradition item, “Hearing about things that happened a long time ago”, deviated from its expected location in the Arab sample. Acceptable Stress 1 values for 19 items are below 0.294 (Spence & Ogilvie, 1973). Performing the MDS without this item, improved the structure and further reduced Stress 1, for all age groups and for both Arabic speakers and Hebrew speakers (see Table 2).

The similarity of the value structure in Arabic and Hebrew speakers suggests the presence of measurement invariance of the values across the two groups. We followed D□ring et al. (2015) and Fontaine et al. (2006, 2008) in comparing the overall value structure in the two samples by computing the correlations between the coordinates of the two-dimensional spatial representation of the value structure. The coordinates correlated positively and meaningfully between the two samples (dimension 1, r=0.93 dimension 2, r=0.68), similarly to the larger cross-cultural study by D□ring et al. (2015). Similarly, the coordinates correlated positively between the genders (dimension 1, r=0.93; dimension 2, r=0.96). The same pattern is clear for girls and boys in each group, and between groups (see Figure S4 in the Supplementary). For Equivalence of Multidimensional Scaling results between boys and girls and between ages, see Tables S3, S4 in the Supplementary.

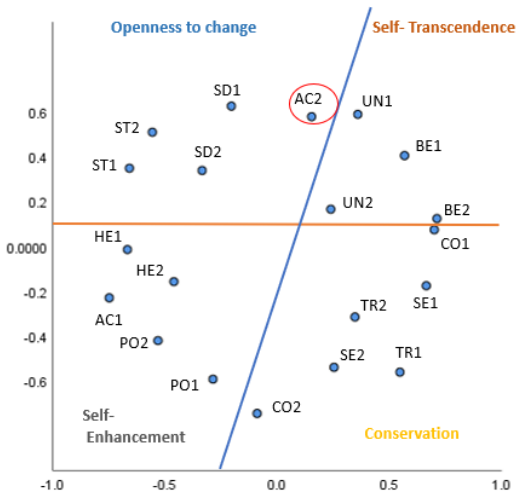
We next sought to replicate the structure among the youngest children in the study, 5-year-olds (N=49) (see Figure 5). Except for one of the achievement items, the value structure of these young children demonstrated the distinction between values based on the two

motivational dimensions. After dropping the achievement item, the fit improved, Stress 1= 0.285.

Consistency: Hypothesis 2 expected the order of the 10 values within each individual to correlate positively between the two sets of items, to indicate that children's values show internal consistency. On average, the two sets of values were positively correlated within individuals (mean *r*= 0.18, *SD*= 0.32). After transforming the correlation using a Fisher's-Z transformation, we performed one-sample T-tests. Testing the difference from a mean correlation of 0 that would be expected if there was no consistency revealed that the effect was positive and significant (*t*= 11.19, *df* =399, *p* < 0.001, *Cohen's d* = 0.56, CI [0.45,0.66]), in support of Hypothesis 2. This effect was replicated in Arabic speakers, t= 5.31, *df*=199, *p* < 0.001, *Cohen's d* = 0.38, CI [0.23,0.52]), and Hebrew speakers, t= 10.54, *df*=199, *p* < 0.001, Cohen's d = 0.75, CI [0.59, 0.90])).

Figure 5

Confirmatory MDS for all Age 5 data (Study 2)



Note. Confirmatory MDS combining 5-year-old Hebrew speakers and Arabic speakers (Stress 1=0.306). The second item for achievement values is deviated from its expected location.

Hypothesized Value Mean Differences

Table 3 presents the means and standard deviations of the 10 values in the two samples. As hypothesized (Hypothesis 3), benevolence values were more important than power values among children. A paired sample t-test of the difference between benevolence and power values suggested that the effect is positive, statistically significant, and of medium size (*t* (399) = 11.10, *p* < 0.001, *Cohen's d*= 0.55, 95 % CI [0.45, 0.66])). This effect was replicated in Arabic-speaking children (t (199) = 8.10, *p* < 0.001, *Cohen's d*= 0.57, 95 % CI [0.42, 0.72])) and Hebrew-speaking children (t (199) = 7.68, *p* < 0.001, *Cohen's d*= 0.54, 95 % CI [0.39, 0.69])).

