



Positive emotion expression at age 11 is associated with multiple well-being outcomes 39 years later

John K. Coffey^{1,2} · S. Katherine Nelson-Coffey^{1,2} · Hannah Parsley¹ · Michael Pluess³

Accepted: 11 May 2022

© The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2022

Abstract

In this study, we investigated the association between positive emotion expression in children's writing at age 11, as indicated by objective raters, and age 50 self-reported well-being outcomes—positive emotions, optimism, life satisfaction, meaning in life, social well-being, and physical health. Using a representative sample ($N=436$) from the United Kingdom who participated in the National Child Development Study (NCDS), we found that positive emotion expression at age 11 was related to greater optimism, life satisfaction, meaning in life, and social well-being, but not positive emotions or physical health, at age 50 after controlling for socioeconomic status (SES) in adulthood. The associations between positive emotion expression in childhood and well-being in adulthood remained significant when accounting for age 11 academic ability and SES. By using an observational measure of positive emotion during childhood and accounting for relationships among well-being outcomes in adulthood, our findings offer important insights regarding the long-term correlates of children's positive emotions.

Keywords Positive emotion expression · NCDS · Well-being · Happiness · Lifespan development

Introduction

Parents want their children to live long, happy, and healthy lives (Diener & Lucas, 2004), yet research linking children's emotional experiences to later well-being is limited. Thus, children's positive emotional experiences might be overlooked during educational or child welfare policy development. In one study, nuns in their early twenties who

expressed more positive emotions in their written autobiographies lived longer (Danner et al., 2001), but this study did not consider other well-being outcomes or whether the benefits of positive emotions begin in childhood. In this investigation, we explore the links between written positive emotion expression, indicated by the use of positive emotion words in an essay, in childhood (age 11)—independent of academic ability and socio-economic status (SES)—for multiple well-being outcomes at age 50.

Positive Emotion and Well-Being

Positive emotions are associated with better social, emotional, and physical health (Coffey et al., 2015; Fredrickson, 2013; Lyubomirsky et al., 2005). Nuns who expressed positive emotions in their written autobiographies and college students who expressed positive emotions in their yearbook photographs were happier, healthier, and more satisfied in their relationships decades later (Danner et al., 2001; Harker & Keltner, 2001). A meta-analysis of this literature suggests that positive emotions precede beneficial outcomes across domains (Lyubomirsky et al., 2005); however, few studies consider the long-term associations between positive emotions in childhood and multiple areas of adult well-being in middle age.

John K. Coffey and S. Katherine Nelson-Coffey contributed equally to the preparation of this manuscript.

The analyses in this work are based on analysis of data from the National Child Development Study (NCDS). The data were deposited at the UK Data Archive by the Centre for Longitudinal Studies at the Institute of Education, University of London. NCDS is funded by the Economic and Social Research Council (ESRC).

✉ John K. Coffey
jkcoffey@asu.edu

¹ Psychology Department, Sewanee: The University of the South, 735 University Ave, Sewanee, TN 37383, USA

² School of Social and Behavioral Sciences, Arizona State University, Glendale, AZ, USA

³ Department of Biological and Experimental Psychology, Queen Mary University of London, London, UK

We hypothesized that written positive emotion expression in childhood would be associated with adult well-being outcomes for several reasons. “Thin slices” of expressive behavior are reliable indicators of personality, emotion, and interpersonal skills (Ambady & Rosenthal, 1992), including in children (Oveis et al., 2009; Tackett et al., 2016). In addition, patterns of language, such as use of positive emotion words in an essay, carry psychological significance regarding how an individual perceives and responds to the world around them (Pennebaker et al., 2003). As a result, written positive emotion expression has been linked to mental and physical health in adults (Danner et al., 2001; King, 2001; Pennebaker et al., 2003).

Written expression of positive emotion likely reflects the experience of frequent positive emotions, as well as stable individual differences in positivity, both of which are hypothesized to be associated with long-term well-being (Bartels, 2015; Fredrickson, 2013; Okbay et al., 2016; Weiss et al., 2008). Experiencing frequent positive emotions may contribute to long-term well-being in part because positive emotions enable people to broaden their perspectives and build resources for future needs, thus generating upward spirals of well-being (Fredrickson, 2013). Indeed, children’s positive emotions are linked to better social skills, emotion regulation, mental health, and physical health throughout childhood (Abe & Izard, 1999; Coffey, 2018, 2019), which could contribute to long-term well-being. In addition, dispositional positivity among adolescents predicted subsequent experiences of frequent positive emotions (Caprara et al., 2017), and a meta-analysis revealed that genetic factors explain roughly 36% of variation in well-being (Bartels, 2015). If expressing positive emotions reflects stable underlying personality, we would predict associations with long-term well-being outcomes independent of other environmental factors (e.g., SES) because both measures may reflect a genetic predisposition for positivity. Accordingly, we anticipate that positive emotion expression, reflecting both the experience of frequent positive emotions and dispositional positivity, would be related to long-term well-being.

Innovations in Measurement

Positive emotion has been measured in several ways, including self-reported experiences and observational measures of emotions via expression (e.g., written expressions of emotion). Patterns of emotion expression in language can provide an observational indicator of emotion expression, thus minimizing limitations of self-report (Pennebaker et al., 2003). Observational indicators of emotion are an especially valuable tool for emotion measurement in children, who may have limited emotion understanding and ability to directly self-report their emotions (Abe & Izard, 1999; Coffey, 2018). In light of evidence that observers’ ratings

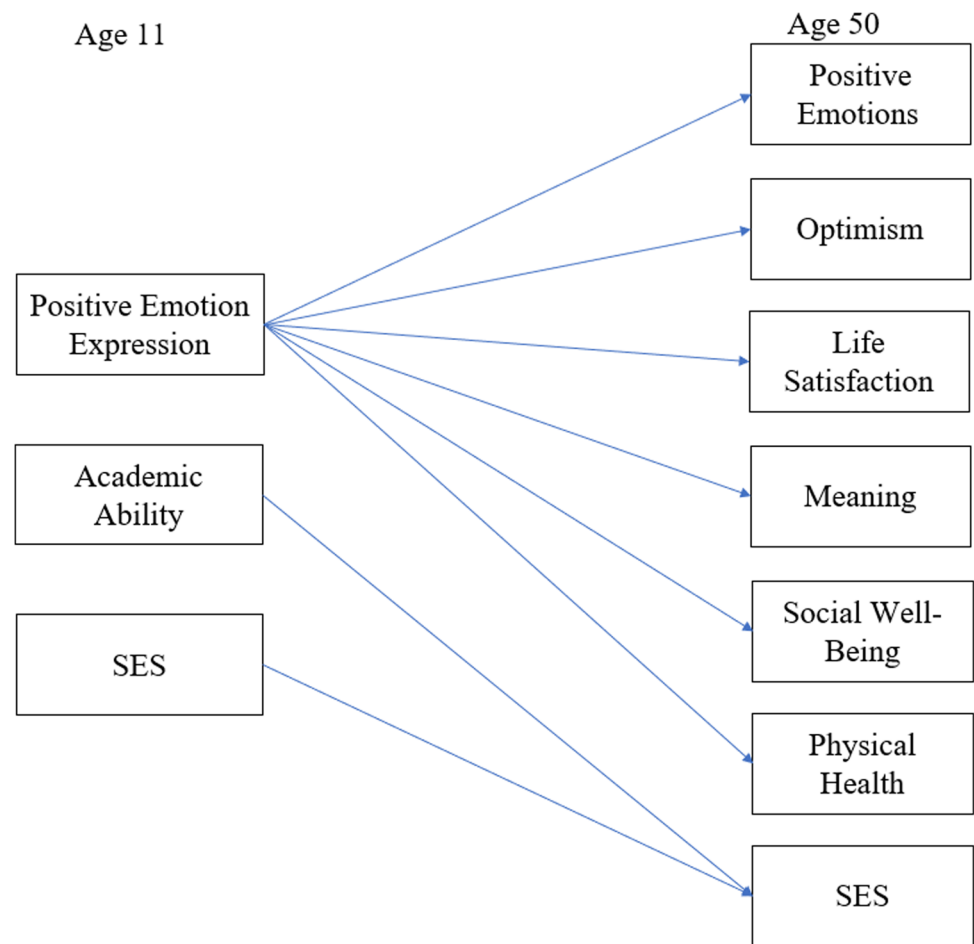
of expressed emotions were relatively more closely associated with individuals’ felt emotions (rather than emotions calculated via algorithm using LIWC; Sun et al., 2019), we trained independent coders to rate each essay for positive emotion expression. Using similar observational indicators of emotion expression, positive emotion expression among young adults was associated with long-term benefits for social relationships, well-being, and physical health (Danner et al., 2001; Harker & Keltner, 2001).

