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Cross-sectional age differences in 24 character strengths: Five meta-analyses from early adolescence to late adulthood

The present study comprises five meta-analyses (47 samples with a total *N* of 1,098,748) that investigate cross-sectional age differences in the 24 character strengths entailed in the VIA model. It is expected that most strengths show age differences, especially higher levels throughout adulthood. Ten age groups from early adolescence (10–12 years) to late adulthood (65+ years) were compared for each strength using random-effects models. Overall, significant age differences were found for 23 of the 24 character strengths (all except perspective) across the lifespan, with 91% of the effects indicating higher levels of the character strengths with age. Effect sizes were mostly very small, in line with age differences found for other traits. Most age differences were found for creativity, curiosity, love of learning, zest, and self-regulation as well as in middle adulthood. These results provide an impetus for research and applications on the development of character strengths.

Keywords: character strengths; meta-analysis; age differences; VIA model; lifespan development; interventions

Introduction

In the past decade, the malleability of traits has become a central topic in both research and theories. Several meta-analyses summarized normative mean-level changes in a variety of traits, such as the Big Five personality traits (Roberts, Walton, & Viechtbauer, 2006) and self-esteem (Huang, 2010). They found that these traits are both stable but can also change throughout the lifespan. The present meta-analyses extend our knowledge about age differences in the 24 character strengths of the VIA model (Peterson & Seligman, 2004) from early adolescence to late adulthood. This provides a foundation for future longitudinal studies and strengths-based interventions.

Age differences in personality traits

Personality traits are stable interindividual differences; that is, how people differ habitually in their thinking, behavior, feelings, and motivations has generally a high

rank-order stability, peaking in middle adulthood (e.g., Mõttus, Johnson, & Deary, 2012; Roberts & DelVecchio, 2000; Specht, Egloff, & Schmukle, 2011; Terracciano, Costa, & McCrae, 2006). At the same time, a plethora of studies and theories suggest a certain degree of variability in the mean levels of traits throughout the life span, from childhood to late adulthood; for example, conscientiousness, a broad personality trait that is associated with many adaptive outcomes (for an overview, see Ozer & Benet-Martinez, 2006), tends to decrease from early to middle adolescence, increases from middle adolescence to young adulthood, is relatively stable in middle adulthood, and then shows complex change patterns in late adulthood (e.g., Costa, McCrae, & Löckenhoff, 2019; Roberts et al., 2006; Soto, John, Gosling, & Potter, 2011; Specht et al., 2011; Srivastava, John, Gosling, & Potter, 2003; Terracciano, McCrae, Brant, & Costa, 2005; Wrzus & Roberts, 2017). Similar mean-level patterns have been found for other personality traits, such as social dominance, emotional stability, agreeableness, and self-esteem (for overviews, see Huang, 2010; Roberts et al., 2006). These normative mean-level changes were mostly very small (increase of around 1/10 of a standard deviation per decade; Terracciano et al., 2005), although they can potentially accumulate across the lifespan.

Several models and theories were set up to explain these normative changes of traits (for overviews, see Specht, 2017; Wrzus & Roberts, 2017). They attributed these changes to the person (e.g., due to intrinsic maturation or self-regulated personality change; Costa et al., 2019; Denissen, van Aken, Penke, & Wood, 2013), the environment (e.g., life events and developmental tasks; Bleidorn, Hopwood, & Lucas, 2018; Hutteman, Hennecke, Orth, Reitz, & Specht, 2014; Luhmann, Orth, Specht, Kandler, & Lucas, 2014; Roberts & Wood, 2006; Specht et al., 2011), or their

interactions (e.g., gene-environment transactions; Krueger, South, Johnson, & Iacono, 2008).

Character strengths

Related to personality traits (McGrath et al., 2020), one central concept in positive psychology is the "good character". The most prominent model is the VIA classification (Peterson & Seligman, 2004), which encompasses 24 rationally derived character strengths. They are defined as positive and morally valued traits that are both stable and malleable and that contribute to the flourishing of individuals and the society (Peterson & Seligman, 2004). These strengths were conceptualized as fulfilling six core virtues, namely wisdom and knowledge, courage, humanity, justice, temperance, and transcendence (see Supplementary Table S1 for an overview of the 24 character strengths and their assignment to the six core virtues). To be eligible for a character strength in Peterson and Seligman's (2004) model, candidate concepts had to meet a majority of several criteria (see also Ruch & Stahlmann, 2019); for example, a strength contributes to the "good life", is morally valued, is manifested in behavior (broadly construed as thoughts, feelings, and actions) and is trait-like and thus stable across situations and time. There should also be childhood prodigies as well as institutions and rituals in a society that foster and sustain strengths.

Research has shown that the endorsement of character strengths is related to higher scores in different aspects of flourishing, including subjective, social, and psychological well-being (e.g., Baumann, Ruch, Margelisch, Gander, & Wagner, 2020; Blanca, Ferragut, Ortiz-Tallo, & Bendayan, 2018; Brdar, Anić, & Rijavec, 2011; Gradisek, 2012; Peterson, Ruch, Beermann, Park, & Seligman, 2007; Shoshani, 2019; Wagner, Gander, Proyer, & Ruch, 2020). Furthermore, strengths-based positive psychology interventions were effective in enhancing positive outcomes, such as life

satisfaction, happiness, and state-expressions of strengths, and in reducing negative outcomes such as depressive symptoms (e.g., Duan & Bu, 2017; Lavy, 2020; Pang & Ruch, 2019; Proctor et al., 2011; Proyer, Gander, Wellenzohn, & Ruch, 2015; Schutte & Malouff, 2019; Seligman, Steen, Park, & Peterson, 2005). Thus, character strengths are a viable route to enhance well-being, both for individuals and for the larger society (e.g., by improving relationships and pro-environmental behavior; Moeller & Stahlmann, 2019; Wagner, 2019; Weber & Ruch, 2012a).

A developmental perspective on character strengths

Peterson and Seligman (2004) did not set up a specific prediction or model for the lifespan development of character strengths. They stated that strengths are potentially malleable and included a section on the development of each strength in their book. Different perspectives allow deriving potential mechanisms that underlie changes in character strengths. One of Peterson and Seligman's (2004) criteria entails that character strengths can be fostered by rituals and institutions, which suggests that individual character strengths should increase to the extent that people participate in rituals and attend institutions. If these rituals and institutions are experienced by many people in a given culture, they should result in overall increases in relevant character strengths with age (i.e., normative mean-level changes); for instance, self-regulation could be fostered by attending school and perseverance could be fostered at worke. Other rituals and institutions might not be universal and thus rather influence intra-individual development trajectories of character strengths; for instance, spirituality could be fostered by attending religious events and institutions, and teamwork might be fostered by being a member of the scouts.

Furthermore, change mechanisms proposed in models of personality traits might also apply, at least partially, to character strengths as positive traits. Changes in the

person due to intrinsic maturation (for an overview, see Costa et al., 2019) seem plausible as character strengths were found to have a biological and genetic basis (Steger, Hicks, Kashdan, Krueger, & Bouchard, 2007), which would imply that increases in strengths may be found especially in adolescence and young adulthood. Self-regulated personality change (Denissen, van Aken, Penke, & Wood, 2013; Hennecke, 2014) might also be a feasible mechanism for character strength development: People should have a desire to increase their level of strengths, and to the extent that they are able to habitually implement changes of strengths in their everyday lives, higher levels of strengths should eventually occur. Given limited resources and time, it is unlikely that people would increase in all 24 strengths; instead, they would likely focus on specific strengths that they find the most important or that help them to best achieve their goals. To the extent that people pursue changes in similar strengths at similar ages, normative mean-level changes would result. Importantly, in this framework, self-regulation would be a change mechanism in itself. This implies that the strength of self-regulation would moderate the success of increases in other character strengths.