Table 3

Value priorities for Arabic speakers and Hebrew speakers (Study 2).

Value	Arabic (N=200)		Hebrew (N=200)		Difference: Arabic and Hebrew		
	M (SD)	Rank	M (SD)	Rank	t	p	D
Universalism	3.06 (0.63)	5	3.06 (0.72)	4	-0.11	0.91	-0.01
Benevolence	3.31 (0.71)	3	3.56 (0.81)	1	-3.28	<0.001***	-0.33
Tradition	3.61 (0.62)	1	2.68 (0.94)	9	-11.72	<0.001***	1.17
Conformity	2.58 (0.69)	9	2.56 (0.68)	10	0.37	0.714	0.04
Security	3.38 (0.70)	2	3.27 (0.67)	3	1.5	0.135	0.15
Power	2.60 (0.81)	7	2.76 (0.94)	8	-1.82	0.07	-0.18
Achievement	3.23 (0.81)	4	2.84 (0.88)	7	4.58	<0.001***	0.46

Hedonism	3.03 (0.80	6	3.37 (0.8)8	2	-4.02	<0.001***	-0.40
Stimulation	2.67 (0.86)	8	2.98 (0.83)	5	-3.66	<0.001***	-0.37
Self-Direction	2.57 (0.738)	10	2.93 (0.744)	6	-4.82	<0.001***	-0.48

We also proposed well-established gender differences as another validation criterion (for means and standard deviations of the 4 higher order values for boys and girls in the two samples, see Supplementary Table S5). As predicted (Hypothesis 4), girls ranked self-transcendence as more important compared to boys (t (398) = 3.43, $p < 0.001$, *Cohen's d*= 0.35, 95 % CI [0.15, 0.55])), an effect replicated for Arabic-speaking (t (198) = 2.62, $p = 0.01$, Cohen's d= 0.37, 95 % CI [0.09, 0.65])) and Hebrew-speaking children (t (198) = 2.48, $p = 0.014$, Cohen's d= 0.36, 95 % CI [0.07, 0.64])). The opposite effect, higher importance for boys, was found for self-enhancement values (t (398) = 2.89, $p = 0.004$, *Cohen's d*= 0.29, 95 % CI [0.09, 0.49])) and found separately for Arabic speakers, (t (198) = 2.76, $p= 0.006$, *Cohen's d*= 0.39, 95 % CI [0.11, 0.67])), but not significantly among Hebrew speakers, (t (198) = 1.61, $p = 0.108$, *Cohen's d*= 0.23, 95 % CI [-0.05, 0.51])).

Robustness of the Application

The fact that the Arab sample was reached in two separate ways (online and in-person administration at schools) enabled us to check for the suitability of the measure in different contexts (this analysis, like all the following analyses, was not preregistered). Running the MDS separately on the two parts of the Arab sample yielded similar value structures, again with the theorized distinctions among values (Supplementary Figure S5). The Stress 1 of the MDS

obtained with 122 of the children run at school (*Stress 1*= 0.276) was similar to that obtained with 78 run online (*Stress 1* = 0.269).

Similarly, the order of importance of the 10 values correlated highly across the two subsamples, rho= 0.82, p = 0.007, indicating that the app is robust to method of administration. This similarity is meaningful considering the different demographics of the sample, with the school sample from Jerusalem mainly characterized as a coming from a low socio-economic status, conservative area, whereas the online sample was from the North of the country, typically characterized as less conservative and of better socio-economic status (Israel central of Bureau for Statistics, 2021).

Moreover, we used online application values data from 91 Hebrew-speaking adults, collected for purposes unrelated to the current study. Participants were mainly undergraduate psychology university students (age-range= 19-25). Adults' MDS (Figure S6 in the Supplementary) showed the same value structure and a Stress 1 level (0.241) similar to the one in the children's sample (0.231). The similar Stress 1 value indicated that the application works well for children and provided a value structure as meaningful as the one found with adult participants. Importantly, the order of importance of the 10 values was very similar in the two samples (see Supplementary Table S6, (*rho* =0.94, $p < 0.001$).