Consistent with other studies using similar approaches (Danner et al., 2001; Pennebaker et al., 2003), we use the term positive emotion expression in the current study to refer to the use of positive emotion words in children’s essays about their future lives as young adults. We use the term positive emotion expression rather than optimism for several reasons. Although children’s essays were future-oriented, which could convey optimism, optimism represents an individual difference characteristic in which people generally expect good things to happen to them (Scheier et al., 2001). Thus, optimism reflects a broader characteristic comprising evaluative judgments about one’s life, which correlates with positive emotion (King, 2001). For example, in describing their future life, an optimist might suggest that they are happy and have a good job. In the current study, we focus on positive emotion expression to better understand the precise role of positive emotion rather than the broader characteristic of optimism.

Well-Being in Adulthood

Psychological scientists have discovered several constructs that are related to living a fulfilling life—including positive emotions (Fredrickson, 2013), optimism (Scheier et al., 2001), life satisfaction (Diener, 2000), meaning in life (Steger et al., 2006), social well-being (Keyes, 2002), and physical health (Pressman & Cohen, 2005). These well-being constructs are moderately to highly correlated with one another, suggesting that these constructs could be combined to indicate global well-being (Coffey et al., 2016; Kashdan et al., 2008). Other research, however, suggests that these constructs have unique antecedents and consequences (Baumeister et al., 2013; VanderWeele, 2017), demonstrating the importance of considering them separately. However, studies investigating individual outcomes in separate models may overlook the possibility that well-being constructs may be confounded by other aspects of well-being or the environment. For example, studies demonstrating that positive emotion is related to improvements in life satisfaction could also be capturing variation in meaning in life or optimism.

Similar issues exist in studies including multidimensional measures of well-being, which often incorporate multiple components of well-being into a single construct. For example, the Warwick-Edinburgh Mental Well-Being Scale (Tennant et al., 2007) consists of a broad range of items including,

Fig. 1 Conceptual Model

for example, optimism (“I’ve been feeling optimistic about the future”), positive emotions (“I’ve been feeling cheerful”), and connectedness (“I’ve been feeling close to other people”). Including such scales in studies evaluating the factors that promote well-being provides a holistic perspective of well-being; however, the use of this and similar scales limits precision in understanding the factors that promote specific aspects of well-being. Thus, research investigating the unique associations of positive emotion expression with distinct well-being constructs in a single study is needed to account for the interrelationships across these well-being constructs.

Current Study

Evidence supports the possibility that positive emotion expression in childhood could be linked to well-being in middle age, yet few studies have evaluated this hypothesis. We aim to fill these gaps in the literature by considering whether positive emotion expression in children’s essays about what their lives will be like as adults is associated with multiple well-being outcomes—positive emotions, optimism, life satisfaction, meaning in life, social well-being, and physical health—39 years later.

We hypothesize that rater-coded positive emotion expression in childhood will be related to each well-being outcome in adulthood. Furthermore, given the known connections between children’s academic ability, SES, and adult well-being (e.g., Jewell & Kambhampati, 2015; Wood et al., 2021) and their possible connections to essay content, we sought to establish the associations between positive emotion expression and well-being when including SES and academic ability in our models (see Fig. 1 for our conceptual model). We also consider whether the associations between positive emotion expression and adult well-being changes after accounting for the connections among academic ability, SES, and positive emotion expression in childhood.

Method

Participants

Participants were a subsample ($n = 495$) of the 17,638 children and their families from the ongoing National Child Development Study (NCDS; Brown et al., 2012).

All children in the NCDS were born in one week in March 1958 in Great Britain and have been followed throughout their lives, including 10 surveys through 2013–2014 when participants were 55 years old. The present study included participants who completed Wave 3 (age 11) and Wave 9 (age 50). In Wave 3, participants ($n = 14,100$) wrote an essay about what they imagined their life would be like at age 25. Of these essays, a stratified subset of 495 were transcribed (for more details, see Brown et al., 2012; Elliott & Morrow, 2007). The subsample was stratified by 1) participant sex, 2) social class and family background, and 3) general academic ability. A disproportional sampling method (sampling fractions ranging from .03 to .19) was used to minimize gender and socioeconomic differences in general ability scores. Thus, general ability scores did not differ by sex or by father's occupation (manual vs. non-manual) in the stratified sample (Elliott & Morrow, 2007), although they do significantly differ in the full sample. Data (and other information like consent) are available online with permission from the Institute of Education (Brown et al., 2012). This archival study was approved by the Institutional Review Board of Sewanee: The University of the South.

In this study, we coded positive emotion expression in the transcribed essays to correlate with age 50 (Wave 9) well-being outcomes. Of the 495 essays, we excluded essays with fewer than 50 discernable words ($n = 31$) and those that could not be coded due to lack of clarity ($n = 29$). Our final sample consisted of 436 participants. Participants were age 11 (46.8% female) with an average mother's age of 38.94 ($SD = 5.76$) and father's age of 42.23 ($SD = 6.65$) at the time of assessment. Excluded essay participants were not significantly different from the included essays based on the social class of the father, $t(493) = 0.495$, $p = .621$ or the family background variable used for the stratified subsample selection, $t(493) = -0.24$, $p = .81$. Excluded essay participants were more likely to be girls, $t(493) = 3.051$, $p = .002$, lower academic ability, $t(493) = 5.508$, $p < .001$, and lower SES, $t(493) = 3.19$, $p = .002$, than included participants.

These 436 participants did not differ from the full NCDS sample in age 11 academic ability, SES, or age 50 positive emotions, optimism, life satisfaction, meaning, social well-being, or general health ($ps > .08$). Age 50 SES was slightly higher for the full NCDS sample, $t(9726) = -4.59$, $p < .001$. Of the 436 participants with useable essay content, 336 responded to the age 50 questionnaire. Participants who did not complete the age 50 survey did not differ on sex, social class, or academic ability at age 11, $ps > .12$; however, participants who dropped out of the study had greater positive emotion content in their essays than those who continued participating, $t(434) = 2.279$, $p = .024$. All available data were included in analyses using structural equation modeling ($n = 436$).

Positive Emotion Expression

In this study, we used the transcribed essays that children wrote at age 11 in response to the prompt "Imagine you are now 25 years old. Write about the life you are leading, your interests, your home life and your work at the age of 25." Children were given 30 minutes to complete the essays (Elliott & Morrow, 2007). These instructions were not designed to influence the emotional content or general focus of children's essays.

We coded the essays for positive emotion expression by counting the number of positive emotion words or phrases used in each essay (adapted from Danner et al., 2001). Coders first identified and counted all emotion-related words or phrases in an essay that described an experienced emotion (e.g., happy, grateful) or behaviors subsequent to emotions (e.g., smiling). Coders did not code causes of emotions (e.g., getting married) or attempts to control emotional expression. Similarly, they did not code words with positive connotations (e.g., good) if they did not directly describe an emotional experience (e.g., feeling good). Coders were given examples of words related to positive emotions (e.g., amused, happy, grateful, love). Four coders were trained to reliability on a practice sample of essays ($N = 17$) collected from an independent group of children who responded to the same essay prompt. Intraclass correlations for the four coders were all above .85 on these practice essays.

Each of the transcribed essays from the subsample was scored by two of the four coders. Reliability was high between coders with intraclass correlations ranged from .81 to .95 ($ps < .001$). The number of positive emotion words or phrases were averaged across the two coders for each essay and divided by the total word count to reflect a total positive emotion expression proportion score for each participant.

Adult Well-Being Measures

Scale Development The Wave 9 NCDS data collection was the first to include items measuring positive aspects of well-being, such as life satisfaction, optimism, and meaning in life; however, the majority of scales included were broad and multidimensional (e.g., Malaise Inventory, Warwick-Edinburgh Mental Well-Being Scale; see Brown et al., 2012 for a full list of measured items). When possible, we used established measures of specific well-being constructs (i.e., physical health) included in the dataset. To overcome the limitations of multidimensional composites, for other variables at age 50 (positive emotions, optimism, life satisfaction, and social well-being), we constructed new scales from available items in the dataset based on definitions of each construct and by comparing available items with validated, widely-used measures of those well-being constructs (see Coffey et al., 2015, 2016 for a similar approach).