Other developmental theories of personality traits emphasize the relevance of the environment, including life events, developmental tasks, and social roles (Bleidorn et al., 2018; Hutteman et al., 2014; Luhmann et al., 2014; Roberts & Wood, 2006; Specht et al., 2011). This is also likely to be relevant for strengths, given that they are influenced by environmental factors (Steger et al., 2007) and that one of their criteria entails changes by rituals and institutions (Peterson & Seligman, 2004). Again, to the extent that these situations and experiences are shared by many people (e.g., work, family, school, university) at a similar age, they would result in normative mean-level changes in character strengths across age. Furthermore, non-shared situations and

experiences (e.g., studying abroad, unemployment, traumatic events) would trigger different intra-individual change trajectories in strengths.

Investigating changes in character strengths would not only allow testing different mechanisms of change derived from personality models, but also specific principles of change. For example, Roberts' neo-socioanalytic model of personality (Roberts, Caspi & Moffitt, 2001; Roberts & Nickel, 2017; Roberts & Wood, 2006) incorporates the *maturity principle* (traits change in directions that are more socially desirable and adaptive during adulthood), the *plasticity principle* (personality is malleable by environmental influence at any age) and the *social investment principle* (traits develop as people invest in social roles specific to each age group). These principles have received support for different personality traits, especially extraversion, conscientiousness, and agreeableness (for an overview, see Roberts & Nickel, 2017). As character strengths are conceptualized as socially desirable and adaptive traits, it seems likely that similar change mechanisms underlie their development.

Although there are a multitude of relevant models and mechanisms that could be applied to character strengths, little is yet known about how they actually develop across the life span due to a paucity of long-term longitudinal studies. A few cross-sectional studies conducted age comparisons in adolescence (e.g., Brown, Blanchard, & McGrath, 2020; McGrath & Walker, 2016; Ruch & Wagner, 2013) and in adulthood (e.g., Linley et al., 2007). For instance, Brown et al. (2020) assessed the VIA-Youth in adolescents from 10–17 years and found that most strengths had lower levels in older compared to younger adolescents. Linley et al. (2007) assessed the VIA Inventory of Strengths (VIA-IS) in adults from 18–65+ years and found that curiosity, love of learning, zest, fairness, forgiveness, and self-regulation showed higher mean levels across adulthood (small correlations). Thus, these cross-sectional studies support age

differences for certain strengths across the lifespan. It should however be kept in mind that cross-sectional comparisons of age differences confound genuine developmental differences with societal and environmental changes, and also fail to capture intra-individual trajectories.

Several short-term longitudinal studies across time periods from 6 months to 3.5 years found high rank-order stabilities for character strengths in both adolescents and adults (Chopik et al., 2021; Gander, Hofmann, Proyer, & Ruch, 2020; Hausler et al., 2017; Park & Peterson, 2006a; Ruch, Proyer, Harzer et al., 2010). One recent study investigated mean-level changes in character strengths in adulthood (mostly middle-aged participants) in two samples from German-speaking countries across 3.5 years (Gander et al., 2020). The absolute changes in all strengths ranged on average from 0.26 (honesty) to 0.38 (spirituality) on the five-point scale of the VIA-IS (Peterson et al., 2005). They also computed reliable change scores, which indicated that between 3% (creativity and curiosity) and 9% (spirituality) of the participants reported a reliable change (in either direction). Additionally, changes in character strengths were parallel to changes in well-being in the direction compatible with cross-sectional correlations between the two concepts. Another recent study (Chopik et al., 2021) investigated the mean levels of a total character score, which was computed across a subset of the 24 character strengths, in a large sample of soldiers (mostly young adults). Across four time points, one before deployment and three after deployment (time span around 6 months to 1 year each), the authors found the total character score to be stable for most soldiers, while they decreased directly after deployment for a subset of soldiers. These results mostly support the interpretation of character strengths as being stable.

Similar to the scarcity of empirical studies of changes in character strengths, potential mechanisms and principles underlying changes have rarely been explored.

Several cross-sectional studies found that the levels of some character strengths (e.g., kindness, leadership, and spirituality) were higher in response to traumatic experiences, terror attacks, and catastrophes, which was attributed to post-traumatic growth (Peterson, Park, Pole, D'Andrea, & Seligman, 2008; Peterson & Seligman, 2003; Schueller, Jayawickreme, Blackie, Forgeard, & Roepke, 2015). Furthermore, higher levels of strengths (e.g., honesty, fairness, humility, and spirituality) were found in response to positive events, such as a major sports event (Proyer, Gander, Wellenzohn, & Ruch, 2014). However, the findings of these studies have been partly inconsistent (Schueller et al., 2015). Additionally, the designs compared different groups rather than prospective longitudinal changes in character strengths, which limits the extent to which differences in character strength mean scores can be attributed to posttraumatic growth (Lamade, Jayawickreme, Blackie, & McGrath, 2020). The longitudinal findings by Chopik et al. (2021), which indicated stability or even temporary declines in character strengths in soldiers after deployment, cast further doubt on whether adverse experiences can actually increase character strengths.

The present meta-analyses

The field of character strengths development is currently characterized by many theoretical and conceptual approaches, while empirical evidence is yet scarce. The present study aims at strengthening the empirical underpinning by summarizing cross-sectional studies on the character strengths across 10 age groups (10–12, 13–15, 16–17, 18–20, 21–24, 25–34, 35–44, 45–54, 55–64, and 65+ yo). Adjacent age groups are compared for the five age stages of early/mid-adolescence, mid/late-adolescence, young adulthood, middle adulthood, and late adulthood. In line with the definition of the character strengths as being stable and malleable and the review of theoretical approaches and empirical findings, it is expected that character strengths show small

differences (at least 1/10 of a standard deviation) between the individual age groups, especially in adolescence and young adulthood. Additionally, in line with the only longitudinal study on character strengths (Gander et al., 2020), small age differences are expected in middle adulthood. Late adulthood is often marked by inconsistent changes, and this age group is thus investigated exploratorily.

Materials and Methods

The recommendations by Cooper (2016) were followed in conducting the meta-analyses. Figure 1 presents the search process leading to the studies included in the meta-analyses, which is described in detail below.

Insert Figure 1 about here

Literature search

The literature search was conducted from March to May 2016, using three sources: (1) Reference databases were searched for the terms "VIA-IS", "Values in Action", "character strengths", or "inventory of strengths" (time period since January 2000), using subject terms in EBSCO host and "intitle" in Google Scholar; (2) Articles from the collection by the VIA Institute on Character (www.viacharacter.org/research/findings) were included; (3) Articles that cited the construction articles of the two standard measures of character strengths, the VIA-IS for adults (Peterson et al., 2005) and the VIA-Youth for adolescents aged 10–17 years (Park & Peterson, 2006a) were included. These three sources together yielded a total of 553 different publications.

Abstract screening

The screening of the abstracts was conducted by two independent coders, who had an agreement rate of 85% on the inclusion and exclusion for the present meta-analyses. If

discrepancies occurred, they were solved in a joint discussion between the two coders. To be initially included in the meta-analysis, abstracts had to meet three criteria: (a) Conducting a quantitative study with at least 10 participants, (b) Employing a self-report measure, and (c) the abstract was written in English. In cases in which the abstract did not provide the necessary information on these three criteria, the articles were reviewed. Altogether 303 abstracts fulfilled the inclusion criteria.