Value Structure Across Age Groups in Arabic Speakers and Hebrew Speakers

To check the structure of values across ages in Arabic and Hebrew speakers, we divided the samples into four age groups (see Table 1). We ran a confirmatory MDS for each age group, within each sample separately. Across ages and comparing Arabic and Hebrew, the same finding emerged, that values were organized based on the two dimensions of four higher order values (Table 2). In general, we noticed that as age increases, the fit of the structure improved (i.e., lower Stress 1), but this improvement pattern did not continue towards early adolescence. Specifically, we replicated the recent finding (Daniel et al., 2023), that children's values were more coherent at ages 9–10 than before or after, as indicated by the fit of the MDS

structure (see Table 2). Although the Stress 1 was higher for Arabic speakers (less fit because of mis-location of the tradition item) compared to the Hebrew speakers, these age patterns were replicated in the two samples.

Coherence and Consistency:

As would be expected from the fact the MDS showed meaningful value structures, individual children tended to show personal value coherence. This is indicated by average coherence levels that were higher than the score of 0 that would be obtained for a person whose values did not show coherence (*t*= 13.03, *df* =399*, p* < 0.001, *Cohen's d* = 0.65, CI [0.54,0.76]). This significant effect was replicated in Arabic-speaking children, t= 8.29, *df*=199*, p* < 0.001, *Cohen's d* = 0.59, CI [0.44,0.74]) and Hebrew-speaking children, t= 10.20, *df*=199, *p* < 0.001, Cohen's d = 0.72, CI [0.57, 0.88])). The correlation between each child's value coherence and his/her consistency score was positive and significant (r= 0.25, p < 0.001). These results replicated for Arabic speakers (*r*= 0.16, *p* < 0.001), and Hebrew speakers (r= 0.29, p < 0.001).

We next explored the mean differences in consistency and coherence between Arabic and Hebrew speakers. The value consistency of Arabic speakers was lower than that of Hebrew speakers, a medium-size effect, t (398) = -4.58*, p-value* < .001; Cohen's d = - 0.46, 95% CI [-0.66, -0.26]). The difference in consistency between Arabic and Hebrew speakers remained significant but was reduced in size when the tradition items were dropped, t (398) = -2.72, *p-value* = 0.007; Cohen's d = - 0.27, 95% CI (-0.47, -0.08), see Supplementary Table S7 for means and standard deviations. The value coherence of Arabic speakers was significantly lower than that of Hebrew speakers, with a small effect size (t (398) = -2.78*, p-value* =0.006; *Cohen's d* = - 0.28, 95% CI [-0.48, -0.08])).