Table 1 Bivariate correlations, means, and standard deviations

	AcadA	SES	Sex	PosEE	SocWB	MIL	Opt	LSat	PosEm	Health	SES
Age 11											
AcadA											
SES	.28***										
Sex	−.02	.09*									
PosEE	.01	−.04	−.04								
Age 50											
SocWB	.06	.13*	−.22***	.09 ⁺		.45***	.54***	.54***	.50***	.26***	.18***
MIL	.11 ⁺	.07	.00	.09 ⁺	.46***		.64***	.78***	.49***	.29***	.20***
Opt	.11 ⁺	.14*	−.05	.07	.58***	.67***		.81***	.69***	.46***	.27***
LSat	.02	.09	−.04	.05	.58***	.66***	.80***		.71***	.43***	.24***
PosEm	.09	.15**	.12*	−.03	.53***	.55***	.70***	.73***		.43***	.16***
Health	.16**	.18**	−.07	.04	.39***	.35***	.51***	.51***	.49***		.25***
SES	.29***	.38***	.01	−.07	.22***	.23***	.28***	.23***	.21***	.27***	
Mean	2.90	14.09	0.47	1.62	0.00	3.53	0.01	0.03	−0.07	67.32	10.04
SD	0.67	2.66	0.50	1.53	0.69	0.70	0.77	0.80	0.77	22.14	1.82

AcadA Academic ability, *SES* Socio-economic status, *PosEE* Essay positive emotion expression, *SocWB* Social well-being, *MIL* Meaning in life, *Opt* Optimism, *LSat* Life Satisfaction, *PosEmo* Positive emotions, *Health* Physical Health. Age 50 social well-being, optimism, life satisfaction, and positive emotions means all used standardized items for composites. Subsample used for the study ($n=436$) is below the diagonal and full age 50 NCDS sample above the diagonal (n s ranged from 8696 to 8750). ⁺ $p < .10$, * $p < .05$, ** $p < .01$, *** $p \leq .001$

We began by identifying theoretically relevant items from Wave 9 (age 50). Next, we categorized items by construct based on existing literature and scales measuring positive emotions (Watson et al., 1988), optimism (Scheier et al., 1994), life satisfaction (Diener et al., 1985), meaning (Steger et al., 2006), and social well-being (Keyes, 2002; Sheldon & Hilpert, 2012). We calculated averages for each well-being outcome after standardizing individual items and reverse-scoring as needed so that high scores reflect higher levels of well-being outcomes. Finally, we examined correlations among all well-being constructs. Scale items, factor loadings, and reliability scores for each construct are available in Table S1 in the online Supplemental Material.

To examine validity of the developed age 50 well-being constructs, we conducted a separate validation study ($N=420$, $M_{\text{age}}=46.35$, $SD=6.09$, 55% Women, 83% White), including our constructed well-being scales along with widely used, validated well-being measures. Our constructed scales were highly correlated with corresponding measures of optimism ($r=.82$; Life Orientation Test-Revised; Scheier et al., 1994), life satisfaction ($r=.85$; Satisfaction With Life Scale; Diener et al., 1985), social well-being ($r=.78$; connectedness subscale of the Balanced Measure of Psychological Needs; Sheldon & Hilpert, 2012), positive emotions ($r=.85$, Affect Adjective Scale, Diener & Emmons, 1984), and meaning ($r=.82$, presence of meaning subscale of the Meaning in Life Questionnaire; Steger et al., 2006). See the Supplemental Material for a complete correlation table.

We also examined correlations among our constructed scales and other measures in the entire age 50 NCDS sample

(not just participants who completed essays at age 11). Replicating prior research (Coffey et al., 2016), the well-being constructs were moderately to highly correlated with one another (r s .19 to .81; see Table 1). Given the strength of these correlations, these well-being constructs should be considered within the same statistical model to account for the associations among constructs. We also considered the associations between these well-being constructs and other age 50 variables for evidence of convergent and divergent validity. The correlations with the intellect/imagination factor from the International Personality Item Pool (Goldberg, 1999) ranged from .09 (physical health) to .32 (social well-being). Correlations between well-being constructs and malaise ranged from $-.59$ (positive emotions) to $-.22$ (social well-being) and correlations with overall job involvement ranged from $-.03$ (social well-being) to .05 (optimism).

Positive Emotions Positive emotions were measured using 7 items focused on high (e.g., “I’ve been feeling cheerful”) and low (e.g., “I am relaxed most of the time”) arousal feelings found in other emotion scales (Watson et al., 1988). Response options varied (e.g., 5-point scale from “None of the time” to “All of the time”); thus, each item was standardized prior to averaging all times to form a composite. Factor analyses (FA) loadings ranged from .60 to .86. Cronbach’s alpha was .88.

Optimism Optimism was measured using 5 items indicating positive, future-oriented thinking (e.g., “I’ve been feeling

optimistic about the future,” “I feel that the future looks good for me”) comparable to those (e.g., “I’m always optimistic about the future”) on validated measures of optimism, such as the Life Orientation Test-Revised (LOT-R; Scheier et al., 1994). Response options varied (e.g., 5-point scale from “None of the time” to “All of the time”). Items were standardized prior to averaging to form a composite. FA loadings ranged from .69 to .88. Cronbach’s alpha was .83.

Life Satisfaction Life satisfaction was measured with 4 items (e.g., “How satisfied PARTICIPANT is with the way life has turned out so far”) that provide an individual’s cognitive assessment of their life. These items are similar to other life satisfaction measures (“I am satisfied with my life”) from the Satisfaction with Life Scale (SWLS; Diener et al., 1985). Response options varied (e.g., 5-point scale from “None of the time” to “All of the time”). Items were standardized prior to averaging to form a composite. FA loadings ranged from .72 to .81. Cronbach’s alpha was .83.

Meaning Meaning in life was measured with a single item (i.e., “I feel that my life has meaning”). This item is similar to statements (e.g., “I have a good sense of what makes my life meaningful”) from the Meaning in Life Questionnaire (Steger et al., 2006), and past research supports the use of single-item measures of meaning in life (Zika & Chamberlain, 1992). Responses were given on a 4-point scale ranging from 1 (*Often*) to 4 (*Never*). Responses to this item were reversed prior to analysis so that higher scores would indicate higher levels of meaning in life.

Social Well-Being Social well-being was measured using 6 items reflecting connection to others (e.g., “I’ve been feeling close to other people” and “I am interested in people”) and support from others (e.g., “Participant has people around to listen to problems and feelings”). These items are comparable to statements (e.g., “People in my life care about me”) from social well-being scales, such as the Relatedness Subscale of the Balanced Measure of Psychological Needs (Sheldon & Hilpert, 2012). Response options varied (e.g., 5-point scale from “Not at all” to “A great deal”). Items were standardized prior to averaging to form a composite. FA loadings ranged from .43 to .77. Cronbach’s alpha was .70.

Physical Health Physical health was measured using the 5-item physical health subscale of the SF-36 (Ware et al., 1993). Questions included items such as “My health is excellent” with responses ranging from “Definitely true” to “Definitely false.” Two items were reversed so all higher scores indicated better health. Scores were calculated by summing responses and dividing by number of responses given for all participants completing at least one item. Scores were

multiplied (adjusted by number of questions answered) so that they ranged from 0 to 100. Cronbach’s alpha was .79.

Covariates

Covariates included SES in childhood, child academic ability, and SES in adulthood. All items are included in Table S2 in the online Supplementary Material.

Age 11 Family SES Measures of SES typically include a combination of at least two of the following: parental education, parental employment status, parental occupation prestige, household income, and eligibility for subsidy (Ensminger & Fotherill, 2003). Furthermore, evidence suggests that housing accommodations is an additionally valuable indicator of SES in the United Kingdom (Dalstra et al., 2006). Accordingly, a measure of SES using 6 parent-reported items was used, including several indicators of SES, such as social class of the father, if the child received free lunches, and type of house to approximate socio-economic standing. Items were recoded and summed creating range from low to high. Cronbach’s alpha was .63.

Age 11 Academic Ability Consistent with prior studies from these data (e.g., Maggs et al., 2008; Richardson et al., 1976), an overall academic ability measure using 4 teacher-reported items was used. Items focus on the child’s general knowledge, number work, book use, and oral ability on a scale from 1 (*excellent*) to 5 (*very limited*). Items were reverse coded and averaged so that higher scores indicated higher academic ability ratings. Cronbach’s alpha was .90.

