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The Development of Subjective Well-Being Across the Life Span: A Meta-Analytic Review of Longitudinal Studies

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How does subjective well-being (SWB) develop across the life span? Theories and previous empirical research suggest heterogeneous conclusions regarding this question. Therefore, in this meta-analysis, we synthesized the available longitudinal data on mean-level change in three SWB components: life satisfaction, positive affect, and negative affect. The analyses were based on 443 unique samples with a total of 460,902 participants. Our results showed that life satisfaction decreased from age 9 to 16 ($d = -0.56$), increased slightly until age 70 ($d = 0.16$), and then decreased again until age 96 (i.e., the oldest age for which data on life satisfaction were available; $d = -0.24$). Positive affect declined from age 9 for almost the entire time until age 94 ($d = -1.71$). Negative affect showed small ups and downs between ages 9 and 22. After age 22, negative affect declined until age 60 ($d = -0.92$), after which it increased again until age 87 ($d = 0.58$). Average changes in positive and negative affect were stronger than in life satisfaction. The moderator analyses suggested that the pattern of mean-level changes held across gender, country, ethnicity, sample type, the measure of SWB, time frame of SWB measure, and birth cohort. In sum, we found a favorable developmental trajectory of SWB over large parts of life for life satisfaction and negative affect and decreases from childhood until late adulthood for positive affect. In late adulthood, SWB tended to worsen rather than improve. Consequently, interventions aimed at maintaining or enhancing SWB in older adults might be useful.

Public Significance Statement
This meta-analysis of longitudinal studies suggests that the three components of subjective well-being (i.e., life satisfaction, positive affect, and negative affect) follow distinct developmental patterns across the life span. Whereas life satisfaction and negative affect showed favorable developmental trajectories over large parts of life (i.e., from adolescence until about 70 years), positive affect decreased from childhood until late adulthood.

Keywords: subjective well-being, life satisfaction, affect, life span development, meta-analysis

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At what age are people happiest? This seemingly simple question has been investigated extensively by social scientists over the last decades, but a conclusive answer has yet to be found. To date, hundreds of cross-sectional and longitudinal studies on the development of happiness have been published, with samples from many different countries and generations. In most of these studies, happiness was conceptualized in terms of *subjective well-being* (SWB), which comprises life satisfaction, positive affect, and

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negative affect (Diener, 1984). Despite the extensive studies, the typical shape of the developmental trajectory of SWB across the life span is still under debate. Some studies reported that SWB follows a linear trajectory across the life span (i.e., showing increases or decreases with age; e.g., Pinquart, 2001). Others found that SWB declines particularly in late adulthood during the last years before death (Gerstorf et al., 2008). Finally, several (mostly cross-sectional) studies suggested a U-shaped trajectory across the life span (i.e., high levels of SWB in young adulthood, a nadir in middle adulthood, and high levels of SWB in late adulthood; e.g., Blanchflower & Graham, 2021a; Blanchflower & Oswald, 2008).

The strong scientific interest in the developmental trajectory of SWB across the life span has numerous reasons. When asking people of different ages to list the characteristics they value most in life, they are likely to include aspects of SWB (e.g., "being happy"; King & Napa, 1998; Luhmann et al., 2014). Furthermore, SWB has been found to predict health and longevity (Diener & Chan, 2011; Howell et al., 2007). Due to the desirable consequences of SWB for individuals, many governments view SWB as an important input to policy decisions and include national accounts of SWB as an indicator of a nation's wealth (Diener et al., 2015). It is important to understand whether and how SWB changes as a (possibly nonlinear) function of age when interpreting findings of the individual and societal consequences of SWB. In this way, it is possible to identify age groups that are particularly at risk for loss in SWB and associated negative consequences and to identify countries whose demographic changes contribute to an increased risk for reduced SWB in the population.

Yet, findings on the developmental trajectory of SWB are heterogeneous. In such a situation, comprehensive meta-analyses are ideal for advancing the state of knowledge about a phenomenon. Therefore, in the present meta-analysis, we synthesized the available longitudinal data on mean-level changes in SWB across the life span. Besides estimating the average mean-level change in SWB, we tested potential moderators of these changes.

Definition and Measurement of SWB

According to the widely used definition by Diener et al. (1999), SWB comprises cognitive and affective components. Cognitive well-being includes general life satisfaction (i.e., the cognitive evaluation of one's life overall) and domain satisfaction (i.e., the cognitive evaluation of specific life domains such as job, family, or health). Yet, most studies on SWB only investigate general life satisfaction, but not domain satisfaction. Affective well-being includes positive affect (i.e., the frequency and intensity of positive emotions, such as feeling interested, attentive, and joyful as well as more general positive mood states) and negative affect (i.e., the frequency and intensity of negative emotions, such as feeling frightened, angry, and sad as well as more general negative mood states).