Study selection

Of the 303 abstracts, 234 articles were available as a full text and were evaluated and excluded based on the following four criteria: (a) not written in English, (b) published >5 years ago and contained no information on age differences (authors of studies published in the last 5 years or those who included age differences were contacted for obtaining the raw data; see below), (c) no self-report measure based on the 24 character strengths used, and (d) the sample was already included in a different study (if so, only the larger sample was retained) to ensure the independence of effect sizes. This left 86 studies for preliminary inclusion. For studies that did not provide necessary data for coding and computing the meta-analytic statistics, the corresponding author was contacted and asked for providing supplementary information. We limited the request for data to studies published in the past five years when the literature search was conducted (i.e., 2011–2016), in line with the recommended data retention period of the American Psychological Association (≥ 5 years after publication). The date of publication was not relevant if age differences were already explicitly addressed in the manuscript, yet supplementary data was usually required to be able to compute the meta-analytic statistics. Finally, the data was screened to ensure that the sample consisted of at least 10 participants in the relevant age groups included in the five age group comparisons (for details, see the Analyses section). This procedure resulted in a

final number of 43 studies with 47 samples that could be included in the present meta-analyses.[1]

Study samples

Overall, 1,098,748 participants were included in the five meta-analyses (mostly consisting of convenience samples). Most studies employed the VIA-Youth in pupils (for children and adolescents) and the VIA-IS in community samples (for adults). The samples either had a mixed or a predominantly female gender ratio. Most studies were conducted in English or German. Drawing on the generation classification of the Pew Research Center (Dimock, 2019), the samples spanned cohorts from the silent generation and the boomers in the oldest age groups to the Millennials and Gen Z in the youngest age groups (see Supplementary Tables S2 to S6 for detailed sample descriptions; studies included in the meta-analyses are also marked with asterisks in the reference list).

Age was operationalized in 10 age groups (10–12, 13–15, 16–17, 18–20, 21–24, 25–34, 35–44, 45–54, 55–64, and 65+ years, with the oldest person being 82 years old). These groups were based on predefined categories that were used in several studies included in the meta-analyses (McGrath, 2014, 2015a, 2016; McGrath & Walker, 2016), especially in large samples from popular positive psychology websites (e.g., www.authentichappiness.org, www.viacharacter.org). Thus, age groups rather than continuous scores were sought for to include all relevant studies in the present meta-

[1] While we initially intended to include also studies that assessed only a subset of the 24 character strengths, we only had one such data set available (Diessner et al., 2008). To ensure the comparability of samples across the 24 character strengths, which was the focus of the present meta-analyses, we decided to exclude this dataset from the analysis.

analyses, and the larger sample size was considered to outweigh the loss of a more fine-grained age measurement. Also, no studies were excluded because they employed a different categorization for age groups. The individual age groups spanned 2–17 years, with narrower groups in adolescence and young adulthood and wider groups in middle and late adulthood.

To enable meaningful interpretations of the age comparisons, the samples were further grouped into five age stages comprising at least five samples each for the analyses (to achieve the minimum required sample size for conducting meta-analyses; Cooper, 2016): Early/mid-adolescence, mid/late-adolescence, young adulthood, middle adulthood, and late adulthood. Most studies included rather narrow age ranges, which made this grouping necessary to compare the adjacent age groups using the same samples. This prevented biases by individual study characteristics (e.g., recruitment procedure). Each sample was only entered once in each analysis, although it could be used in more than one meta-analysis (e.g., 25-34 yo were compared with the younger age groups in young adulthood and with the older age groups in middle adulthood). The individual age comparisons were based on the following samples: Early/mid-adolescence (8 samples) with n = 5,610 10–12 yo and n = 12,918 13–15 yo; Mid-/late adolescence (6 samples) with n = 12,431 13–15 yo and n = 8,301 16–17 yo; Young adulthood (20 samples) with n = 101,304 18–20 yo, n = 119,316 21–24 yo, and n = 193,492 25–34 yo; Middle adulthood (30 samples) with n = 194,173 25–34 yo, n = 165,587 35–44 yo, n = 138,430 45–54 yo, and n = 66,774 55–64 yo; Late adulthood (13 samples) with n = 66,142 55–64 yo and n = 14,288 65–82 yo.

Data analyses

Pairwise comparisons of adjacent age groups was preferred as the data (means and standard deviations) was only available for the ten age groups and as non-linear and

complex age differences might occur. No comparisons were conducted between 16–17 and 18–20 yo, because studies usually do not cover both of these age groups and as the standard instruments (VIA-IS vs. VIA-Youth) and sample types (pupils vs. college/university students and community; see Tables S3 and S4) differ for adolescents and adults. Thus, we conducted a total of eight comparisons across the adjacent age groups.

The MAd package (Del Re & Hoyt, 2014) for R (R Core Team, 2018) was used to compute the mean effect sizes. Hedges' *g* was computed as an unbiased estimate of Cohen's *d* (Ellis, 2010). Positive *g* values represent higher scores for the older in comparison to the younger age group (i.e., higher mean levels with age), and negative values of *g* represent higher scores for the younger in comparison to the older age group (i.e., lower mean levels with age).

All analyses were computed using a random-effects model (Konstantopoulos & Hedges, 2009), which allows generalizing the findings beyond the included studies. This model was preferred over a fixed-effects model for two reasons. Conceptually, we did not expect uniform effects in the individual samples, given their heterogeneity (e.g., sample type, culture, measure, sample size). Using random-effects models also helps to better balance the results, as studies with large sample sizes receive a lower weight and studies with smaller sample sizes receive larger weights than in fixed-effects models (Borenstein et al., 2010). Empirically, 77 of the 192 analyses (40%) had a high heterogeneity of the character strength means between the studies. This was indicated by a significant Q_T value as a measure of homogeneity or an $I^2 \geq .75$ as the degree of heterogeneity across the samples (i.e., ≥ 75% between-population variance; Higgins & Thompson, 2002; see Supplementary Table S7).

Effect sizes were categorized according to Cohen's (1992) guidelines, with *g* values of ≥ |0.80| interpreted as large, |0.50|–|0.79| as medium, and |0.20|–|0.49| as small. Additionally, effects of |.10| or higher were of interest as well, as this effect size was previously found in studies of personality trait change per decade (Terracciano et al., 2005). As all comparisons were conducted separately for the 24 character strengths in the five meta-analyses (with an average of 38.4 comparisons per meta-analysis), the significance threshold was set to $p < .001$ (two-tailed) to correct for multiple comparisons. In addition, the 95% confidence intervals (*CI*s) of the effect sizes were computed. The effect sizes of each individual study are shown in the Supplementary Tables S8 to S15.

The trim-and-fill method (Duval, 2005) was conducted to test whether the results were influenced by publication bias (i.e., potential impact of missing studies on the main effects). These analyses were conducted using the *trimfill* function of the *metafor* package (Viechtbauer, 2010). Finally, to plot the age differences of the character strengths, the means of the 10 age groups were first rescaled (if another measure of character strengths was used) to a five-point scale from 1–5 as implemented in the VIA-IS and the VIA-Youth using the *rescale* function in the *scales* package (Wickham, 2018). The resulting means and standard errors were then plotted using the *ggplot2* package (Wickham, 2016).

Results

The effect sizes and 95% confidence intervals of the age differences in the 24 character strengths, tested in eight comparisons of adjacent age groups, are shown in Table 1. To illustrate the age differences of the character strengths across the life span, the means and standard errors of each strength were plotted for the ten age groups (see Figure 2).

Insert Table 1 and Figure 2
around here

Adolescence

Two comparisons were conducted in adolescence, which spanned a total of 7 years (10–17 yo). Comparing young (10–12 years) and middle adolescents (13–15 years), 2 of the 24 character strengths showed significant differences. Both creativity and zest had lower levels in middle than in young adolescents (small effects). For middle and older adolescents (16–17 years), 9 of the 24 character strengths showed significant effects. While zest continued to be lower in older adolescents, the eight other strengths had higher levels in older adolescents (i.e., judgment, kindness, social intelligence, teamwork, self-regulation, appreciation of beauty and excellence, gratitude, and hope). Overall, 11 of 48 comparisons were significant (23%), and 8 effects were at least |.10| (17%).

Young adulthood

Two comparisons were conducted in young adulthood, which spanned a total of 16 years (18–34 yo). Three character strengths (curiosity, judgment, and love of learning) showed higher levels steadily throughout young adulthood, from 18–20 to 25–34 years. Furthermore, perseverance and prudence had higher levels from 18–20 to 21–24 years, and creativity, fairness, and forgiveness had higher levels from 21–24 and 25–34 years. Additionally, kindness, humility, and humor had lower levels from 18–20 to 21–24 years. Thus, 8 of the 24 strengths had higher levels during young adulthood, while 3 strengths had lower levels. Overall, 14 of 48 comparisons were significant (29%), and 5 effects were at least |.10| (10%).