Age 50 SES A measure of material environment using 4 items was used to approximate SES, including self-reported social class, employment, tenure in current accommodation, and type of accommodation, following recommended approaches to measuring SES (Dalstra et al., 2006; Ensminger & Fotherill, 2003). Cronbach’s alpha was .48.

Analytic Plan

We tested our hypotheses using Structural Equation Modeling (SEM) path analyses in MPlus 8.0. SEM allows for precise testing of theorized and exploratory pathways in multivariate models. This approach allows for a more accurate modeling and exploration of alternate models. We used established standards (i.e., *CFI*, *TLI*, *RMSEA*, and χ^2) to evaluate model fit (Byrne, 2012). Our sample size is sufficiently large for longitudinal modeling (Byrne, 2012). Covariance coverage was high for all variables, ranging from .768 to 1.000. We used maximum likelihood estimation with robust standard errors (MLR) as a conservative method to reduce any negative impact of

non-normality. Full information maximum likelihood (FIML) was used to model missing data (Graham, 2009), and all 436 participants with usable essays were included in analyses.

We began with a measurement model (see Table 1), which examines associations among all study variables, and then tested structural models to consider the longitudinal associations between age 11 positive emotion expression, other age 11 factors, and all adult well-being outcomes simultaneously (Muthén & Muthén, 2017). This multivariate approach minimizes the possibility of Type 1 error. Following recommended model-building procedures (Byrne, 2012), we began with a model predicting the association between positive emotion expression and all age 50 outcomes (Model 1). In Model 2, we tested our hypothesis that age 11 positive emotion expression would be associated with adult well-being after including age 11 SES and academic ability. Thus, Model 2 included all predicted pathways (see Fig. 1 for our conceptual model) along with age 11 and age 50 covariates. In all models, age 50 outcomes were allowed to covary. Thus, our models tested whether age 11 positive emotion expression is related to unique aspects of well-being at age 50 after accounting for the overlap among related constructs. Following recommended model-building procedures (Byrne, 2012), we dropped non-significant paths with $ps > .50$.

We performed a series of checks to determine whether our final model provided the best fit to the data. Throughout, we considered SEM model fit indices, which indicate how well the estimated model matches the variances, covariances, and means of the observed data. These fit indices can be used to explore whether adding (when theoretically appropriate) or removing paths improve model fit, thus allowing for selection of the best model (Byrne, 2012; West et al., 2012). Additionally, we tested a model with paths from age 11 academic ability and SES to age 50 well-being outcomes, which were not included in the initial models to avoid oversaturation. Finally, we tested an alternate model including covariation among age 11 SES, academic ability, and positive emotion expression to consider the possibility that the relationship between positive emotion expression in childhood and adult well-being was reflective of children's sociodemographic characteristics and cognitive abilities.

Results

Preliminary Analyses

Means, standard deviations, and bivariate correlations for the study sample are in Table 1. Correlations among the age 50 well-being measures ($rs = .35$ to $.80$) were comparable to those of the full sample. Girls had relatively lower SES at age 11 ($r = .09$ [.002, .186], $p = .044$), and women reported

fewer positive emotions at age 50 ($r = .12$ [.019, .225], $p = .020$), but higher social well-being at age 50 ($r = -.22$ [-.324, -.135], $p < .001$). Given the long-term nature of this study with 39 years between measurements, not surprisingly, the bivariate correlations between age 11 positive emotion expression and age 50 variables were relatively weak but in the expected direction (see Table 1). Notably, SEM provides greater precision for detecting small effects (Byrne, 2012), and our planned analytic approach could reveal significant associations between positive emotion expression and adult well-being after accounting for covariates and the intercorrelations among age 50 well-being outcomes (Martinez Gutierrez & Cribbie, 2021).

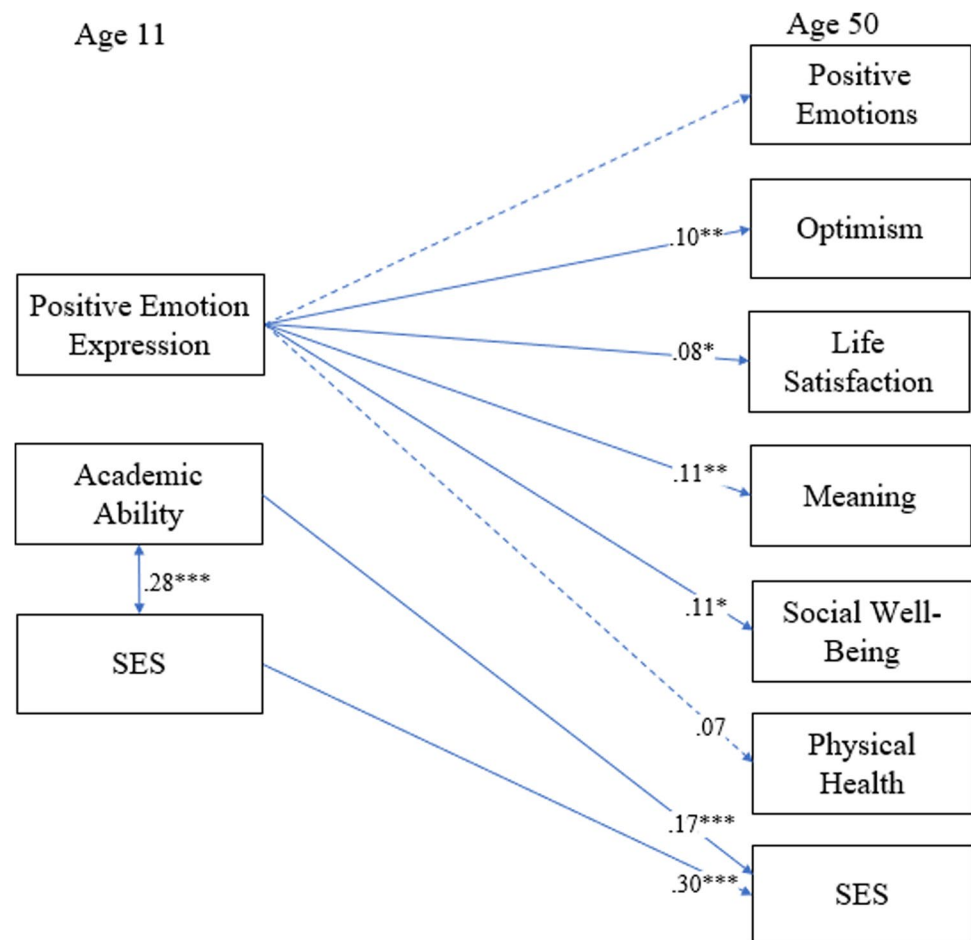
Prediction Models

We tested our hypotheses in two prediction models. In Model 1, we examined the associations among age 11 positive emotion expression and all age 50 well-being variables. All age 50 variables were allowed to covary. In this model, paths from age 11 positive emotion expression to all age 50 well-being outcomes were included. Notably, model fit was good ($n = 436$; $CFI = 1.00$, $TLI = 1.00$, $RMSEA = .00$ [90% $CI = .00$ to .13], $\chi^2[1] = .925$, $p = .336$). No modifications to improve model fit were suggested by Mplus. All standardized paths from age 11 positive emotion expression ranged from .07 to .11 ($ps < .178$), except for the path to age 50 positive emotions ($\beta = -.004$, $p = .937$). Given our planned analytic approach, we dropped this path and excluded it from all subsequent models. Model fit improved ($CFI = 1.00$, $TLI = 1.00$, $RMSEA = .00$ [90% $CI = .00$ to .08], $\chi^2[2] = 1.12$, $p = .572$). In this model, all modeled paths were significant except for the path from positive emotion expression to age 50 physical health ($\beta = .07$, $p = .145$). Based on our planned analytic approach and to be conservative, we retained the path from positive emotion expression to health because the standardized estimate was comparable to other age 50 outcomes.

Next, we tested Model 2 (see Fig. 2), which incorporates age 11 SES and academic ability. Again, all age 50 variables were allowed to covary. Age 11 academic ability and SES were correlated, and paths were modeled from age 11 academic ability and SES¹ to age 50 SES. Model fit was good, $CFI = .99$, $TLI = .96$, $RMSEA = .05$ (90% $CI = .02$ to .07), $\chi^2(16) = 31.48$, $p = .012$. No modifications to improve fit were suggested by Mplus. In Model 2, age 11 positive emotion expression was related to greater optimism, $\beta = .10$ (95% $CI: .028, .171$), $p = .007$, life satisfaction, $\beta = .08$ (95% $CI:$

¹ Although sex was associated with age 11 SES and age 50 positive emotions, it was not associated with positive emotion expression. All paths remained significant ($ps < .05$) without sex in the model and including sex did not significantly improve model fit. Thus, we excluded sex from all subsequent models.