The SWB components are correlated but conceptually and empirically distinct. For example, major life events tend to have more long-lasting effects on cognitive well-being than on affective well-being (Luhmann, Hofmann, et al., 2012). In addition, although both cognitive and affective components of SWB are correlated with personality traits, such as extraversion and neuroticism, the correlations tend to be stronger for affective well-being than for cognitive well-being (e.g., Soto, 2015). Cognitive well-being, in contrast, tends to be more strongly associated with life circumstances such as income, work status, or marital status than affective well-being (Luhmann et al., 2014; Schimmack et al., 2008; Tov, 2018). Within affective well-being, positive and negative affect are treated either as separate constructs or as opposite poles of a single dimension. Overall, research on the structure of SWB (e.g., Lucas et al., 1996; Luhmann, Hofmann, et al., 2012; Tov, 2018) indicates that the different components should be measured and examined separately, as we did in this meta-analysis.

All components of SWB can be conceptualized as being relatively stable across time and consistent across different contexts (e.g., feeling satisfied with one's work and family life). This perspective refers to habitual or trait-like SWB (Brose et al., 2013). Nevertheless, all components of SWB can also be conceptualized as fluctuating from day to day or from moment to moment, which is typically described as state-like SWB (Brose et al., 2013). Depending on which conceptualization of SWB is used, studies differ in the time frame that is used to measure SWB. Most studies measuring life satisfaction use a rather broad time frame asking about how satisfied one is in general. In contrast, positive and negative affect are typically measured using specific and typically short time frames (e.g., during the past few weeks e.g., Burr et al., 2011) or during the past few months (e.g., Müller et al., 2014). Therefore, in the present meta-analysis, we included these different time frames as a potential moderator of mean-level change in SWB across the life span (see below for more information).

Beyond life satisfaction, positive affect, and negative affect, some studies examined what was referred to as "happiness". Happiness is less consistently defined and measured than SWB. When people say that they lead a "happy life", they typically refer to a broad evaluation of one's life as a whole and thus report on the cognitive part of well-being. Still, there are other meanings of happiness that refer to a particular affective experience that happens over a short time, such as being happy while celebrating a party, chatting with friends, or doing other enjoyable activities. These short-term experiences may not reflect the broader evaluation of one's life. Given the many different terms and conceptualizations used by well-being researchers, we focused on those constructs that can clearly be assigned to SWB according to Diener (1984): life satisfaction, positive affect, and negative affect. In this way, we ensured that the results of the meta-analysis allow for conclusions about clearly defined constructs.

Previous Research on the Development of SWB Across the Life Span

Among the heterogeneous findings on the development of SWB across the life span, the findings suggesting a U-shaped trajectory have elicited much debate in the literature (e.g., Blanchflower & Graham, 2021a; Galambos et al., 2020, 2021). Although many studies support the idea of a U-shaped trajectory of SWB across the life span (e.g., Blanchflower & Graham, 2021a, 2021b; Blanchflower & Oswald, 2008), there are several caveats regarding these studies.

First, the U-shaped trajectory cannot be found for all three components of SWB. Studies that suggested a U-shaped trajectory usually focused on life satisfaction (Kolosnitsyna et al., 2017; Otterbach et al., 2018; Piper, 2015) or positive affect (e.g., Blanchflower & Graham, 2021a; Blanchflower & Oswald, 2008; but see Hudson et al., 2016). In contrast, for negative affect, a

linear decrease appears to be the more common finding (Galambos et al., 2006). To get a comprehensive picture of how SWB develops across the life span, it is necessary to examine all three components of SWB.

Second, many studies that found a U-shaped trajectory used cross-sectional data. Unfortunately, cross-sectional studies confound age and cohort effects (Baltes et al., 1979; Costa & McCrae, 1982). Thus, it is unclear whether the U-shaped relation between age and SWB can be explained by developmental processes related to age or rather by specific life experiences that distinguish some generations from others. Age and cohort effects can be disentangled in studies that track multiple cohorts across time, as was done in this meta-analysis. Longitudinal data are generally more appropriate to study developmental trajectories (Kraemer et al., 2000; Kratz & Brüderl, 2021). For SWB, it seems that the average trajectories found in longitudinal studies often diverge from those observed in cross-sectional studies. For example, a longitudinal study with healthy male veterans showed an increase in life satisfaction from about 40 to 65 years, followed by a decrease (Mroczek & Spiro, 2005), which is inconsistent with the U-shaped trajectory reported in many cross-sectional studies.

Third, a further complication is that the findings might also depend on the data-analytic approach employed in a study (Kratz & Brüderl, 2021). Using the same large-scale longitudinal data set (i.e., the German Socio-Economic Panel; Goebel et al., 2018) but different data-analytic methods, researchers have documented U-shaped, S-shaped, linear upward, and linear downward developmental trajectories for life satisfaction across the life span (Baetschmann, 2014; Baird et al., 2010; Bauer et al., 2017; Cheng et al., 2017; Wunder et al., 2013). Another methodological challenge is the different treatment of control variables between different studies examining how age affects SWB. When integrating relevant control variables (i.e., those influencing the population's age composition and SWB), no U-shaped trajectory was found (Bartram, 2021). Moreover, recent research emphasized turning points of SWB around midlife (mid-40s) and in late adulthood (90s) when looking at between-person results (Biermann et al., 2022). Yet, in studies focusing on within-person changes, SWB appeared mostly stable between ages 16 and 23 and then approached a local maximum at age 75 (if the same person is followed over time; Biermann et al., 2022).