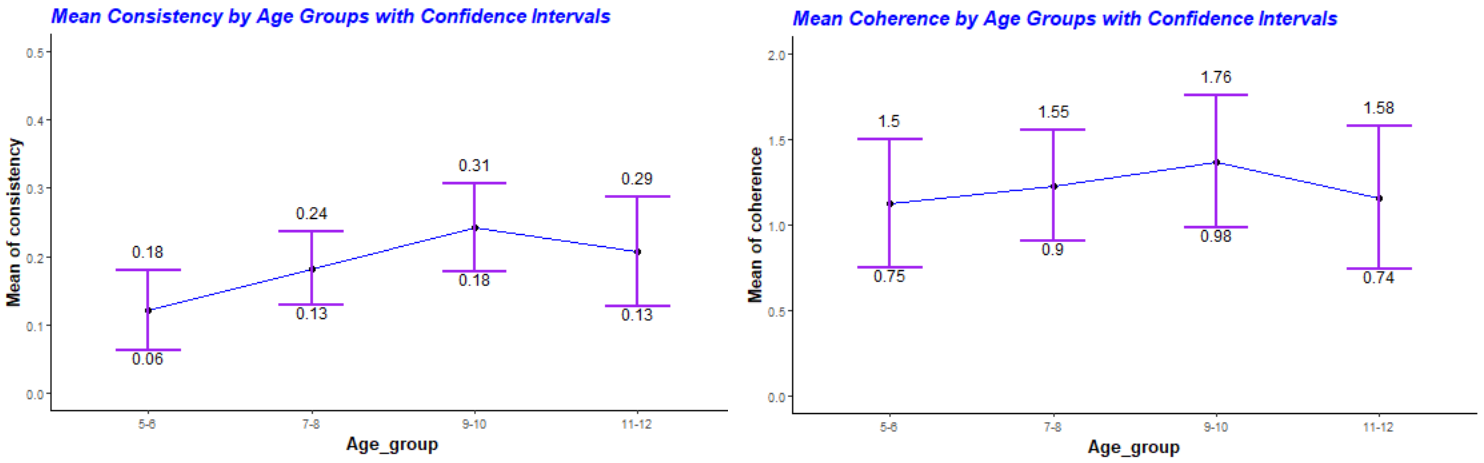
Age group differences in value coherence and consistency appear in Figure 6, while Table 4 presents the value coherence and consistency levels of children of different ages separately for Arabic speakers and Hebrew Speakers. In order to investigate whether

coherence and consistency change across ages, we ran regression models, predicting each of these two variables with age group as an ordinal scale. For value consistency there was evidence for age variation, *B*=0.09, *p*= 0.02, *CI*= 0.01 – 0.17, with the model explaining a small proportion of the variance (R^2= 0.02, *F (3,396) = 3.01, p = 0.03*). Although the quadratic effect of age was not significant, it is worth noting that the point estimate of age 7-8 was not overlapping with the confidence intervals of age 5-6, and similarly, the estimate for age 9-10 did not overlap with the confidence interval for age 7-8. This indicates the increase in consistency with age. However, there was no evidence for further increase from age 9-10 to age 11-2.

Finally, for coherence we found no age group effect, *B*=0.05, *p*=0.79, *CI*= -0.33 – 0.44), indicating no evidence for increase in coherence with age, *adjusted R^2= 0.005, F (3,396) = 0.32, p = 0.809*.

Figure 6

Value Coherence and Value Consistency by age group on all data.



Note. The coherence and consistency measures use the full set of 20 value items. Error bars represent 95% confidence intervals.

Table 4

Means (SDs) of Value Coherence and Consistency by Age Groups for Arabic and Hebrew Speakers (Study2).

Age group	Consistency			Coherence		
	Arabic	**Hebrew**	**Total**	**Arabic**	**Hebrew**	**Total**
5-6 years	0.07 (0.32)	0.17(0.29)	0.12(0.31)	0.94(1.78)	1.30(2.12)	1.12 (1.96)
7-8 years	0.11(0.31)	0.24(0.28)	0.18(0.30)	0.82(1.64)	1.57(1.85)	1.23 (1.79)
9-10 years	0.15(0.28)	0.36(0.33)	0.24(0.32)	1.15(1.50	1.64(2.33)	1.37(1.92)
11-12 years	0.13(0.33)	0.28(0.36)	0.21(0.35)	0.93(1.68)	1.39(1.99)	1.15(1.83)
Grand Total	**0.11**(0.31)	**0.25**(0.31)	**0.18**(0.32)	**0.96**(1.64)	**1.47** (2.05)	**1.22** (1.87)

Value Priorities across Ages in Arabic Speakers and Hebrew Speakers

We did not present specific hypotheses for differences in the mean importance of values between Arabic and Hebrew speakers. Nevertheless, our exploratory analyses showed that the Arabic-speaking children gave higher importance to tradition and achievement values, whereas Hebrew speakers were higher in benevolence, hedonism, stimulation, and self-direction (Table 3). Means and standard deviations for values across ages are presented in the Supplementary Table S8.