Fig. 2 Test of Conceptual Model (Model 2). *Note.* We dropped the predicted path from positive emotion expression to age 50 positive emotions ($p < .90$) from the conceptual model. All age 50 variables were set to covary (between .16 and .80, $ps < .05$). Model fit was good, $CFI = .99$, $TLI = .96$, $RMSEA = .05$ (90% $CI = .02$ to $.07$), $\chi^2(16) = 31.48$, $p = .012$. * $p < .05$, ** $p < .01$, *** $p \leq .001$



.006, .149), $p = .034$, meaning, $\beta = .11$ (95% $CI: .028, .190$), $p = .008$, and social well-being, $\beta = .11$ (95% $CI: .027, .190$), $p = .009$, but not physical health, $\beta = .07$ (95% $CI: -.027, .158$), $p = .167$ at age 50. Age 11 SES was associated with age 50 SES, $\beta = .30$ (95% $CI: .206, .398$), $p < .001$ and age 11 academic ability, $\beta = .28$ (95% $CI: .199, .366$), $p < .001$. Academic ability was related to age 50 SES, $\beta = .17$ (95% $CI: .072, .274$), $p = .001$. All outcome variables were correlated between .16 and .80 ($ps < .05$).

Robustness Checks

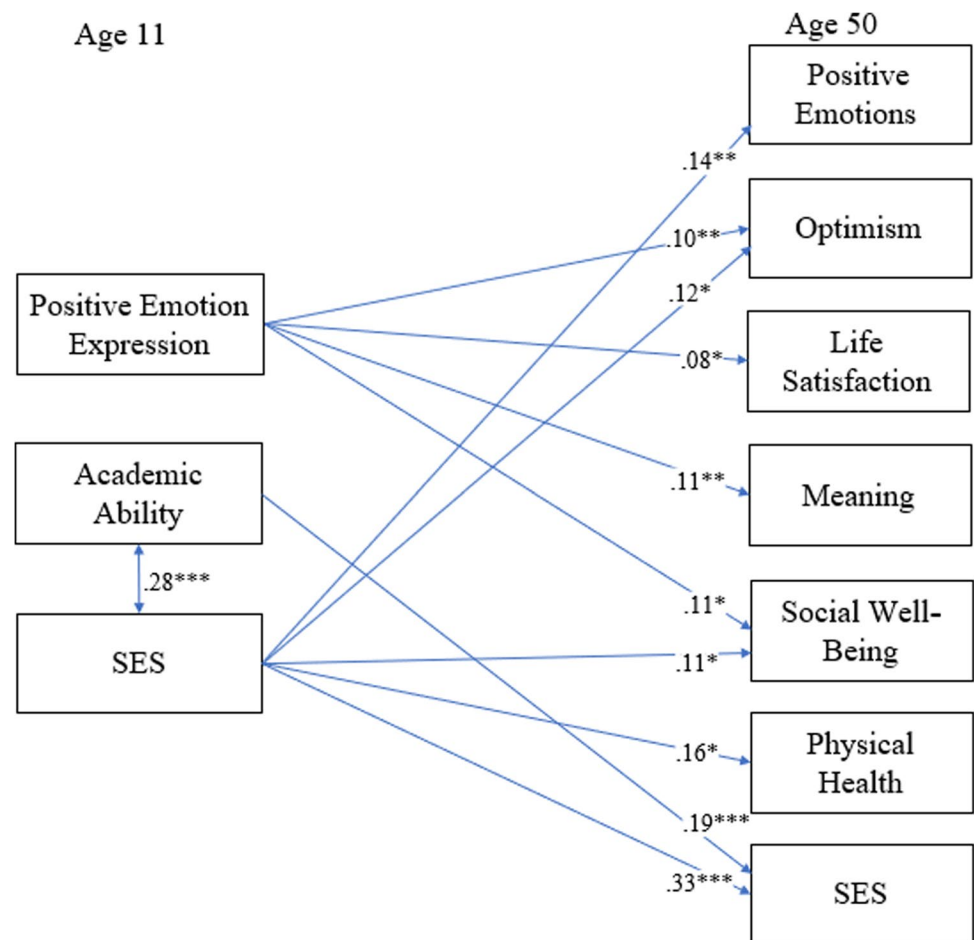
As an additional test of the robustness of the relationship between positive emotion expression and age 50 well-being, we added paths from age 11 academic ability and SES to every age 50 variable. In this model, paths from age 11 positive emotion expression to age 50 optimism, satisfaction with life, meaning, and social well-being all remained significant with comparable effect sizes, $\beta s > .07$, $ps < .05$. Age 11 academic ability was not related to any adult well-being outcome. The paths from age 11 SES to age 50 optimism, $\beta = .12$ (95% $CI: .015, .232$), $p = .025$, social well-being, $\beta = .13$ (95% $CI: .018, .238$), $p = .022$, positive emotions,

$\beta = .14$ (95% $CI: .033, .237$), $p = .009$, and health, $\beta = .16$ (95% $CI: .038, .273$), $p = .009$, were significant. Model fit was good, $CFI = 1.00$, $TLI = 1.00$, $RMSEA = .00$ (90% $CI = .00$ to $.06$), $\chi^2(4) = 2.42$, $p = .659$. See Fig. 3.

Alternatively, age 11 positive emotion expression may reflect concurrent academic ability and SES, which may explain the associations among positive emotion expression and adult well-being outcomes. To test this possibility, prediction paths were added to the previous model from age 11 academic ability and SES to age 11 positive emotion expression. Neither academic ability ($p = .636$) or SES ($p = .371$) significantly correlated with age 11 positive emotion expression even though model fit remained good, $CFI = .99$, $TLI = .95$, $RMSEA = .04$ (90% $CI = .03$ to $.08$), $\chi^2(14) = 30.31$, $p = .007$. All other effects remained comparable with those of prior models. Thus, age 11 positive emotion expression appears to be independent of concurrent academic ability and SES and the alternate possibility—that positive emotion expression is merely a reflection of academic ability and SES—is not supported.

In summary, these results support our hypotheses that age 11 positive emotion expression is associated with age 50 optimism, life satisfaction, meaning, and social well-being

Fig. 3 Robustness Check Including Significant Standardized Effects. *Note.* In this model, we added prediction paths from age 11 SES and academic ability to all dependent variables. Only significant paths are shown. As in other models, we dropped the path from positive emotion expression to age 50 positive emotions ($p < .90$). All age 50 variables were set to covary (between .16 and .80, $ps < .05$). Model fit was good, $CFI = 1.00$, $TLI = 1.00$, $RMSEA = .00$ (90% $CI = .00$ to .06), $\chi^2(4) = 2.42$, $p = .659$. * $p < .05$, ** $p < .01$, *** $p \leq .001$



after accounting for age 50 SES and including age 11 academic ability and SES. Our hypotheses that age 11 positive emotion expression would be related to age 50 positive emotions and health were not supported.

Discussion

In this study, positive emotions expressed in writing at age 11 were linked to greater optimism, life satisfaction, meaning in life, and social well-being 39 years later, at age 50. These longitudinal findings are remarkable, given the decades-long nature of this study and that these associations remained significant even after accounting for age 11 academic ability, and SES in childhood and adulthood. Age 11 positive emotion expression was not related to academic ability or SES, and academic ability did not predict adult well-being. By relying on an innovative, observational measure of positive emotion during childhood and accounting for relationships among well-being outcomes in adulthood, our findings offer important insights regarding the long-term correlates of children's positive emotions.

The results presented here contribute to an emerging body of research considering the long-term benefits of positive

emotion in childhood (Coffey, 2019; Coffey et al., 2015; Jewell & Kambhampati, 2015). The findings of our study are among the first to demonstrate the unique connections between positive emotion in childhood to multiple indicators of well-being (optimism, life satisfaction, meaning in life, social well-being) nearly four decades later. These well-being constructs have unique antecedents and consequences (Baumeister et al., 2013), and people can report high levels of well-being in one domain yet low levels in other domains (Krämer & Rodgers, 2019). Our findings indicate that positive emotion expression in childhood correlates with these well-being outcomes simultaneously.