Fourth, most previous studies used North American samples. Still, some studies suggest that the typical trajectory of life satisfaction may be different for samples from other parts of the world (Baird et al., 2010). Thus, it is important to examine the development of SWB in different countries and cultural contexts, as we did in this meta-analysis.

Yet, despite these heterogeneous results, two findings have been replicated in multiple studies: Life satisfaction tends to increase from midlife to late adulthood (Lachman et al., 2008; Mroczek & Spiro, 2005; Stone et al., 2010), and life satisfaction and positive affect tend to decline in very late adulthood (Baird et al., 2010; Berg et al., 2009; Gerstorf et al., 2008; Mroczek & Spiro, 2005).

Theoretical Perspectives on the Development of SWB Across the Life Span

To date, no theory is available that fully explains how SWB changes across the life span. Nevertheless, several theories from the fields of positive psychology, personality psychology, and developmental psychology allow deriving hypotheses about the trajectories of SWB across the life span. In the following, we summarize the core principles of theoretical perspectives that are relevant for understanding the development of SWB and outline similarities and differences among these theories. Not all of the reviewed theories make direct statements about SWB; in some cases, they refer to SWB-related constructs, such as personality traits or emotion regulation, which can provide insights into the developmental trajectory of SWB. Moreover, we describe life circumstances or major life events that are linked to SWB and occur more often in specific life stages than in others (i.e., differences regarding the prevalence). We briefly review that some life circumstances or major life events might be especially important for SWB in specific life stages (i.e., differences regarding the relevance).

Set Point Theory

Early research on SWB has theorized that SWB is a very stable characteristic of individuals: Some people are born satisfied, and others are not (e.g., Brickman & Campbell, 1971). Consistent with this idea are findings showing that SWB is, to some extent, heritable. For example, two meta-analyses of twin and family studies have estimated an average heritability of 36% (Bartels, 2015) and 40% (Nes & Røysamb, 2015). Set point theory—which is sometimes also referred to as adaptation-level theory (Diener et al., 2006)—suggests that major life events (e.g., marriage, divorce, becoming unemployed) may lead to temporary increases or decreases in SWB but that psychological mechanisms regulate SWB such that it eventually returns to its *set point* (Lykken & Tellegen, 1996). According to the set point theory, SWB should be highly stable across the life span. In recent years, however, the idea of an immutable set point of SWB has been challenged by many empirical studies (Diener et al., 2006; for an overview, see Hudson et al., 2019).

Neo-Socioanalytic Theory

Neo-socioanalytic theory suggests that adults typically develop in the direction of mature personality traits, including a decrease in neuroticism, especially in young adulthood (Roberts & Robins, 2021; Roberts & Wood, 2006). This so-called maturity principle has been supported in numerous studies (Bleidorn et al., 2009; Caspi et al., 2005; Roberts et al., 2006; Specht et al., 2011). It has been argued that the adoption of age-related social roles (e.g., the role of an employee when entering the job market or the role of a mother when getting one's first child) leads to the specific behavior that is required to better fulfill these social roles (Bleidorn, 2015; Roberts & Wood, 2006). These behavioral changes are then reflected in changes in broader personality traits. Yet, recent studies on the development of personality traits and socioemotional phenomena surrounding major life events have challenged this view because they did not find evidence for all hypothesized changes (Denissen et al., 2019; Hang et al., 2023).

As neuroticism is closely linked to negative affect (DeNeve & Cooper, 1998), neo-socioanalytic theory suggests that negative affect decreases in adulthood, especially in young adulthood. For late adulthood, however, research has found that social vitality (i.e., a facet of extraversion) decreases. Since social vitality is positively related to positive affect and to life satisfaction but negatively to

negative affect (DeNeve & Cooper, 1998), this finding suggests—based on neo-socioanalytic theory—that positive affect and life satisfaction might decrease in late adulthood, while negative affect might increase.

Disruption Hypothesis

Whereas the maturity principle has received relatively strong empirical support for adult personality development, in youth personality development, another finding is striking: Certain desirable personality traits, including extraversion and emotional stability (i.e., low neuroticism), show a temporary dip from childhood to adolescence (Brandes et al., 2021; Soto, 2016). This trend has been called the *disruption hypothesis* (Soto & Tackett, 2015). Girls especially appear to become prone to negative affect during adolescence, whereas for boys, negative affect was rather stable (Soto et al., 2011; Van den Akker et al., 2014). Moreover, levels of sociability are lower during childhood and adolescence than during adulthood (Denissen et al., 2013; Van den Akker et al., 2014). As noted above, SWB is correlated with neuroticism and extraversion. Thus, the disruption hypothesis suggests that life satisfaction and positive affect decrease from childhood to adolescence, while at the same time, negative affect increases. Moreover, there might be gender differences—especially in mean-level change of negative affect during childhood and adolescence.