Middle adulthood

Three comparisons were conducted in middle adulthood, which spanned a total of 39 years (25–64 yo). For middle-aged adults, significant age differences were found for most character strengths. Specifically, 11 strengths had higher levels steadily from 25–34 to 55–64 years (creativity, curiosity, love of learning, bravery, fairness, forgiveness, humility, prudence, self-regulation, appreciation of beauty and excellence, and gratitude) and three strengths had higher levels from 35–44 to 55–64 years (perseverance, zest, and kindness). Honesty had significantly higher levels in the comparisons of 25–34 and 35–44 yo and 45–54 and 55–64 yo, respectively, but not between 35–44 and 45–54 yo. Leadership and spirituality had higher levels from 25–34 to 45–54 years, but did not show differences in 55–64 yo. Love and teamwork had significantly higher levels from 35–44 to 45–54 years. No significant age differences were found for judgment, perspective, social intelligence, and hope. Lower levels were only found for humor, between 45–54 and 55–64 yo. Overall, 48 of 72 comparisons were significant (67%), and 18 effects were at least |.10| (25%).

Late adulthood

Two comparisons were conducted in late adulthood, which spanned a total of 27 years (55–82 yo). In the comparison of middle-aged (55–64 years) and older adults (65+ years), 4 of the 24 strengths showed significant differences (17%). Older adults had higher scores in zest, self-regulation, hope, and humor than the middle-aged adult group. These effects were very small (g<|.20|), with the exception of self-regulation (small effect), and 2 effects were at least |.10| (8%).

Trim-and-fill analyses

The trim-and-fill analyses corroborated these age differences (see Supplementary Table 16). In 78 of the 192 analyses (41%), one to three studies were added, and in 58 analyses (30%), more than three studies were added. However, only 8 effect sizes

changed their significance due to the addition of the new studies (4%), with effect-size changes from |.01|–|.03|. Thus, the results of the meta-analyses were robust against a potential publication bias.

Discussion

The present study is the first to comprehensively investigate age differences in character strengths across the life span. Of the total of 192 comparisons, 77 age differences were significant (40%). Of these, only seven effects were negative (i.e., lower levels across age), while 91% of the effects were the positive direction. Most age differences (five of eight age group comparisons significant) were found for creativity, curiosity, love of learning, zest, and self-regulation. Overall, all strengths, except for perspective, showed age differences across the lifespan, and most of them showed higher levels with age or complex and unique patterns. These results highlight the need for fine-grained and non-linear investigations of age differences in character strengths.

Effect sizes approached those in personality trait development with around 1/10 of a standard deviation between adjacent age groups (see Terracciano et al., 2005). Of the 77 significance age differences, 33 effect sizes (43%) were at least |0.10|. Again, only three of these effects were negative. Most age differences of |.10| or larger were found for curiosity (4/8), love of learning (5/8), and self-regulation (4/8). Small effect sizes (i.e., $g \geq |.20|$) were found for creativity and zest (lower levels from 10–12 to 13–15 years), love of learning (higher levels from 21–24 to 25–34 years), and self-regulation (higher levels from 55–64 to 65+ years). As character strengths are inherently positive and rewarding, even small age differences could potentially translate into higher well-being for the individual (as suggested by Gander et al., 2020) and, if accumulated for many people over the lifespan, a better functioning of the society.

Interestingly, the age differences were smaller than the longitudinal mean changes previously reported across 3.5 years in middle adulthood (Gander et al., 2020). This suggests that the cross-sectional nature of the data might rather have underestimated the true level of change; that is, people likely do not uniformly increase or decrease in all 24 strengths, but rather in a subset of strengths. For example, people might increase the most in their signature strengths (i.e., the three to seven strengths that are highest and thus the most central for one's identity; Peterson & Seligman, 2004), in specific strengths for best solving specific developmental tasks or for managing specific social roles (e.g., perseverance for the workplace, love of learning for university studies, and love for becoming a parent), or in strengths that are fostered the most by rituals and institutions in a given culture (e.g., self-regulation in schools, spirituality in religious events and institutions, teamwork in the scouts). Some of these institutions and rituals are normative, such as family, schools, and work, and might thus contribute to normative mean-level increases in the character strengths; others might rather influence individual development trajectories, such as religious affiliations, voluntary service, or participation in the scouts. Future longitudinal studies that assess character strengths as well as life events and social activities can test these hypotheses. This would also provide an empirical means of testing some of the criteria (fostered by rituals and institutions) and characteristics (stable, but malleable) attributed to character strengths. Additionally, well-being should be assessed to see if increases in character strengths co-occur or are followed by increases in well-being (as was done by Gander et al., 2020).

The most numerous and largest age differences that indicated higher character strengths levels across age were found in middle adulthood (19 of 24 strengths with higher scores), rather than adolescence (8/24) and young adulthood (8/24) as initially expected. This was also reflected in the relative proportion of differences, which

corrected for the different number of comparisons in the different age stages: The highest proportion of significant effects and of effects of at least |.10| was found in middle adulthood, followed by young adulthood and adolescence, while the smallest proportion was found in late adulthood. These results might help explain why Chopik et al.'s (2021) longitudinal study in young soldiers did not find age-related increases, especially in aggregated strengths. Furthermore, these results are in contrast to longitudinal studies in personality trait development, which usually found the largest and most numerous increases in personality traits in young adulthood (e.g., Mõttus et al., 2012; Roberts & DelVecchio, 2000; Specht et al., 2011; Terracciano et al., 2006).

A potential explanation for this discrepancy could be the existence of different change mechanisms for personality traits and character strengths; for example, personality traits might change early when facing and investing in new social roles, while character strengths might be fostered later in the process when these roles are already mastered and strengths can help to transform them into pleasurable, engaging, and meaningful activities. Another explanation could be purely methodological: The age comparisons of middle adulthood were based on the largest sample size and thus had a larger power to detect effects than the other age comparisons (especially in adolescence and late adulthood). However, effect sizes were comparable or even stronger for the individual strengths in this age group, which makes a purely methodological explanation unlikely. Future studies could investigate the co-development of broad (e.g., Big Five domains) or specific personality traits (e.g., Big Five aspects or facets) with character strengths to determine the timing of their mutual changes.

Perspective was the only strength that did not show significant differences in any age group. Although counterintuitive at first, this finding is in line with the broader

literature on developmental changes in general wisdom. Perspective is conceptually similar to general wisdom, emphasizing insight into life and good judgment (Peterson & Seligman, 2004; Reitz & Staudinger, 2017). Studies supported the stability of this construct and showed that age alone is not sufficient for achieving wisdom (e.g., Baltes, Glück, & Kunzmann, 2002; Glück, Bluck, & Weststrate, 2019; Reitz & Staudinger, 2017; Webster, 2003). This suggests that different change mechanisms might operate for perspective in comparison to the other strengths, such as opportunities in the environment to face new challenges and to make new experiences as well as a person's cognitive abilities and growth goals (e.g., Bauer & McAdams, 2004; Reitz & Staudinger, 2017).

Limitations and future directions for research and applications

The present meta-analyses focused on age differences in character strengths using cross-sectional data in ten age groups. First, although longitudinal and cross-sectional findings on trait trajectories were often found to converge (Costa et al., 2019; Terracciano et al., 2005), age, period and cohort effects are confounded in this design. As the samples included in the present meta-analyses were collected in a rather narrow time span (i.e. from 2002 to 2016), the age groups often belonged to different generations (see the ESM Tables S2–S6), blurring age-related, period-related and cohort-related differences. The present findings should thus be cautiously interpreted in terms of possible age differences—and eventually developmental trajectories—of character strengths. To disentangle the effects of development and societal/environmental changes, sequential studies should be conducted (Schaie, 1965). Also, investigating intra-individual change patterns requires longitudinal data. Longitudinal designs would also allow assessing additional developmental patterns of character strengths, including rank-order consistency and profile-pattern or ipsative stability (De Fruyt et al., 2006). The latter

would be especially interesting for character strengths, as it would allow tracking changes in signature strengths across the lifespan.