Our results also demonstrate that the connections between children's positive emotion expression and adult well-being were independent of childhood academic ability and SES in a diverse sample of participants from the UK. These findings are consistent with other research indicating childhood happiness is weakly associated with household factors, such as wealth (Coffey, 2019; Jewell & Kambhampati, 2015). Notably, however, evidence suggests that the association between SES and happiness in adults has strengthened in recent decades (Twenge & Cooper, *in press*). We found that SES was unrelated to positive emotion expression in childhood, yet

SES in childhood and adulthood was correlated with adult well-being outcomes. In other words, in our sample including diverse socioeconomic backgrounds, children's positive emotion expression was not reliant on their SES, even though SES was related to well-being later in life.

Notably, the associations between SES in childhood and adult well-being were comparable in size to the associations between positive emotion expression and adult well-being. Yet SES in childhood did not explain the associations between positive emotion expression and adult well-being, suggesting that both of these aspects of children's lives may be comparably related to adult well-being outcomes via different mechanisms. For example, positive emotion expression may relate to adult well-being via psychological mechanisms, such as emotion regulation capabilities or personality characteristics (e.g., Abe & Izard, 1999; Coffey, 2018; Fredrickson, 2013), whereas children's socioeconomic background may relate to adult well-being via life circumstances such as education or income (e.g., Diener et al., 2010), which tend to have a smaller association with long-term well-being (Sheldon & Lyubomirsky, 2021). Furthermore, the associations between children's positive emotion expression and adult well-being were not explained by SES in adulthood, nor were they explained by academic ability in childhood.

Children's positive emotion expression may be related to well-being in adulthood for several reasons. Experiencing frequent positive emotions during childhood shapes emotion regulation, social skills, and academic skills that benefit well-being as children grow (Abe & Izard, 1999; Coffey, 2018; Fredrickson, 2013). For example, in one study, adolescents who reported more positive emotion were more likely to use adaptive emotion regulation strategies, which predicted fewer depressive symptoms (Van Beveren et al., 2018). The development of these and other resources may provide lifelong benefits, thus generating upward spirals of well-being (Fredrickson, 2013). Alternatively, the results reported here may also reflect underlying personality characteristics, such as optimism or dispositional positivity. For example, the associations between positive emotion expression in childhood and adult well-being likely also reflect a genetic predisposition for positive affect (Bartels, 2015; Okbay et al., 2016; Weiss et al., 2008). However, our design does not allow testing for the specific contribution of genetic factors.

Positive emotion expression in childhood was not associated with self-reported positive emotion in adulthood in our study. These findings are consistent with prior research demonstrating that positive and negative emotions in infancy were unrelated to positive and negative emotions 15 years later, but they were related to life satisfaction and workplace optimism 28 years later (Coffey et al., 2015). Our distinct measures of emotion in childhood and adulthood may capture different aspects of emotion. Although our validation study indicated that the measure of self-reported positive emotion

in adulthood was closely correlated with validated positive emotion measures, the measure of positive emotion in adulthood was limited by the availability of emotion items in the NCDS dataset. For example, the measure of positive emotion included items assessing feelings of cheerfulness, relaxation, and confidence, and does not include other common positive emotions, such as happiness, gratitude, amusement, hope, or pride. The narrow range of positive emotions captured by this measure in adulthood may not reflect the types of positive emotions expressed in children's essays. Additional work is needed incorporating a wider variety of positive emotions to consider whether positive emotion expression is similarly related (or unrelated) to positive emotion in adulthood. For example, recent evidence suggests that discrete positive emotions have unique profiles and consequences (Shiota et al., 2017). Thus, it is plausible that specific positive emotions have unique emotional antecedents as well.

The limited focus of the self-reported positive emotion in adulthood may also explain why positive emotion expression in childhood was related to other indicators of well-being, including optimism, life satisfaction, meaning, and social well-being, but not positive emotion. The correlations in the current study between positive emotion expression in childhood and other indicators of well-being could be due to the role of specific emotions. For example, prior research suggests that gratitude is a social emotion with specific benefits to close relationships (Algoe, 2012), which would suggest a correlation between gratitude expression and social well-being. Thus, the connection between positive emotion expression and social well-being could be due to the expression of social emotions like gratitude or love in children's essays; however, because these specific emotions were not available to be included in the self-reported measure of positive emotions in adulthood, the correlation between children's positive emotion expression in adulthood is minimized. Similarly, we might expect the expression of other specific emotions to have unique associations with optimism (e.g., hope), meaning (e.g., interest), and life satisfaction (e.g., happiness). Future research could build on our findings that positive emotion expression in general is associated with well-being benefits by considering the role of discrete positive emotions.

Positive emotion expression in childhood was also not associated with self-reported physical health in adulthood. Prior research on the links between positive emotion and health have been inconsistent, with some studies finding no association between positive emotion and health outcomes (e.g., Martin et al., 2002) and others finding that positive emotions are associated with benefits for physical health (e.g., Pressman & Cohen, 2005). One explanation for these discrepancies focuses on the level of emotional arousal. Specifically, one study found that high arousal positive emotions (i.e., feeling "active") predict benefits to physical health, whereas low arousal emotions do not (Petrie et al., 2018). In the current

study, we did not distinguish high vs. low arousal positive emotions in children's essays. Thus, our measure of expressed positive emotion may not have captured these nuances in the links between positive emotion and physical health. Future studies investigating the links between children's emotions and adult health and longevity would be informative.

Strengths, Limitations, and Future Directions

The results of this study are strengthened by the use of an observational measure of emotion in childhood, teacher reports of academic ability, the measurement of multiple indicators of well-being in adulthood, and the use of a longitudinal design spanning 39 years. The use of an observational indicator of positive emotion expression reduces response biases, minimizes validity issues related to children's emotion understanding, and reduces the likelihood of obtaining significant results due to common method variance. Furthermore, our analyses revealed robust associations between positive emotion expression in childhood and adult well-being. By relying on multiple indicators of well-being in adulthood, our study provides a more precise understanding of the associations between children's positive emotion expression and their well-being in adulthood.

The results of this study should also be considered in light of a few limitations, which offer ideas for future research. First, the effect sizes for the longitudinal associations between positive emotion expression in childhood and adult well-being were relatively small (average $\beta = .10$), suggesting that positive emotion in childhood does not have a particularly strong association with long-term well-being. This effect size is relatively unsurprising, given longitudinal nature of this study spanning 39 years between measurements and the many contributors to well-being that operate at any given moment or developmental period. The effect sizes in the current study are comparable in size to research evaluating the childhood personality correlates of adult mental health (e.g., Martin et al., 1995). In addition, even small effects can be practically meaningful, especially when considering the course of a person's entire life. The Binomial Effect Size Display offers one way to interpret the practical significance of small effects (Rosenthal & Rosnow, 2008). Based on an effect size $\beta = .10$, we would expect that 55% of people who expressed a relatively higher number of positive emotions in their essays at age 11 would report high levels of well-being at age 50 compared to only 45% of people who expressed few positive emotions in their essays. Although a 10% difference may seem relatively small, studies find that most people want to be happy (Diener, 2000), and improving rates of high well-being by 10% would result in millions more people reporting high levels of well-being when considered across an entire population.

Second, future studies could consider how positive emotion expression relates to underlying personality and genetic dispositions, parent-child attachment, or the experience of frequent positive emotions, which were not included in this

study. The results of this study are based on a diverse sample from the UK, but studies investigating the long-term benefits of positive emotions in other countries would enhance generalizability. Replication of these findings using validated well-being measures is needed, which were not available in the current dataset. Future research could also incorporate informant reports of well-being and physical health.

Third, we also cannot determine whether positive emotion in childhood causes increases in well-being in adulthood. Future studies could consider the long-term benefits of increasing children's positive emotions. Substantial research has indicated that simple practices such as being kind to others, expressing gratitude, or practicing optimistic thinking lead to improvements in well-being (Roth et al., 2017); however, fewer studies have considered the causes or consequences of increasing well-being among children. Research on this topic would inform causal understanding of the consequences of increasing children's happiness.

Conclusions

We found that children who expressed more positive emotions in an essay at age 11 were more satisfied with their lives, felt more optimistic about the future, felt that their lives were more meaningful, and felt more socially connected at age 50, independent of their age 11 academic ability or SES. Given the mounting evidence about the importance of children's emotional experiences, children's well-being and educational policy should give stronger consideration to the long-term value of children's positive emotions.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s12144-022-03218-4>.