Socioemotional Selectivity Theory

Whereas research on the disruption hypothesis allows deriving hypotheses about the development of SWB in youth, socioemotional selectivity theory might be relevant for understanding changes in SWB in later life. This theory suggests that with increasing age—once people realize that their remaining lifetime is limited—people select themselves into situations that maximize the experience of positive emotions and minimize the experience of negative emotions (Carstensen et al., 1999). Moreover, when such a selection of situations is not possible, older adults show enhanced emotion regulation by selecting and optimizing emotion regulation processes to compensate for losses in internal and external resources (Urry & Gross, 2010). Consequently, socioemotional selectivity theory suggests that affective well-being (more than cognitive well-being) changes in older adulthood in a way that leads to increases in positive affect and decreases in negative affect.

Theory of Dynamic Integration

Both the optimization of happiness and positive affect as well as the ability to tolerate and differentiate tension and negative affect are considered crucial for high well-being. The balance between optimization and differentiation is called *dynamic integration* (Labouvie-Vief, 2003). The capacity to dynamically integrate increases from adolescence to middle adulthood, possibly because individuals acquire more conscious insight into their emotions and learn to differentiate blended distinct emotions (e.g., emotions involving both positive and negative affective states such as sadness and joy; Labouvie-Vief, 2003). This theoretical perspective is supported by empirical findings on growth in affective complexity (i.e., a better understanding and clearer description of one's own and other's emotions) through middle adulthood (Labouvie-Vief et al., 2007). Still, dynamic integration decreases later in life, possibly due to cognitive decline and poor emotion regulation strategies (Grühn et al., 2013; Labouvie-Vief et al., 2007). Older adults may face difficulties in the integration and toleration of negative affect. While dynamic integration theory does not provide a clear prediction for how positive affect, negative affect, and life satisfaction develop across the life span, the theory does emphasize that the nature of emotion regulation and the integration of emotions and cognitions change across the life span. The theory of dynamic integration discusses these changes as mechanisms for changes in well-being.

Model of Strength and Vulnerability Integration

The Model of Strength and Vulnerability Integration (SAVI; Charles, 2010) describes changes in the processes of emotion regulation in later adulthood, which are used to explain changes in affective well-being from middle to later adulthood. The model distinguishes between age-related strengths and vulnerabilities. On the one hand, aging is related to increased strengths in the frequency and successful use of adaptive emotion regulation strategies such as appraisals. These strengths allow people to circumvent negative emotions and enhance positive emotions. The increase in such emotion regulation processes may explain why some studies observed high levels of affective well-being in late adulthood. On the other hand, aging is also related to vulnerabilities such as reduced physiological flexibility. The SAVI model postulates that if older adults can employ the strengths of aging, age-related increases in affective well-being will emerge. Though, if age-related vulnerabilities predominate, affective well-being is expected to decline. It is assumed that some situations happen in late adulthood where there is little opportunity to appraise the situation and eliminate negative feelings or to direct attention elsewhere (i.e., the strengths of age cannot be exploited), resulting in decreases in well-being. Such situations include threats and loss of social belonging, exposure to uncontrollable chronic stressors, and neurological dysregulation (Charles, 2010).

Terminal Decline Hypothesis

SWB shows steep end-of-life deterioration—a phenomenon called *terminal decline* (Gerstorf et al., 2008; Gerstorf & Ram, 2015). The terminal decline hypothesis postulates that a preterminal phase of gradual decline is followed by a terminal phase of much more pronounced decline in the last years before death, for example, due to changes in social orientations and social losses (Gerstorf et al., 2008, 2016). For instance, using 22-wave longitudinal data, Gerstorf et al. (2008) showed that the decline in life satisfaction steepened about 4 years prior to death. Moreover, Vogel et al. (2013) found decreases in positive affect and increases in negative affect accelerating shortly before death. Consequently, the terminal decline hypothesis suggests a substantial decline in life satisfaction and positive affect and a substantial increase in negative affect in late adulthood.

Changes in Life Circumstances as Triggers of Changes in SWB

People's objective life circumstances (e.g., health, relationship status, work status) change in normative ways across the life span (e.g., Alwin & Wray, 2005; Dolan & Sale, 2019; Hutteman et al.,

2014; Wrzus, Hänel, et al., 2013). For example, most people start their first romantic relationship during late adolescence or young adulthood (Boisvert & Poulin, 2016) and enter the job market during young adulthood (Pusch et al., 2019). There is strong evidence that these life circumstances are related to SWB (e.g., Braithwaite et al., 2010; Dush & Amato, 2005; Lucas et al., 2004; Lukkala et al., 2016). Even still, certain life circumstances are more prevalent (i.e., occur more frequently) or more relevant (i.e., are more closely related to SWB) during some life stages than during others. Consequently, changes in SWB across the life span could at least partially be explained by changes in the prevalence and the relevance of such life circumstances (e.g., declining health in late adulthood; Kunzmann et al., 2000). For instance, young adulthood is characterized by a large number of major life events, most of which are positively perceived (Lüdtke et al., 2011), resulting in higher SWB during this life stage. In contrast, late adulthood is characterized by more death- and loss-related life events (e.g., death of peers or partner; Buecker et al., 2021; Luhmann, Hofmann, et al., 2012), which may result in lower SWB during this life stage.