For each value we ran a regression model to predict the level of importance of the value from sample (Arabic vs. Hebrew), age group, and their interaction. Two significant age

differences in value importance were found, with security values less important at age 11-12 (*B*=- 0.29, *p*= 0.046, *CI*= -0.57 – - 0.01), and self-direction less important at age 9-10 years (*B*= -0.32, *p*= 0.025, *CI*= -0.61 – -0.04). The only significant interaction between age and sample was found in security values, which at age 9-10 years were ranked as more important among Hebrew speakers than among Arabic speakers (*B*=0.38, *p*= 0.048, *CI*= 0.00 – 0.76).

Importantly, we were able to check for consistency in the importance of values across Study 1 and Study 2. Because subsample sizes in Study 1 are small, we are careful in interpreting the findings. Nevertheless, while in Study 2 the rank order of the value means of Arabic speakers was only weakly correlated with that of Hebrew speakers, rho= 0.3*, p*= 0.407, there was meaningful similarity between the two studies in the rank order of the value means of Arabic-speaking children, rho= 0.76*, p* = 0.016, as was true for Hebrew-speaking children, rho= 0.95, $p < 0.001$, further supporting cultural differences in the importance of values.

General Discussion

In the current studies we measured for the first time the values of Arab children starting from age 5. We aimed to validate the PBVS-C measure of values in Arabic, and after establishing its validation, to use the measure to explore cultural differences and developmental patterns in Arabic-speaking and Hebrew-speaking children. For Study 1, we translated the PBVS-C to Arabic and, considering the religious diversity in the Arab society, adapted the measure culturally in order to be applicable across diverse Arab contexts. These considerations provide an important basis for cross-cultural comparability between and within cultures (Davidov et al., 2014). Study 1 confirmed the measure's effectiveness, particularly in distinguishing the four higher-order values across both Arabic and Hebrew speakers, although a revision was needed for two items. Study 2 supported several preregistered hypotheses for validating the PBVS-C app measure. Specifically, both Arabic and Hebrew speakers, even the youngest

group of 5-year-olds, showed the distinction between the four higher-order values, as well as an order of values in the value circle that resembled the prototypical one by Schwartz (1992), demonstrating that the measure allowed us to measure the values of children starting from age 5.

In addition to the replicated results of the structure of values, children showed the expected consistency between the two halves of the value measure, higher importance to benevolence as compared to power, and the typical gender differences found in previous work (Schwartz & Rubel, 2005; Uzefovsky et al., 2016). These findings, again, were largely replicated in both cultural groups, further supporting the validity of the measure.

Overall, these results therefore suggest that the Arabic measure works very well. Additional, not preregistered comparisons between the structure of values of two subsamples (online and school) of Arab children, and similarly between the Hebrew-speaking children sample and a Hebrew-speaking student sample exemplified the robustness of the application.

Despite this overall suitability of the app to testing values in Arab children, and the fact that most findings were replicated in the two cultural groups, we note that among Arabic speakers fit to the value structure, coherence, and consistency were lower compared to the Hebrew-speaking children. An interpretation for this pattern may be that one or more of the items were not optimally translated. Indeed, we changed the phrasing of items from Study 1 to Study 2. However, although we revised the translation, the same tradition item mislocated again in the value structure of Arabic speakers in Study 2. After dropping this item, we noticed that the Stress of the structure, consistency, and coherence of the Arabic speaker sample improved. It may be that Arabic speakers did not perceive this specific value item as theorized, calling for further refinement of this item in future work. Qualitative research could be helpful to address the meaning of tradition in children, which could then be used to develop and test new items for the tradition value. Later on, different versions of the application with different tradition value items could be compared to address the differences.

Importantly, the somewhat better performance of the Hebrew measure is not surprising if one considers the fact that it has been used for over a decade of work and has been improved from time to time (Uzefovsky et al., 2016; Abramson et al., 2017; Daniel et al., 2023). In future years, additional refinements of the phrasing of specific items are expected to further improve also the Arabic PBVS-C.