Second, the age groups were rather broad, spanning 2–17 years each. Tracking change patterns using intensive longitudinal designs would enable targeting the specific periods of change and linking them to life events, changes in social roles, and developmental tasks that the individual experienced (see Bleidorn et al., 2018; Luhmann et al., 2014). This would allow testing different mechanisms of change, such as maturation and environmental influences. Additionally, state assessment could investigate how short-term fluctuations can lead to long-term changes (as outlined in the TESSERA framework; Wrzus & Roberts, 2017). This approach seems especially fruitful as changes in traits can already occur after a few weeks of interventions (for an overview, see Roberts et al., 2017) and volitional change intentions (Hudson, & Fraley, 2015). This would allow testing whether models of personality trait change also apply to character strengths as positive traits, or whether specific models need to be developed that are, for instance, based on the definitions and criteria of character strengths (Peterson & Seligman, 2004; Ruch & Stahlmann, 2019).

Third, the age range covered by the meta-analyses was restricted to early adolescents from 10 years on and in older adulthood from 65–82 years. This precludes inferences on the development of character strengths in childhood and late adulthood. The majority of character strengths research focused on adulthood, and only a few studies employed the VIA-Youth for adolescents aged 10–17 years. Parent reports (Park & Peterson, 2006b; Shoshani, 2019) for pre-school children and self-reports for school children (Shoshani & Shwartz, 2018) could be used to evaluate the early development of character strengths and its moderators (e.g., school type or membership in a youth association; Ruch & Wagner, 2013). Furthermore, a recent study supported the notion

that the structure of character strengths (which partially overlapped with the strengths in the VIA classification) becomes more differentiated and complex from late childhood to adolescence (Shubert, Wray-Lake, Syvertsen, & Metzger, 2019).

Furthermore, extending the study of character strengths to late adulthood would enable connecting character strengths to indicators of successful/positive ageing (Baltes, & Baltes, 1990). The current findings already suggest that the level of strengths remains similar or is higher (zest, self-regulation, hope, and humor) in this age group. Future studies can directly investigate these changes and to what extent they depend on factors such as employment status (as individuals will often retire in their 60's), living situation, cognitive ability, physical health, and opportunities provided by the environment (Baumann et al., 2020; Owens, Baugh, Barrett-Wallis, Hui, & McDaniel, 2018; Reitz & Staudinger, 2017). Character strengths could potentially help provide meaning and fulfillment in older adults, which in turn are important predictors for successful ageing (see Greenstein & Holland, 2015; Reker & Wong, 2012; Wong, 2015).

Fourth, the sample sizes did not allow conducting moderation analyses. Future studies could investigate whether the developmental trajectories of character strengths differ for males and females (see e.g. Heintz, Kramm, & Ruch, 2019; Soto et al., 2011; Srivastava et al., 2003) and for different measures (e.g., comparing the VIA-IS with short forms and the newly developed VIA Assessment Suite; e.g., McGrath, 2017; Ruch, Martínez-Martí, Proyer, & Harzer, 2014). Additionally, studying different nations (e.g., McGrath, 2015b) would be important, as the present meta-analyses mostly included samples from North America and Europe. These studies should also employ samples that are representative for a certain target group to better generalize the

developmental trajectories, rather than the convenience samples in the present meta-analyses (which potentially suffer from self-selection biases).

Fifth, the five age stages differed regarding (a) the total time span covered (ranging from 5 years to 30 years), (b) the time spans of the individual age groups (from 2 years to 17 years), (c) the sample sizes, and (d) the number of comparisons conducted (from one to three). While using effect sizes and relative proportions of effects helped overcome some of these limitations, comparisons between the age stages (i.e., across the individual meta-analyses) should be made with caution. Instead, mainly age differences within the individual stages should be used to inform on future studies and applications of character strengths. Future studies on character strengths and age differences should collect data that entail individual ages (in years) with sufficient sample sizes over a large time span rather than age groups in limited time spans to enable correlational and regression analyses across age.

Sixth, the large number of comparisons across all five meta-analyses (192 in total), as well as the large sample within each meta-analysis, suggests that the effect sizes, rather than the significance alone, should be used for interpreting the results. Around 60% of the significant effects were marginal (i.e., <.|.10|) and hence unlikely to be of practical value. Focusing future research and applications on strength that showed the most numerous and largest effects across age (i.e., curiosity, love of learning, and self-regulation) or those that showed the largest effects within specific age groups (e.g., creativity for adolescents) seem the most promising avenues. At the same time, the present study cautions against using higher-order factor scores to study age differences in character strengths. Individual strengths that are usually assigned to one higher-order factor showed different patterns, and hence strength-specific trajectories would not be unveiled when collapsing analyses across strengths (see Chopik et al., 2021); for

example, the intellectual-strengths factor comprises, among other strengths, creativity (lower in adolescence, higher in young and middle adulthood), judgment (higher in adolescence and young adulthood), and perspective (no age differences).

Lastly, it is important to establish measurement invariance of the individual character strength scales across different age groups to ensure that the items and scales can be meaningfully compared. McGrath and Walker (2016) supported the measurement invariance across age for adolescents from 10–17 years for four higher-order factors derived from the VIA-Youth. Importantly, measurement invariance across the two standard measures of the character strengths, the VIA-IS and the VIA-Youth, should be tested, as their item format, number, and content differs. This currently advises caution in interpreting differences between adolescents and adults.

Conclusion

Overall, the patterns of age differences across the life span for most strengths found in the present meta-analyses are in line with Peterson and Seligman's (2004) definition that character strengths can be both stable and malleable. Age differences were most pronounced in middle adulthood and for the strengths curiosity, love of learning, and self-regulation. As this is a pioneer study, little is yet known about the mechanisms underlying age differences and eventually the development of character strengths. Still, the present findings are in line with longitudinal changes found in character strengths (Gander et al., 2020) and in desirable personality traits (Huang, 2010; Roberts et al., 2006). Long-term longitudinal and intervention studies that track trait-level changes of strengths, ideally combined with state-level measures as well as other relevant variables (such as personality traits and well-being), would give further insight into the change processes underlying character strengths. This would eventually enable individuals to fulfill their potential to lead a "good life" and to contribute to a flourishing society.

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Table 1. *Age Differences in the 24 Character Strengths across the Lifespan*