Moreover, the relative importance of certain life circumstances for SWB varies systematically across the life span (Cheung & Lucas, 2015; George et al., 1985). According to the motivational theory of life span development (Heckhausen et al., 2010), different life stages are associated with unique demands and expectations, also called developmental tasks. People are motivated to invest their resources to fulfill the key developmental tasks of their life stage. For example, when people perceive certain life circumstances as important and desirable during a certain life stage (e.g., starting a family in young adulthood) and can achieve these life circumstances, this might enhance their SWB in this life stage. Yet, the same life circumstances might not have a strong beneficial effect during other life stages. Moreover, when people cannot reach their desired life circumstances in a certain life stage, the absence of certain events may harm SWB (Luhmann et al., 2021). In summary, changes in SWB across the life span might be partially accounted for by changes in people's actual and desired life circumstances.

Change of Emotional Intensity Across the Life Span

Research suggests that the intensity of general affect (for both positive and negative affect) decreases across the life span (for a review, see Bailen et al., 2019; Larsen & Diener, 1987). For example, compared to an adult sample, adolescents reported more intense positive and negative emotions (Larson et al., 1980). Possible explanations for this decrease in emotional intensity are related to biological changes that occur with age and to the finding that older people have already been exposed to much more emotional incidents and, consequently, have habituated in their emotional responses or have improved their emotion regulation strategies. Indeed, self-report studies show that older adults view themselves as more in control of their emotions (e.g., Lawton, 2001) and show lower physiological responses to mild stressors (e.g., Wrzus, Müller, et al., 2013) than younger adults. Moreover, as people age, they may have learned from their experiences how to cope with difficult situations or major life events and may thus be better able to put their emotions into perspective. The decreasing trend in affect intensity across the life span suggests that both positive and negative affect decrease as a function of age.

Potential Moderators of the Development of SWB

In this meta-analysis, we expected that there is significant heterogeneity in the findings on the development of SWB across the life span. For example, the developmental pattern in SWB might differ across cohorts because each cohort has been raised in a specific sociohistorical context, which might impact the SWB of the cohort members (Bühler & Nikitin, 2020; Drewelies et al., 2019; Gerstorf et al., 2020). Still, thus far, little is known about cohort effects in the development of SWB. Therefore, we tested for cohort effects using the sample's mean year of birth as a proxy for the cohort.[1]

Also, it is possible that other sample characteristics account for the heterogeneity of findings. Therefore, we tested whether sample type, ethnicity, country of origin, and gender composition explain differences in the development of SWB across the life span. For example, studies using a nationally representative sample are more generalizable than studies using convenience samples. If there are no significant differences in the effects between these sample types, then this supports the overall robustness of the meta-analytic findings. Moreover, as described above, different life stages are associated with unique demands and expectations, and their fulfillment is related to SWB (Heckhausen et al., 2010). These demands and expectations could vary across ethnic groups and countries (Bleidorn et al., 2013). Nevertheless, in previous primary studies, cultural and ethnic differences in SWB development have oftentimes been neglected. Therefore, we tested whether ethnicity and country of origin moderated the effect sizes. Finally, previous research found gender differences in the development of SWB, especially in childhood and adolescence (González-Carrasco et al., 2017; Steinmayr et al., 2019). Such gender differences might be due to differences in SWB-related biological changes or changes in social roles occurring in these age groups. Therefore, we tested whether the percentage of females in the sample moderated the findings.

Because the field of SWB research uses a wide variety of measures, we tested whether effect sizes from studies using the most prominent measures of life satisfaction (i.e., Satisfaction With Life Scale; Diener et al., 1985) and affect (i.e., Positive and Negative Affect Scale [PANAS]; Watson et al., 1988) differed from studies using other measures, such as selected mood adjectives from Bradburn's affect scales (Bradburn, 1969). Moreover, previous studies discussed the role of different time frames (e.g., referring to affect during the last week, month, or year) when studying SWB and its development (e.g., Luhmann, Hawkley, et al., 2012). Therefore, we also tested whether the time frame moderated the effect sizes.

Besides the moderators that were included in this meta-analysis, there are other characteristics that would also be theoretically relevant but could not be tested. For example, socioeconomic status is related to SWB (Cheung & Lucas, 2015; Sainz et al., 2021) and might also affect the development of SWB across the life span. Regardless, this information was rarely reported and, if reported, the measures were not comparable across most of the included studies.

[1] Note that the samples included in this meta-analysis were relatively homogeneous regarding age, which is a precondition that the mean year of birth of the sample is an adequate approximation of the birth cohort.

The Present Research

The ongoing debate about the typical, normative trajectory of SWB across the life span (e.g., Blanchflower & Graham, 2021a; Galambos et al., 2020, 2021) has highlighted that previous empirical findings and theoretical perspectives on SWB across the life span are inconsistent. Therefore, the goal of the present research was to draw a precise and comprehensive picture of the normative trajectories of life satisfaction, positive affect, and negative affect from childhood to late adulthood by meta-analyzing the available data from longitudinal studies on SWB. Moreover, we tested several moderators of the development of SWB: Birth cohort, sample type, ethnicity, country of origin, gender, the measure of SWB, and time frame of the SWB measure.