Author Contributions J. K. Coffey, S. K. Nelson-Coffey, and M. Pluess developed the study concept. H. Parsley directed the coding of essay data under the supervision of J. K. Coffey and S. K. Nelson-Coffey. J. K. Coffey performed the data analysis, and J. K. Coffey, S. K. Nelson-Coffey, and M. Pluess interpreted the analyses. H. Parsley conducted the literature review; J. K. Coffey and S. K. Nelson-Coffey drafted the manuscript, and M. Pluess and H. Parsley provided critical revisions. All authors approved the final version of the manuscript for submission.

Funding The research presented in this paper was supported by a Faculty Development grant to John K. Coffey.

Data Availability The data are deposited at the UK Data Archive by the Centre for Longitudinal Studies at the Institute of Education, University of London, where they are available on request.

Declarations

Ethics and Informed Consent The study was performed in accordance with the ethical standards laid down in the Declaration of Helsinki, confirmed by the Institutional Review Board of Sewanee: The Uni-

versity of the South for the analyses presented in the current paper. All participants provided informed assent or consent for each survey.

Conflict of Interest The authors declare no competing interest.

References

- Abe, J. A. A., & Izard, C. E. (1999). The developmental functions of emotions: An analysis in terms of differential emotions theory. *Cognition and Emotion*, 13(5), 523–549. <https://doi.org/10.1080/026999399379177>
- Algoe, S. B. (2012). Find, remind, and bind: The functions of gratitude in everyday relationships. *Social and Personality Psychology Compass*, 6(6), 455–469. <https://doi.org/10.1111/j.1751-9004.2012.00439.x>
- Ambady, N., & Rosenthal, R. (1992). Thin slices of behavior as predictors of interpersonal consequences: A meta-analysis. *Psychological Bulletin*, 111(2), 256–274. <https://doi.org/10.1037/0033-2909.111.2.256>
- Bartels, M. (2015). Genetics of wellbeing and its components satisfaction with life, happiness, and quality of life: A review and meta-analysis of heritability studies. *Behavior Genetics*, 45, 137–156. <https://doi.org/10.1007/s10519-015-9713-y>
- Baumeister, R. F., Vohs, K. D., Aaker, J. L., & Garbinsky, E. N. (2013). Some key differences between a happy life and a meaningful life. *Journal of Positive Psychology*, 8(6), 505–516. <https://doi.org/10.1080/17439760.2013.830764>
- Brown, M., Elliott, J., Hancock, M., Shepherd, P., & Dodgeon, B. (2012). *National Child Development Study: 2008–2009 follow-up*. Institute of Education.
- Byrne, B. M. (2012). Structural equation modeling with Mplus: Basic concepts, applications, and programming. In *Multivariate applications series*. Routledge.
- Caprara, G. V., Eisenberg, N., & Alessandri, G. (2017). Positivity: The dispositional basis of happiness. *Journal of Happiness Studies*, 18, 353–371. <https://doi.org/10.1007/s10902-016-9728-y>
- Coffey, J. K. (2018). Positive psychology among infants and young children. In S. J. Lopez, L. M. Edwards, & S. C. Marques (Eds.), *The handbook of positive psychology* (3rd ed.). Oxford University Press.
- Coffey, J. K. (2019). Cascades of infant happiness: Infant positive affect predicts childhood IQ and adult educational attainment. *Emotion*, 20(7), 1255–1265. <https://doi.org/10.1037/emo0000640>
- Coffey, J. K., Warren, M. T., & Gottfried, A. W. (2015). Does infant happiness forecast adult life satisfaction? Examining subjective well-being in the first quarter century of life. *Journal of Happiness Studies*, 16(6), 1401–1421. <https://doi.org/10.1007/s10902-014-9556-x>
- Coffey, J. K., Wray-Lake, L., Mashek, D., & Branand, B. (2016). A multi-study examination of well-being theory in college and community samples. *Journal of Happiness Studies*, 17(1), 187–211. <https://doi.org/10.1007/s10902-014-9590-8>
- Dalstra, J. A., Kunst, A. E., Mackenbach, J. P., & E. U. Working group on socioeconomic inequalities in health. (2006). A comparative appraisal of the relationship of education, income and housing tenure with less than good health among the elderly in Europe. *Social Science & Medicine*, 62(8), 2046–2060. <https://doi.org/10.1016/j.socscimed.2005.09.001>
- Danner, D. D., Snowdon, D. A., & Friesen, W. V. (2001). Positive emotions in early life and longevity: Findings from the nun study. *Journal of Personality and Social Psychology*, 80(4), 804–813. <https://doi.org/10.1037/0022-3514.80.5.804>
- Diener, E. (2000). Subjective well-being: The science of happiness and a proposal for a national index. *American Psychologist*, 55(1), 34–43. <https://doi.org/10.1037/0003-066X.55.1.34>
- Diener, E., & Emmons, R. A. (1984). The independence of positive and negative affect. *Journal of Personality and Social Psychology*, 47, 1105–1117. <https://doi.org/10.1037/0022-3514.47.5.1105>
- Diener, M. L., & Lucas, R. E. (2004). Adults' desires for children's emotions across 48 countries: Associations with individual and national characteristics. *Journal of Cross-Cultural Psychology*, 35(5), 525–547. <https://doi.org/10.1177/0022022104268387>
- Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment*, 49(1), 71–75. https://doi.org/10.1207/s15327752jpa4901_13
- Diener, E., Ng, W., Harter, J., & Arora, R. (2010). Wealth and happiness across the world: Material prosperity predicts life evaluation, whereas psychosocial prosperity predicts positive feeling. *Journal of Personality and Social Psychology*, 99(1), 52.
- Elliott, J., & Morrow, V. (2007). *Imagining the future: Preliminary analysis of NCDS essays written by children at age 11*. Institute of Education.
- Ensminger, M., & Fotherill, K. (2003). A decade of measuring SES: What it tells us and where to go from here. In M. Bornstein & R. Bradley (Eds.), *Socioeconomic status, parenting, and child development* (pp. 13–28). Lawrence Erlbaum.
- Fredrickson, B. L. (2013). Positive emotions broaden and build. In E. A. Plant & P. G. Devine (Eds.), *Advances in experimental social psychology* (Vol. 47, 1st ed., pp. 1–53). <https://doi.org/10.1016/B978-0-12-407236-7.00001-2>
- Goldberg, L. R. (1999). *International Personality Item Pool: A scientific collaboratory for the development of advanced measures of personality and other individual differences*. [Online]. Available at www.ipip.ori.org
- Graham, J. W. (2009). Missing data analysis: Making it work in the real world. *Annual Review of Psychology*, 60(1), 549–576. <https://doi.org/10.1146/annurev.psych.58.110405.085530>
- Harker, L. A., & Keltner, D. (2001). Expressions of positive emotion in women's college yearbook pictures and their relationship to personality and life outcomes across adulthood. *Journal of Personality and Social Psychology*, 80(1), 112–124. <https://doi.org/10.1037/0022-3514.80.1.112>
- Jewell, S., & Kambhampati, U. S. (2015). Are happy youth also satisfied adults? An analysis of the impact of childhood factors on adult life satisfaction. *Social Indicators Research*, 121(2), 543–567. <https://doi.org/10.1007/s11205-014-0642-6>
- Kashdan, T. B., Biswas-Diener, R., & King, L. A. (2008). Reconsidering happiness: The costs of distinguishing between hedonics and eudaimonia. *Journal of Positive Psychology*, 3(4), 219–233. <https://doi.org/10.1080/17439760802303044>
- Keyes, C. L. M. (2002). The mental health continuum: From languishing to flourishing in life. *Journal of Health and Social Behavior*, 43(2), 207–222. <https://doi.org/10.2307/3090197>
- King, L. A. (2001). The health benefits of writing about life goals. *Personality and Social Psychology Bulletin*, 27(7), 798–807. <https://doi.org/10.1177/0146167201277003>
- Krämer, M. D., & Rodgers, J. L. (2019). The impact of having children on domain-specific life satisfaction: A quasi-experimental longitudinal investigation using the socio-economic panel (SOEP) data. *Journal of Personality and Social Psychology*. <https://doi.org/10.1037/pspp0000279>
- Lyubomirsky, S., King, L., & Diener, E. (2005). The benefits of frequent positive affect: Does happiness lead to success? *Psychological Bulletin*, 131(6), 803–855. <https://doi.org/10.1037/0033-2909.131.6.803>
- Maggs, J. L., Patrick, M. E., & Feinstein, L. (2008). Childhood and adolescent predictors of alcohol use and problems in adolescence and adulthood in the National Child Development Study.