	Young/middle adolescence (8 samples)		Middle/late adolescence 2 (6 samples)		Young adulthood (20 samples)			
	10–12 to 13–15 yo (n = 5,610 and 12,918)		13–15 and 16–17 yo (n = 12,431 and 8,301)		18–20 and 21–24 yo (n = 101,340 and 119,316)		21–24 and 25–34 yo (n = 119,316 and 193,492)	
Character strengths	*g*	95% *CI*	*g*	95% *CI*	*g*	95% *CI*	*g*	95% *CI*
Creativity	-0.20***	[-0.29, -0.12]	0.00	[-0.12, 0.12]	-0.01	[-0.04, 0.02]	0.09***	[0.06, 0.12]
Curiosity	-0.09	[-0.14, -0.03]	0.11	[-0.02, 0.24]	0.07***	[0.05, 0.09]	0.11***	[0.08, 0.14]
Judgment	-0.03	[-0.17, 0.12]	0.17***	[0.14, 0.20]	0.16***	[0.15, 0.17]	0.10***	[0.09, 0.12]
Love of learning	-0.16	[-0.30, -0.02]	0.05	[-0.10, 0.20]	0.17***	[0.12, 0.21]	0.20***	[0.15, 0.26]
Perspective	0.02	[-0.11, 0.15]	0.09	[0.00, 0.19]	0.06	[0.02, 0.10]	-0.02	[-0.06, 0.03]
Bravery	-0.06	[-0.12, 0.00]	0.04	[-0.09, 0.16]	0.00	[-0.04, 0.03]	0.04	[0.01, 0.08]
Perseverance	-0.24	[-0.41, -0.08]	-0.17	[-0.33, -0.02]	0.07***	[0.04, 0.12]	0.03	[-0.02, 0.09]
Honesty	-0.08	[-0.22, 0.06]	0.05	[-0.02, -0.13]	0.00	[-0.03, 0.03]	0.01	[-0.04, 0.05]
Zest	-0.20***	[-0.30, -0.11]	-0.12***	[-0.15, -0.09]	-0.03	[-0.06, 0.00]	0.01	[-0.04, 0.06]
Love	-0.07	[-0.18, 0.05]	0.03	[0.00, -0.06]	-0.01	[-0.05, 0.02]	0.01	[-0.04, -0.05]
Kindness	-0.03	[-0.15, 0.09]	0.12***	[0.09, 0.15]	-0.03***	[-0.04, -0.02]	-0.04	[-0.10, 0.01]
Social intelligence	0.06	[-0.06, 0.19]	0.11***	[0.08, 0.13]	0.00	[-0.02, 0.02]	0.02	[-0.03, 0.07]
Teamwork	-0.05	[-0.16, 0.06]	0.09***	[0.06, 0.11]	-0.05	[-0.08, -0.01]	-0.01	[-0.05, 0.04]
Fairness	-0.07	[-0.23, 0.09]	0.12	[-0.03, 0.26]	0.04	[0.01, 0.07]	0.09***	[0.07, 0.12]
Leadership	0.03	[-0.05, 0.11]	-0.03	[-0.22, 0.15]	0.01	[-0.01, 0.02]	-0.03	[-0.07, 0.01]
Forgiveness	-0.17	[-0.32, -0.02]	-0.05	[-0.24, 0.14]	-0.01	[-0.04, 0.02]	0.06***	[0.04, 0.09]
Humility	0.00	[-0.11, 0.12]	0.09	[-0.01, 0.20]	-0.03***	[-0.03, -0.02]	0.01	[-0.02, 0.04]
Prudence	-0.14	[-0.31, 0.03]	0.03	[-0.09, 0.15]	0.05***	[0.04, 0.06]	0.04	[0.01, 0.07]
Self-regulation	-0.14	[-0.30, 0.03]	0.11***	[0.08, 0.14]	0.00	[-0.04, 0.04]	0.01	[-0.04, 0.06]
ABE	-0.07	[-0.16, 0.02]	0.12***	[0.09, 0.15]	-0.03	[-0.08, -0.02]	0.06	[0.02, 0.10]
Gratitude	-0.06	[-0.15, 0.04]	0.06***	[0.04, 0.09]	-0.03	[-0.09, 0.02]	0.02	[-0.01, 0.05]
Hope	-0.11	[-0.28, 0.06]	0.08***	[0.05, 0.11]	0.01	[0.00, 0.02]	-0.03	[-0.08, 0.01]
Humor	0.05	[-0.03, 0.14]	-0.05	[-0.08, -0.01]	-0.07***	[-0.09, -0.04]	-0.04	[-0.10, 0.01]
Spirituality	-0.12	[-0.26, 0.02]	-0.11	[-0.36, 0.13]	-0.06	[-0.09, -0.02]	0.02	[-0.02, 0.10]

Table 1 (continued)

	Middle adulthood (30 samples)						Late adulthood (13 samples)	
	25–34 and 35–44 yo (n = 194,173 and 163,587)		35–44 and 45–54 yo (n = 163,587 and 138,430)		45–54 and 55–64 yo (n = 138,430 and 66,774)		55–64 and 65+ yo (n = 66,142 and 14,288)	
Character strengths	g	95% *CI*	g	95% *CI*	g	95% *CI*	g	95% *CI*
Creativity	0.06***	[0.04, 0.09]	0.04***	[0.02, 0.06]	0.03***	[0.02, 0.04]	-0.04	[-0.11, 0.03]
Curiosity	0.12***	[0.08, 0.16]	0.12***	[0.11, 0.14]	0.13***	[0.12, 0.14]	0.09	[0.03, 0.15]
Judgment	0.03	[0.01, 0.05]	0.00	[-0.02, 0.03]	0.03	[0.01, 0.05]	-0.03	[-0.09, 0.04]
Love of learning	0.11***	[0.09, 0.13]	0.10***	[0.08, 0.11]	0.11***	[0.08, 0.13]	0.05	[-0.04, 0.10]
Perspective	-0.01	[-0.05, 0.03]	-0.01	[-0.04, 0.02]	0.04	[0.01, 0.06]	0.01	[-0.02, 0.03]
Bravery	0.11***	[0.07, 0.15]	0.05***	[0.05, 0.06]	0.03***	[0.02, 0.04]	0.06	[0.01, 0.11]
Perseverance	0.06	[0.02, 0.09]	0.06***	[0.05, 0.06]	0.05***	[0.03, 0.06]	0.04	[0.00, 0.07]
Honesty	0.09***	[0.06, 0.12]	0.04	[0.01, 0.06]	0.03***	[0.02, 0.05]	0.02	[-0.03, 0.07]
Zest	0.05	[0.02, 0.08]	0.08***	[0.06, 0.10]	0.09***	[0.06, 0.11]	0.10***	[0.06, 0.15]
Love	-0.02	[-0.04, 0.01]	0.04***	[0.03, 0.05]	0.01	[0.00, 0.02]	0.00	[-0.02, 0.01]
Kindness	0.00	[-0.02, 0.03]	0.07***	[0.05, 0.09]	0.08***	[0.06, 0.11]	0.05	[0.00, 0.10]
Social intelligence	0.01	[-0.03, 0.04]	-0.01	[-0.03, 0.02]	0.00	[-0.03, 0.02]	-0.03	[-0.07, 0.02]
Teamwork	0.00	[-0.01, 0.02]	0.04***	[0.02, 0.05]	0.01	[-0.03, 0.01]	0.00	[-0.03, 0.04]
Fairness	0.10***	[0.07, 0.13]	0.08***	[0.06, 0.12]	0.06***	[0.04, 0.08]	-0.02	[-0.09, 0.04]
Leadership	0.08***	[0.05, 0.10]	0.08***	[0.06, 0.10]	0.03	[0.01, 0.05]	-0.02	[-0.07, 0.03]
Forgiveness	0.11***	[0.10, 0.12]	0.15***	[0.13, 0.17]	0.09***	[0.08, 0.10]	0.02	[-0.02, 0.06]
Humility	0.07***	[0.05, 0.10]	0.08***	[0.06, 0.10]	0.09***	[0.05, 0.12]	0.04	[-0.04, 0.11]
Prudence	0.07***	[0.05, 0.09]	0.05***	[0.02, 0.07]	0.07***	[0.04, 0.10]	0.04	[-0.02, 0.11]
Self-regulation	0.10***	[0.06, 0.14]	0.10***	[0.08, 0.11]	0.08***	[0.07, 0.10]	0.21***	[0.16, 0.27]
ABE	0.05***	[0.02, 0.08]	0.12***	[0.08, 0.15]	0.11***	[0.09, 0.13]	0.01	[-0.07, 0.09]
Gratitude	0.08***	[0.06, 0.10]	0.11***	[0.08, 0.15]	0.10***	[0.07, 0.13]	0.10	[0.01, 0.19]
Hope	0.01	[-0.02, 0.05]	0.03	[0.01, 0.05]	0.04	[0.01, 0.06]	0.06***	[0.04, 0.08]
Humor	-0.05	[-0.09, -0.02]	-0.01	[-0.03, 0.02]	-0.03***	[-0.04, -0.01]	0.05***	[0.03, 0.07]
Spirituality	0.14***	[0.10, 0.18]	0.14***	[0.11, 0.18]	0.06	[0.01, 0.10]	0.03	[-0.04, 0.11]

Notes. ABE = appreciation of beauty/excellence, g = Hedges' g (effect size), 95% *CI* = 95% confidence interval of g; *** $p < .001$.