Initially, we had planned to include happiness as a separate outcome in the meta-analysis (in addition to life satisfaction, positive affect, and negative affect). Yet, the coding process showed that the number of studies that included happiness as an outcome was too small. Multiple effect sizes per age group would be needed to gain reliable insights into happiness changes across the life span. Unfortunately, only 10 studies were available (across all age groups) that provided data on happiness. Therefore, this outcome was not reported separately in the article. Although, when a study used different adjectives expressing positive affect (e.g., happy, excited, enthusiastic) and reported an average score across these items, happiness was included as a part of positive affect in the meta-analysis.

Method

The present meta-analysis used anonymized data and therefore was exempt from approval by the Ethics Committee of the first author's institution (German Sport University Cologne), in accordance with national law.

Systematic Literature Search

We searched for relevant studies in the databases APA PsycInfo and MEDLINE; the search covered all entries until November 10, 2022. We used the following search terms: life satisfaction OR satisfaction with life OR positive affect* OR negative affect* OR subjective well-being. The use of the asterisks allowed us to identify variants of the respective keyword (i.e., by using the term affect* we could identify studies using the terms affect and affectivity). The search terms were entered without quotation marks so that not only "subjective well-being" but also "well-being" in general (and thus also "psychological well-being") appeared in the search hit list. The terms were searched in the title, abstract, key concepts, and subject headings. In APA PsycInfo, we restricted the search to empirical–quantitative studies and longitudinal studies by using the limitation options "empirical study," "quantitative study," and "longitudinal study." Moreover, we restricted the search to studies using a human population and published them in English. As MEDLINE does not offer such limitation options, we added these methodological terms to our search string. We included only effect sizes from nondisordered populations. Therefore, this search procedure was performed once by setting an APA PsycInfo limit to "nondisordered populations" and once by setting the limit to "disordered populations". As the APA PsycInfo tags on the clinical status of the sample are sometimes faulty (e.g., a two-study article with one disordered sample and one nondisordered sample is tagged as "disordered sample"), we screened the titles and abstracts of the subsearch on disordered samples regarding the clinical status of the sample. Studies in this subsearch that used at least one nondisordered sample were assessed in full text for eligibility for this meta-analysis. In contrast, studies that used only clinical samples were excluded in this step. The total number of articles found in these two subsearches corresponds to the total number of studies found without setting any limit regarding the clinical status of the sample. In MEDLINE, no limit regarding the clinical status of the sample could be set. Therefore, studies located via MEDLINE were also screened regarding the clinical status, and studies that used only clinical samples were excluded. In total, k_{total} = 4,754 studies were found using both search engines. The flowchart summarizing the search and selection procedure (Figure 1) shows the number of included and excluded studies.

In addition to the search in databases, we solicited unpublished studies from the scientific community in several psychological subdisciplines (e.g., developmental psychology, personality psychology, gerontology). More specifically, we used mailing lists from various associations such as the Society for the Study of Emerging Adulthood, the Society for Personality and Social Psychology, the European Association of Personality Psychology, and the German Association of Psychology. In total, we included $k = 24$ additional studies (20 unpublished reports, four published studies) with 114 unique samples.