One additional and important step for future research with the app is to validate it against external criteria, and specifically behavior. Using the PBVS-C and AVI, children's values have been shown to relate meaningfully to their behaviors (for a review, see Twito-Weingarten & Knafo-Noam, 2022). For example, evidence that prosocial behavior in both Arabic-speaking and Hebrew-speaking children will relate positively to their benevolence and universalism values, and negatively to their power values will demonstrate the usefulness of the value measure. Importantly, these effects are likely to be weaker for younger children, as there is a tendency to the association between values and behaviors to strengthen across middle childhood (Knafo-Noam et al., 2023). Our application has implications to educational research. We note that we used the application both in private settings and in school settings, with little difference between the settings. This makes the application useful for running and collecting the data in educational settings. Future studies could compare the values of children in schools with those of their teachers or with the school vision. This could be crucial to understanding the compatibility between students' and teachers' values, and for evaluating potential intervention programs for promoting specific values (e.g.: universalism, achievement) (Berson et. al,2016; Daniel et. al, 2013).

Implications to Development of Values

Validation of the measure of values among Arabic speakers is important for understanding how values develop across ages. After dividing the sample into four age groups, investigating the value structure across ages reveals that the dimensions on which the 4-higher order values are built were already distinct starting from age 5. This finding from Arabic-

speaking and Hebrew-speaking children confirms previous findings from Israel, Estonia, and Australia (Collins et al., 2017; Shachnai & Daniel, 2020; Tamm & Tulviste, 2022) that in preschool age children's values already show a meaningful structure reflecting the organization of values proposed by Schwartz (1992).

However, despite the meaningful structure found in preschoolers, value development is a continuous process taking place throughout middle childhood (Knafo-Noam et al., 2023) and beyond, towards adolescence and possibly throughout the lifespan (Daniel & Benish-Weisman, 2019; Döring et al., 2016; Gouveia et al., 2015). Age-based analyses in the current study showed an improvement in the value structure from age 5-6 to age 9-10 (indicated by reduction in stress), demonstrating the maturation of values in this period (Knafo-Noam et al., 2023). Two important criteria for maturation explored, consistency and coherence of values, both showed an increase with age during this period (although the effect for coherence was not significant, the value structure was improved across ages). These findings replicate previous findings that values reach peak coherence at ages (9-10) (Daniel et al., 2023). Importantly, there was no further improvement towards early adolescence (Daniel et al., 2023). Work addressing this issue with Arabic-speaking children is needed, as is work covering the period from middle childhood to middle adolescence, to see what happens to value coherence and consistency beyond the transition to adolescence.

Interestingly, value coherence positively correlated with value consistency, showing that children who rank their values consistently are more likely to be those whose values reflect the conflicts and compatibilities inherent in the value system. Longitudinal research on whether consistency and coherence co-develop with age is also needed.

Finally, we found differences in value importance across ages. Self-direction was less important at age 9-10, and security values were less important at age 11-12. It is interesting to note that these changes occurred for the older children. Previous studies found that value hierarchy changes in middle childhood towards early adolescence (Cieciuch et al., 2016). Such

changes may be part of a development process that leads to fluctuations in value importance over time (Vecchione et al., 2016). Specifically, fluctuations in periods of developmental transition may serve the purpose of enhancing individuals' ability to reset their salient goals, helping them to adapt to their evolving surroundings (Gouveia et al., 2015).

Implications to Understanding the Emergence of Cultural Differences

Understanding development of values can benefit from cross-cultural data. Since values are a core component of culture (Hofstede, 2001; Schwartz, 2001), exploring how value differences between cultures emerge is vital. We found that the priorities of values are different between the two cultural groups. Arabic-speaking children showed more conservative values. They gave higher importance to the conservation value of tradition, and were lower in the openness to change values of hedonism, self-direction, and stimulation. In addition, Arabic-speaking children gave higher importance to achievement values, and were lower in the motivationally-opposed values of benevolence. Thus, cultural differences were in line with the value structure as proposed by Schwartz (1992).