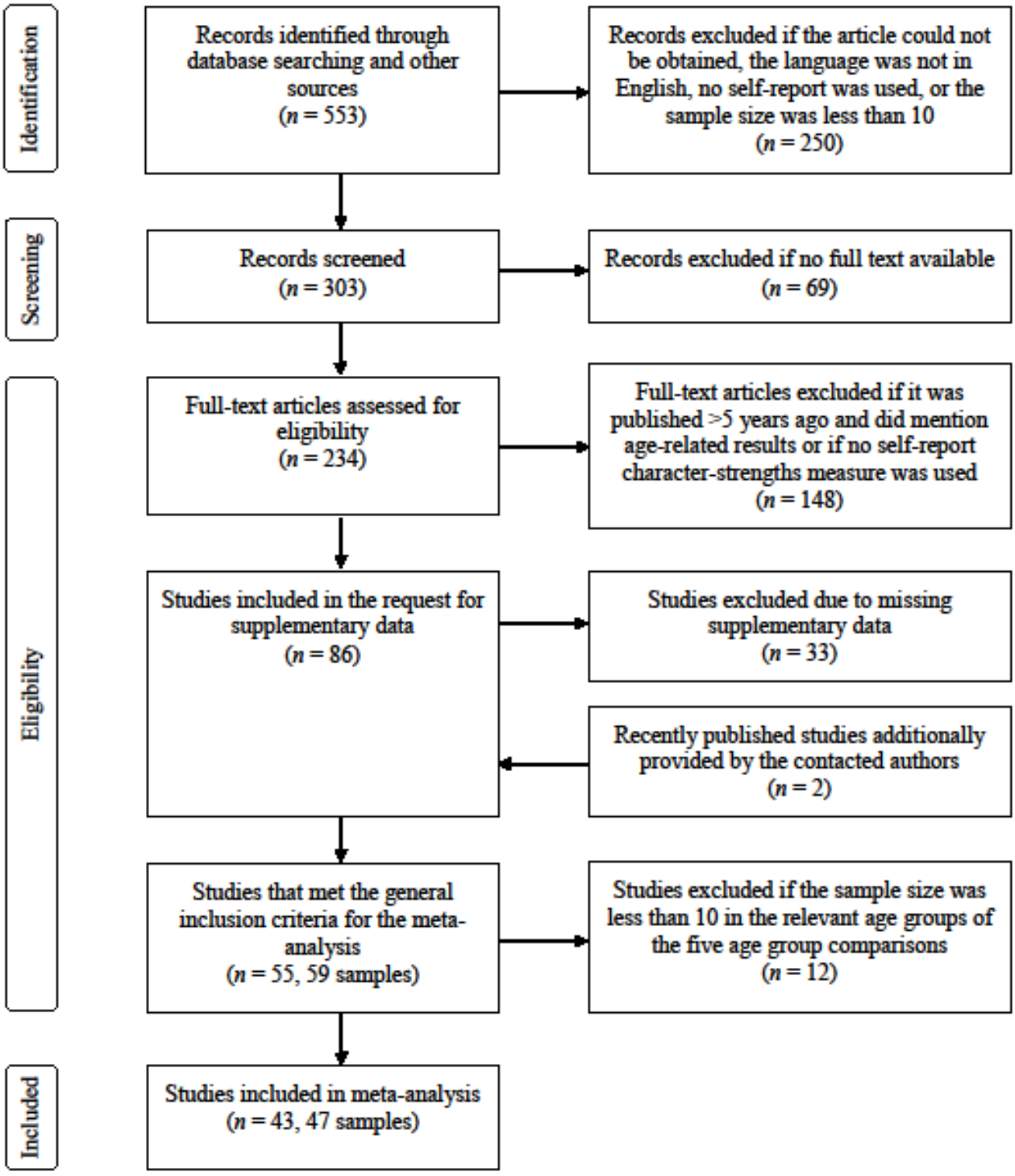
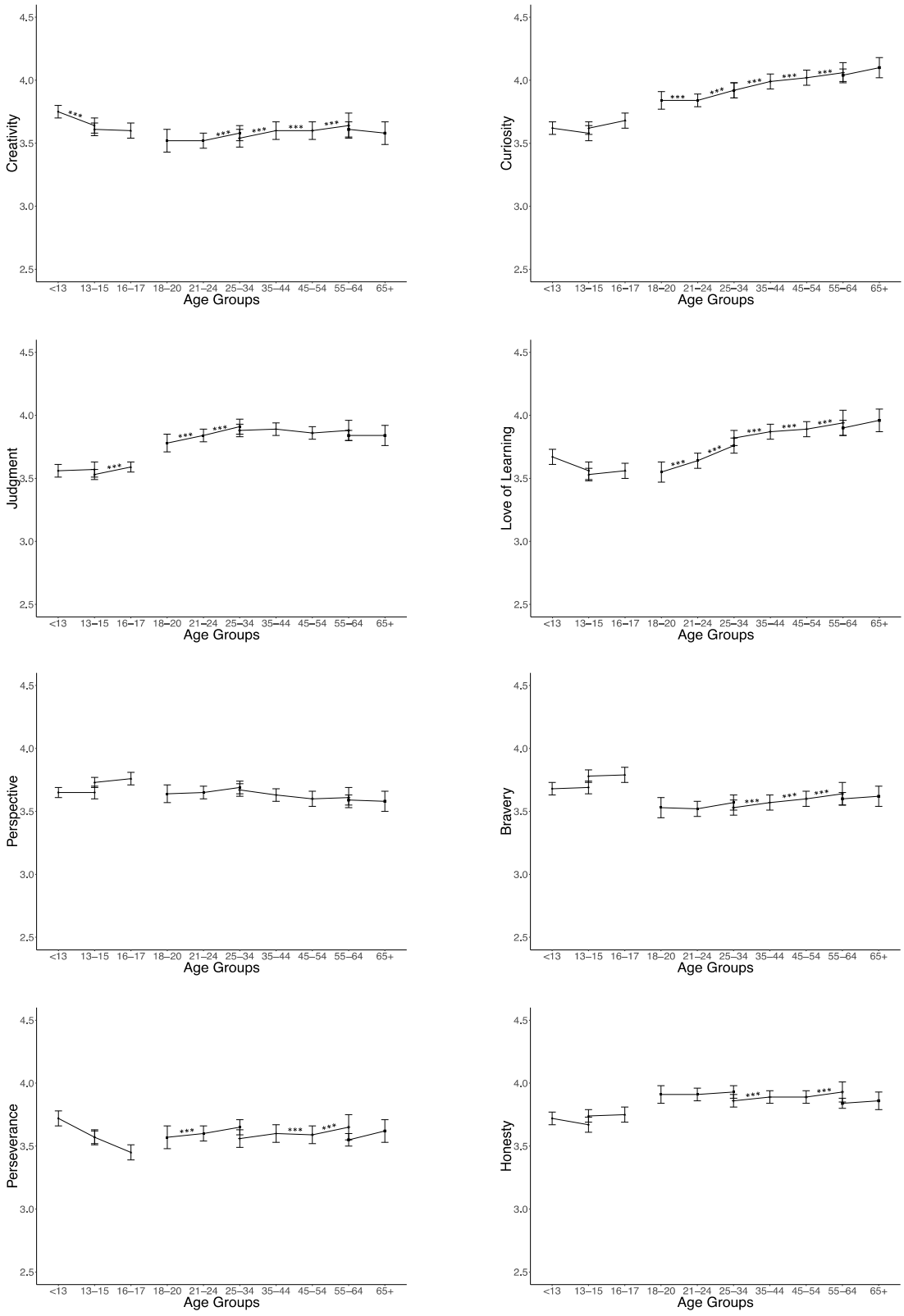
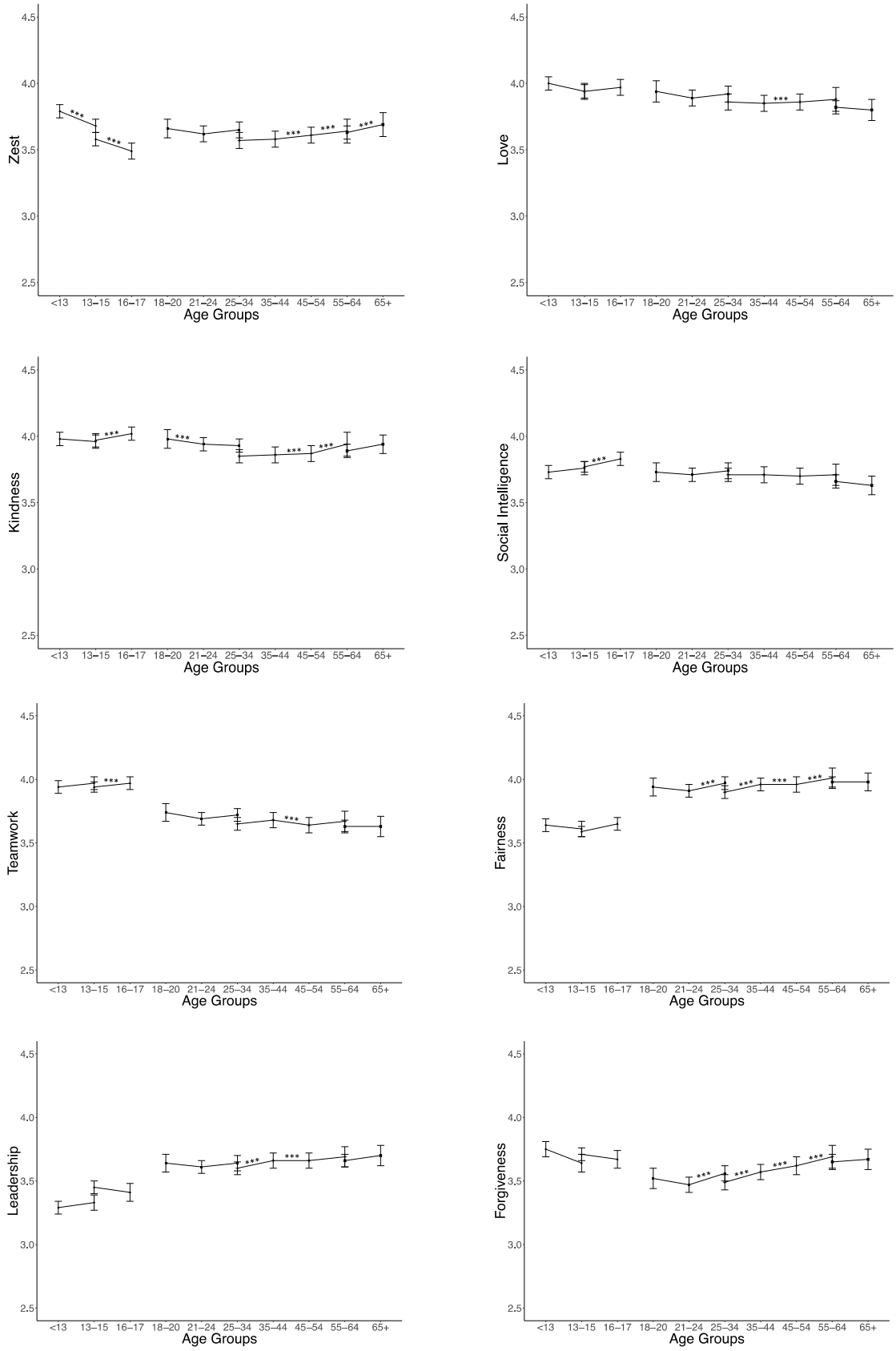