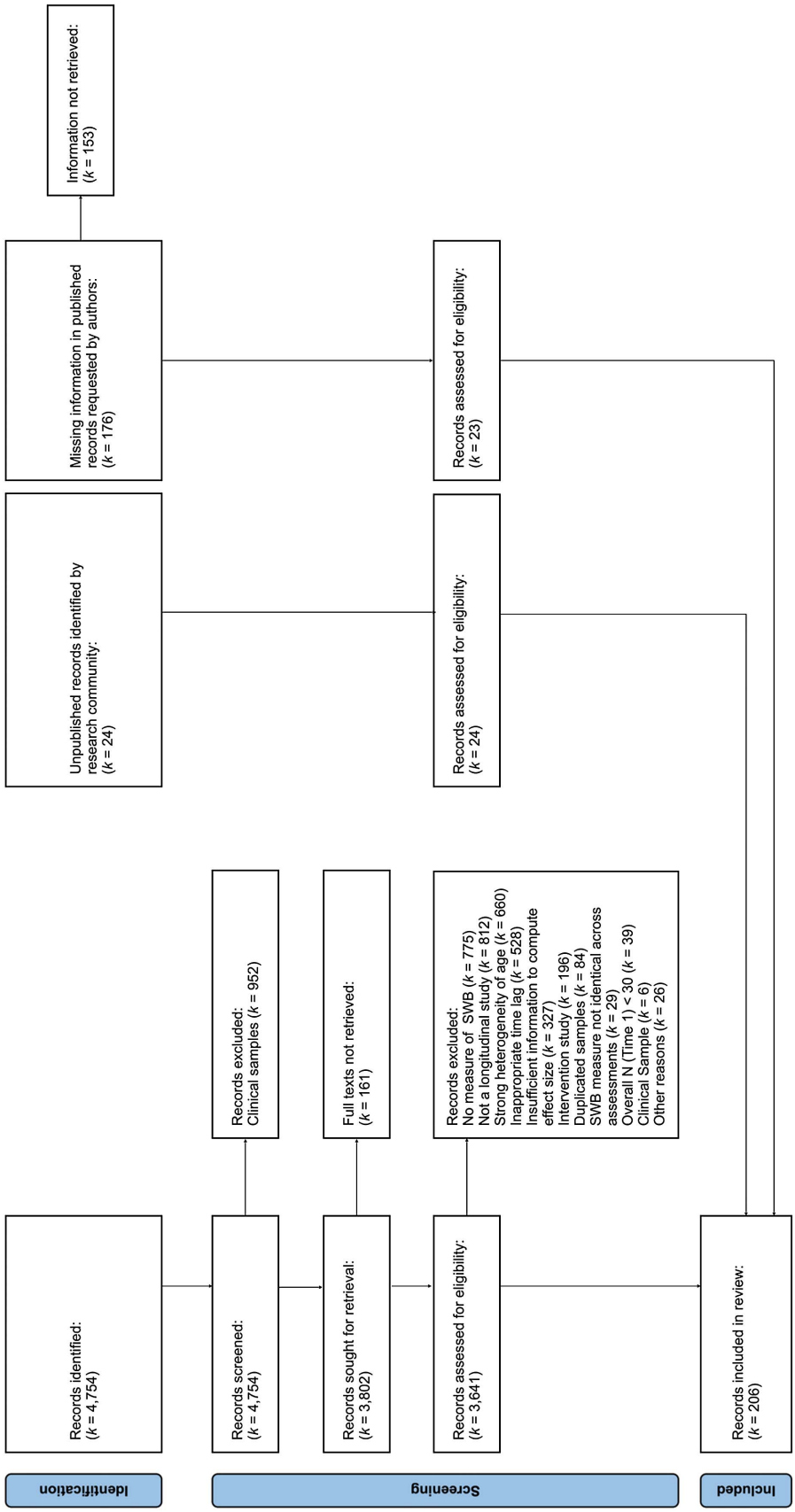
We assessed the validity of the systematic literature search by checking whether narrative reviews on the development of SWB across the life span (i.e., Galambos et al., 2020; Hudson et al., 2019) included longitudinal studies that were not found in the systematic literature search. The results of this procedure showed that the relevant studies (or, more precisely, the data that were used in the studies) were already included in the meta-analytic data set, strengthening our confidence regarding the comprehensiveness of the systematic literature search.

Inclusion Criteria

We included studies if they fulfilled the following eight criteria. (a) The study assessed SWB, including measures of life satisfaction, positive affect, or negative affect. Measures limited to less than three specific emotions (e.g., anger, guilt, pride), and measures of stress, depressed mood, and psychological well-being were not included. (b) The study included a longitudinal measure of SWB with a time lag of at least 6 months (for a similar procedure, see Orth, Erol, & Luciano, 2018). (c) The measure of SWB was identical across measurement occasions (i.e., regarding the number of items, response scale, item wording, etc.). (d) The standard deviation (*SD*) of age in the sample was not larger than 5 years at the first measurement occasion to ensure sufficient homogeneity regarding age (for a similar procedure, see Orth, Erol, & Luciano, 2018). If the heterogeneity regarding age is strong, it is unclear whether the observed mean-level change can be validly related to the average age in the sample. For example, when considering a sample with a broad age range (e.g., 18–60 years), a mean age of 32 years, a *SD* of the age of 10 years, and that shows a mean-level decrease in a construct of $d = -0.20$ across a 1-year interval, it is unclear whether the effect size ($d = -0.20$) could capture normative change at the mean age (32 years) with sufficient precision. Particularly if the age

Figure 1

Adapted PRISMA 2020 Flow Diagram (Page et al., 2021) Visualizing the Search and Coding Procedures



Note. SWB = subjective well-being; *k* = the number of records (i.e., studies); PRISMA = Preferred Reporting Items for Systematic Reviews and Meta-Analyses. See the online article for the color version of this figure.

range of the sample covers developmental stages with distinct patterns of normative change, the average change in the construct could be a highly misleading estimate of normative change at the average age of the sample. For these reasons, we prespecified the inclusion criterion that the *SD* of age in the sample was not larger than 5 years at the first measurement occasion to ensure sufficient homogeneity regarding age. (e) The sample included at least 30 participants (to ensure sufficiently reliable sample means and *SD*s; for a similar procedure, see Orth, Erol, & Luciano, 2018). (f) The sample was not a clinical sample (see above). (g) The sample did not undergo any kind of intervention or treatment as part of the study (information from control groups without any alternative intervention/treatment was used). (h) Enough information was reported to compute effect sizes (i.e., mean and *SD* of age, mean and *SD* of SWB measure, sample size).