Although the cultural differences were robust, we note that mean-differences were small to moderate in size for all values except for tradition (Table 3). This reflects the fact that across multiple cultural contexts, most of the variance in values lies *within* cultures and not between them (Schwartz & Rubel, 2015). It is interesting to note (with the caveat that tradition values need refined measurement in the Arabic version) that the strongest difference was found for tradition values, which also show consistently large cultural differences in adult samples (Schwartz & Rubel, 2015). This could indicate that some cultures, including parts of the Arab society, promote tradition values already in children's early ages, leading to strong focus on these values.

The other value that showed higher importance for Arabic-speaking children was achievement. This replicated previous findings with Arab adolescents in Israel (Daniel et al., 2014). Importantly, the current sample includes 122 Palestinian children from a school with a

large representation (25%) of students from a refugee camp in Jerusalem, which means many of them came from a disadvantaged socio-economic status and difficult political situation. The high importance given to achievement values could be seen as a mechanism to aspire to better life in spite of the obstacles that minority groups confront.

Interestingly, value importance showed only one interaction between age and culture. Specifically, security values, which showed cultural differences only at age 9-10. One could speculate that this reflects differences in the importance of security in a region characterized by political conflict. However, the overall picture was that of moderate cultural differences, that vary little with age. This suggests that at least part of the cultural differences is present before middle childhood, calling for research with even younger samples to understand the emergence of cultural differences (Twito-Weingarten & Knafo-Noam, 2022).

Limitations and Recommendations

Despite the strengths of the current investigation (replication across cultural contexts, developmentally appropriate and child-friendly measurement, highly accessible, scalable and interactive application), our study has several limitations. One of them concerns the reliance on children's reports for their values. While the app reduces the need for reading ability, children in this age group vary in their abstraction ability, which affects how they think about their values (Misgav & Daniel, 2022). Future work should include additional investigation of the role of abstraction ability and possibly additional aspects of cognitive development.

Several limitations originate from challenges of implementing cross cultural research. For example, reaching Arabic-speaking participants through panel companies was more difficult than reaching Hebrew-speaking participants, because the Arab population is smaller in Israel, and more importantly, underrepresented in the commercial panel. This led us to choose different sample recruitment strategies for Arabic-speaking and Hebrew-speaking children, which may have affected the results. The similarity between the two Arab subsamples is

reassuring, but future work should seek to have similar procedures to reach children from the different cultural groups that are to be compared.

Furthermore, we made an effort to reach Arab participants of diverse religious faiths. The relatively small proportion of Christian and Druze children, while reflective of the demographic structure of the population, limited our ability to generalize across different religious contexts.

Importantly, the potential differences among various parts of the Arab population call for a more nuanced understanding of values in different cultural contexts in the broader Arab world, beyond religious differences. Indeed, many theories call for increased consideration of the social context of the child which has a critical effect on our understanding for the development of children (for a review see, Al-Faham et al., 2019). Research using qualitative measures, interviews or focus groups in order to understand how children perceive and understand values is needed for a fine-grained, culturally sensitive understanding of values (e.g., Shachani & Daniel, 2020; for a broader outlook see Bluebond-Langner & Korbin, 2007).

Another limitation stems from technical problems we encountered in linking some of the demographic data to the app. This prevented us from investigating a preregistered hypothesis based on past work (Saroglou et al., 2004; Uzefovsky et al., 2016), expecting an association between openness to change/conservation and parents' education and religiosity. We also faced ethical restrictions from the Ministry of Education regarding individual student demographics. Ideally, we would seek to control for socioeconomic differences to investigate if this information accounts for cultural differences. For example, future work could investigate whether the pattern of lower consistency and coherence among Arabic speakers reflects, rather than methodological aspects of the translation, group differences in socioeconomic background and quality of education available to children in different cultural contexts (indeed, the school subsample of Arabic speakers came from a school that is ranked by the ministry of Education at the bottom 10% in terms of socio-economic status). This could be done by comparing Hebrew-

speaking and Arabic-speaking subsamples of similar socioeconomic background in future work to account for cultural differences.