- Addiction*, 103(s1), 7–22. <https://doi.org/10.1111/j.1360-0443.2008.02173.x>
- Martin, L. R., Friedman, H. S., Tucker, J. S., Schwartz, J. E., Criqui, M. H., Wingard, D. L., & Tomlinson-Keasey, C. (1995). An archival prospective study of mental health and longevity. *Health Psychology*, 14(5), 381–387. <https://doi.org/10.1037/0278-6133.14.5.381>
- Martin, L. R., Friedman, H. S., Tucker, J. S., Tomlinson-Keasey, C., Criqui, M. H., & Schwartz, J. E. (2002). A life course perspective on childhood cheerfulness and its relation to mortality risk. *Personality and Social Psychology Bulletin*, 28(9), 1155–1165. <https://doi.org/10.1177/01461672022812001>
- Martinez Gutierrez, N., & Cribbie, R. (2021). Incidence and interpretation of statistical suppression in psychological research. *Canadian Journal of Behavioural Science*, 53(4), 480–488. <https://doi.org/10.1037/cbs0000267>
- Muthén, L., & Muthén, B. (2017). Mplus user's guide (version 8.0). In *Mplus user's guide (seventh edition)* (7th ed.). Muthén & Muthén.
- Okbay, A., Baselmans, B. M. L., De Neve, J. E., Turley, P., Nivard, M. G., Fontana, M. A., Meddens, S. F. W., Linner, R. K., Rietveld, C. A., Derringer, J., Gratten, J., Lee, J. J., Lui, J. Z., de Blaming, R., Ahluwalia, T. S., Buchwald, J., Vacaadino, A., Frazier-Wood, A. C., Furlotte, N. A., ... Cesarini, D. (2016). Genetic variants associated with subjective well-being, depressive symptoms, and neuroticism identified through genome-wide analyses. *Nature Genetics*, 48(6), 624–633. <https://doi.org/10.1038/ng.3552>
- Oveis, C., Gruber, J., Keltner, D., Stamper, J. L., & Boyce, W. T. (2009). Smile intensity and warm touch as thin slices of child and family affective style. *Emotion*, 9(4), 544–548. <https://doi.org/10.1037/a0016300>
- Pennebaker, J. W., Mehl, M. R., & Niederhoffer, K. G. (2003). Psychological aspects of natural language use: Our words, our selves. *Annual Review of Psychology*, 54, 547–477. <https://doi.org/10.1146/annurev.psych.54.101601.145041>
- Petrie, K. J., Pressman, S. D., Pennebaker, J. W., Øverland, S., Tell, G. S., & Sivertsen, B. (2018). Which aspects of positive affect are related to mortality? Results: From a general population longitudinal study. *Annals of Behavioral Medicine*, 52(7), 571–581. <https://doi.org/10.1093/abm/kax018>
- Pressman, S. D., & Cohen, S. (2005). Does positive affect influence health? *Psychological Bulletin*, 131(6), 925–971. <https://doi.org/10.1037/0033-2909.131.6.925>
- Richardson, K., Calnan, M., Essen, J., & Lambert, L. (1976). The linguistic maturity of 11-year-olds: Some analysis of the written compositions of children in the National Child Development Study. *Journal of Child Language*, 3(1), 99–115. <https://doi.org/10.1017/S030500900001331>
- Rosenthal, R., & Rosnow, R. L. (2008). *Essentials of behavioral research: Methods and data analysis* (3rd ed.). McGraw Hill.
- Roth, R. A., Suldo, S. M., & Ferron, J. M. (2017). Improving middle school students' subjective well-being: Efficacy of a multicomponent positive psychology intervention targeting small groups of youth. *School Psychology Review*, 46(1), 21–41. <https://doi.org/10.1080/02796015.2017.12087610>
- Scheier, M. F., Carver, C. S., & Bridges, M. W. (1994). Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): A reevaluation of the life orientation test. *Journal of Personality and Social Psychology*, 67(6), 1063–1078. <https://doi.org/10.1037/0022-3514.67.6.1063>
- Scheier, M. F., Carver, C. S., & Bridges, M. W. (2001). Optimism, pessimism, and psychological well-being. In E. C. Chang (Ed.), *optimism & pessimism: Implications for theory, research, and practice*. (pp. 189–216). <https://doi.org/10.1037/10385-009>
- Sheldon, K. M., & Hilpert, J. C. (2012). The balanced measure of psychological needs (BMPN) scale: An alternative domain general measure of need satisfaction. *Motivation and Emotion*, 36, 439–451. <https://doi.org/10.1007/s11031-012-9279-4>
- Sheldon, K. M., & Lyubomirsky, S. (2021). Revisiting the sustainable happiness model and pie chart: Can happiness be successfully pursued? *The Journal of Positive Psychology*, 16(2), 145–154. <https://doi.org/10.1080/17439760.2019.1689421>
- Shiota, M. N., Campos, B., Oveis, C., Hertenstein, M. J., Simon-Thomas, E., & Keltner, D. (2017). Beyond happiness: Building a science of discrete positive emotions. *American Psychologist*, 72(7), 617–643. <https://doi.org/10.1037/a0040456>
- Steger, M. F., Frazier, P., Kaler, M., & Oishi, S. (2006). The meaning in life questionnaire: Assessing the presence of and search for meaning in life. *Journal of Counseling Psychology*, 53, 80–93. <https://doi.org/10.1037/0022-0167.53.1.80>
- Sun, J., Schwartz, H. A., Son, Y., Kern, M. L., & Vazire, S. (2019). The language of well-being: Tracking fluctuations in emotion experience through everyday speech. *Journal of Personality and Social Psychology*, 2019. <https://doi.org/10.1037/pspp0000244>
- Tackett, J. L., Herzhoff, K., Kushner, S. C., & Rule, N. (2016). Thin slices of child personality: Perceptual situational, and behavioral contributions. *Journal of Personality and Social Psychology*, 110(1), 150–166. <https://doi.org/10.1037/pspp0000044>
- Tennant, R., Hiller, L., Fishwick, R., Platt, S., Joseph, S., Weich, S., Parkinson, J., Secker, J., & Stewart-Brown, S. (2007). The Warwick-Edinburgh mental well-being scale (WEMWBS): Development and UK validation. *Health and Quality of Life Outcomes*, 5, 63. <https://doi.org/10.1186/1477-7525-5-63>
- Twenge, J. M., & Cooper, A. B. (in press). The expanding class divide in happiness in the United States, 1972–2016. *Emotion*.
- Van Beveren, M. L., Harding, K., Beyers, W., & Braet, C. (2018). Don't worry, be happy: The role of positive emotionality and adaptive emotion regulation strategies for youth depressive symptoms. *British Journal of Clinical Psychology*, 57(1), 18–41. <https://doi.org/10.1111/bjc.12151>
- VanderWeele, T. J. (2017). On the promotion of human flourishing. *Proceedings of the National Academy of Sciences*, 114(31), 8148–8156. <https://doi.org/10.1073/pnas.1702996114>
- Ware, J. E., Snow, K. K., Kosinski, M., & Gandek, B. (1993). SF-36 Health Survey manual and interpretation guide. Boston New England Medical Centre.
- Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, 54(6), 1063–1070. <https://doi.org/10.1037/0022-3514.54.6.1063>
- Weiss, A., Bates, T. C., & Luciano, M. (2008). Happiness is a personal(ity) thing: The genetics of personality and well-being in a representative sample: Research report. *Psychological Science*, 19(3), 205–210. <https://doi.org/10.1111/j.1467-9280.2008.02068.x>
- West, S. G., Taylor, A. B., & Wu, W. (2012). Model fit and model selection in structural equation modeling. *Handbook of structural equation modeling*, 1, 209–231.
- Wood, N., Hardy, R., Bann, D., Gale, C., & Stafford, M. (2021). Childhood correlates of adult positive mental well-being in three British longitudinal studies. *Journal of Epidemiology & Community Health*, 75(2), 177–184. <https://doi.org/10.1136/jech-2019-213709>
- Zika, S., & Chamberlain, K. (1992). On the relation between meaning in life and psychological well-being. *British Journal of Psychology*, 83(1), 133–145. <https://doi.org/10.1111/j.2044-8295.1992.tb02429.x>