Figure 1. Flow chart of the search process leading to the studies included in the meta-analyses (template adapted from Moher et al., 2009).



(Figure 2 is continued)



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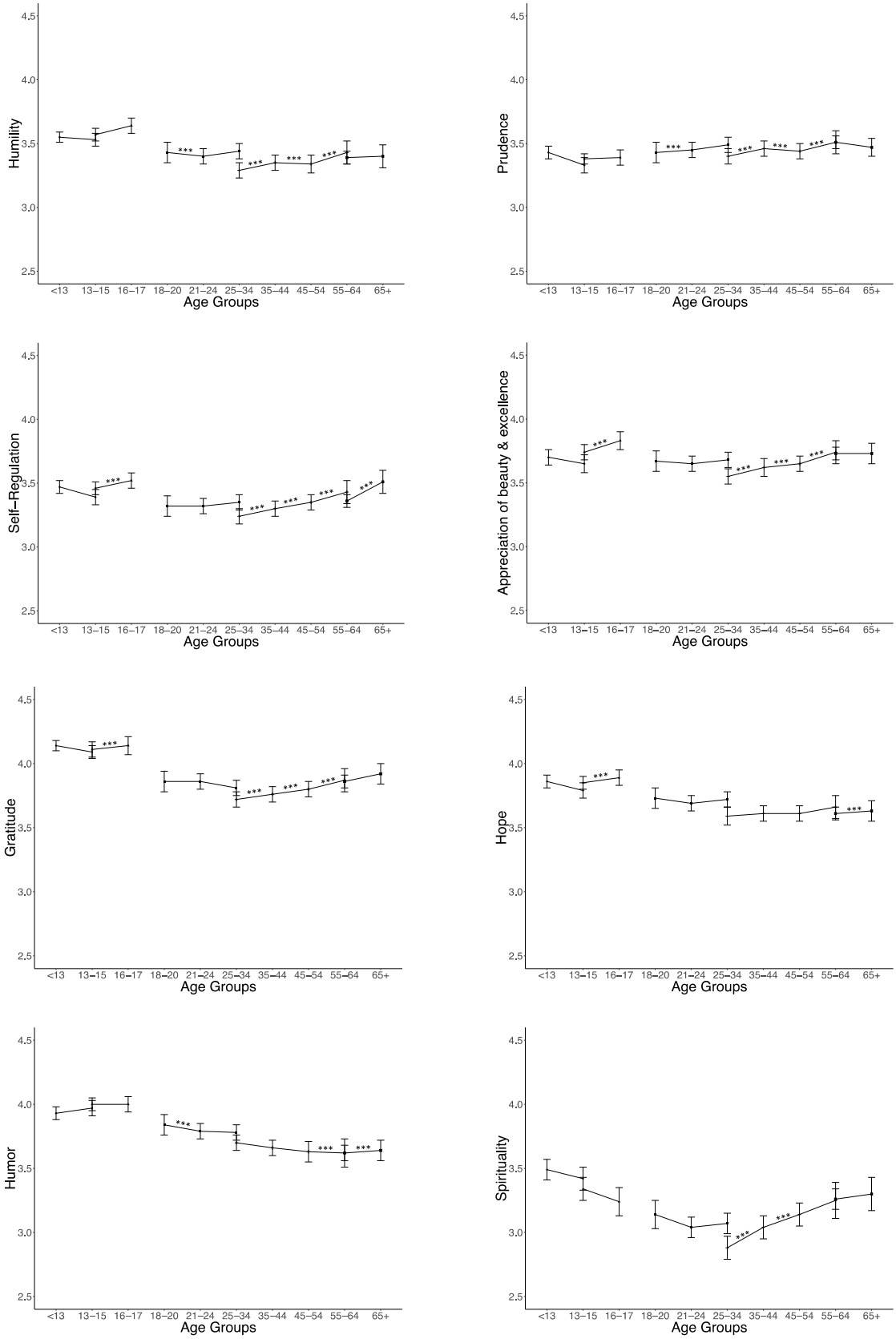

Figure 2. Visualizations of the age differences in the 24 character strengths across the lifespan. Error bars denote standard errors. *** $p < .001$.