One limitation to our study that is based on a narrow group of Arabic speakers in the Middle East region. Future research should investigate if our results can be generalized to broader Arabic-speaking contexts outside Israel. Even if all Arab countries share the same official Arabic language and aspects of their culture, they are diverse in terms of political situation and economic development. Therefore, we may expect differences in value priorities across diverse Arab contexts (for example, Syrian children who experienced an ongoing war at their region, or economic difficulties in Tunisia). Future research can address these differences by comparing values of children from different Arab countries.

The Schwartz (1992) theory has been tested with adults in diverse Arab contexts, including very different countries such as Egypt and Yemen (Schwartz, 2008). The development of the Arabic PBVS-C is a first step for studying values with children in such varied cultural contexts. Nonetheless, our results cannot be generalized directly to all Arabic speakers due to cultural variations across the Arabic-speaking world. As mentioned in the introduction, Modern Standard Arabic (MSA) serves as a unifying form across the Arab world, while spoken dialects can differ significantly from country to country and even within regions of the same country. For instance, the Maghrebi dialects of North Africa, including Moroccan Arabic, are often considered the most divergent from MSA and other dialects. They incorporate many loanwords from French, Spanish, and Amazigh languages (Industry Arabic,2023). While most of the schools in Arab countries consider the MSA as the official language for teaching. Some variations between the countries make the use of our application in its current MSA language challenging. One may prefer implementing dialect-specific versions or allowing users to select their preferred dialect. This can be easily done with our app interface, and we hope to collaborate with authors from other parts of the Arab world (e.g., Morocco) to develop additional Arabic versions. Another option could be by offering multilingual options to accommodate code-switching and linguistic

preferences. Although these solutions may make comparisons between cultural groups more difficult, they acknowledge the rich diversity of Arabic dialects, and may better serve the needs of Arabic speakers across different regions and cultures. These options are not exclusive for Arabic speakers across the world, but also to Palestinians in diaspora. As of mid-2024, there are approximately 14.8 million Palestinians living in diaspora (al-shatat al-filastini) around the world (Palestinian Central Bureau of Statistics, 2024). Those who are located at Middle East countries primarily use Arabic, which aligns well with our application's current language offerings. However, Palestinians and Arabs living in Western or non-Arab countries are often bilingual or multilingual. These users may prefer to interact with the application in the language of their country of residence. To address this diversity, we are working on enhancing our application's language and cultural adaptation features. Our updated approach will permit the user first to choose the preferable language, then ask them to specify their religion or cultural background. As these preferences will be noted in the data, researchers will be able to use them as important variables in cross-cultural research (e.g., comparing the values of immigrant Arab children using the Arabic version to those using another language).

Therefore, to generalize our results, we recommend for future studies to apply the new PBVS-C in other Arabic-speaking contexts or countries. This will definitely require adapting the recording of instructions and item captions to specific Arabic contexts, and possibly also redesigning some of the PBVS-C images. Despite these challenges, our measure shows robustness and suitability for Arabic speakers, providing a basis for future cross-cultural comparisons not only with Hebrew speakers but also with other cultures and different religions.

Conclusion

Our results largely support the suitability and robustness of the PBVS-C app for assessing values in Arab children, although lower coherence and consistency among Arabic speakers suggested some remaining translation issues, highlighting the need for further refinement of the measure, particularly for items that may not translate well culturally. This

research offers significant insights on multiple fronts. Culturally, it provides unprecedented information about the values of Arab children as young as five years old. Developmentally, it enriches value research by incorporating essential factors like culture, value coherence and consistency across middle childhood. Technologically, it enhances access through a digital version of the PBVS-C, which is highly scalable and compatible with computers, tablets, and smartphones. The measure is currently available in English, Hebrew, and Arabic, with ongoing work on additional languages such as Russian, Estonian, and Brazilian Portuguese. This improved access to the value measure not only facilitates global understanding of children's values but can also help develop future research on how these values may influence behaviors across different ages.

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