If two or more studies relied on the same data, we included the study with the largest sample size and the most comprehensive information on study characteristics tested as moderators. In cases where the information required for inclusion of the study was missing (e.g., mean and *SD* of SWB measure), but the study, in general, appeared to meet the inclusion criteria, the authors of the study were contacted via email. In total, we contacted 176 authors. Of those, 23 authors responded that they still had access to the data and provided us with the information necessary for inclusion. In addition to the 23 authors who provided data that could be included in this meta-analysis, another 26 authors replied, but their data could not be included for several reasons (e.g., the data were not available any longer, no longitudinal assessment of well-being was included, or information on age was not collected in the study).

Some studies have made significant contributions to examining the longitudinal development of SWB but could not be included in this meta-analysis. For example, the samples used in Jackson and Chen (2008a) as well as Jackson and Chen (2008b), which were excluded, were also used in Chen and Jackson (2009), which was included. Moreover, the samples used in Kolosnitsyna et al. (2017) and Shankar et al. (2015) could not be included in the meta-analysis because of strong age heterogeneity (i.e., a *SD* of age larger than 5 years; see the exclusion criteria described above).

Coding Procedure

The coding was performed by experienced researchers based on a prespecified coding manual (see Open Science Framework [OSF]: https://osf.io/wn7vm/; Buecker et al., 2023). We coded the following information: year of publication, publication type, sample size, sample type, the proportion of women, country of origin, ethnicity, year of Time 1 measurement, SWB component, SWB scale, the time frame of SWB measure, mean age at Time 1, *SD* of age at Time 1, time lag between measurement occasions, and effect size information (i.e., mean and *SD* of the SWB measure). If the year of Time 1 measurement was not reported in the article or other sources of information on the sample, we estimated it using the following formula: year of Time 1 measurement = publication year − 3 years (assuming that studies were published on average 3 years after the completion of data collection) − interval between first and last measurement occasion (i.e., duration of data collection; for a similar procedure, see Orth, Erol, & Luciano, 2018).

For studies that included more than two measurement occasions, we coded all available occasions if they were at least 6 months apart. Moreover, if studies provided more than one effect size because two different measures of SWB were used, all measures were included. Consequently, we included multiple effect size estimates per study for some studies (see below for details on how we handled the statistical dependency between the effect sizes). If a study included more than two measurement occasions with time lags smaller than 6 months (e.g., first measurement occasion in January, the next in March, and then again in August), we used only those measurement occasions that provided information on consecutive (i.e., nonoverlapping) time intervals that were 6 months or longer (e.g., January and August).

To ensure high reliability of the codings, three coders (two postdoctoral researchers and one doctoral student) double-coded studies using a rotation principle. The basic procedure of this rotation principle was that Coder 1 independently coded 50 studies that were already coded by Coder 2. Coder 2 independently coded 50 studies that were already coded by Coder 3. Coder 3 independently coded 50 studies that were already coded by Coder 1. Regarding inclusion/exclusion, the intercoder agreement was 97% across all pairs of coders. Regarding the study characteristics, intercoder agreement was on average 89% across all pairs of coders (ranging from 50% to 100%). Divergent coding was discussed until the coders reached a consensus.

Computation and Analysis of Effect Sizes

All analyses were conducted in R Version 4.0.3 (R Core Team, 2020). We used the single-group, pre–post effect size to study the mean-level change in SWB across the life span (Morris & DeShon, 2002). A similar procedure has been used in previous meta-analyses on mean-level change across the life span (e.g., Luhmann, Hofmann, et al., 2012; Mund et al., 2020; Orth, Erol, & Luciano, 2018; Roberts et al., 2006). Following Morris and DeShon (2002), we calculated the standardized mean change *d* as follows:

$$d_i = \frac{\text{raw mean at time}_t - \text{raw mean at time}_{t-1}}{\text{standard deviation at time}_{t-1}}. \quad (1)$$

A positive *d* value indicates an increase in SWB, and a negative *d* value indicates a decrease. By using these procedures (i.e., by computing the effect sizes based on means and *SD*s of the variables), we ensured that none of the effect sizes included in the meta-analytic data set had been adjusted for covariates. Thus, even if some of the original studies from which the meta-analytic data were drawn controlled for covariates in the analyses, the effect sizes of the present meta-analysis were not adjusted for any covariates. In the next step, we set the *d* in relation to the observed time interval by dividing it by the length of the time lag (in years) between time $t - 1$ and time t. Thus, our final effect size measure in the present meta-analysis is a change-to-time ratio, with the unit *d* per year.

When using standardized mean change *d* per year as effect size, the within-study variance per year is given by

$$v_i = \frac{\frac{2(1-r_i)}{n_i} + \frac{d_i^2}{2n_i}}{(\text{time lag between time}_{t-1} \text{ and time}_t)^2}, \quad (2)$$

where d_i is the standardized mean change *d* in study *i*, n_i is the sample size in study *i*, and r_i is the correlation between the measures at time $t - 1$ and time t in study *i*. The denominator in the formula is

important because we needed the within-study variance *per year* that corresponds to the effect size *d* per year (Viechtbauer, 2019). We used the test–retest correlation between time $t - 1$ and time t reported in the original study whenever possible. In cases in which r_i was not reported in the original study, we used the mean correlation across SWB components and studies (i.e., $r = .523$). We estimated random-effects metaregression models to generalize the findings beyond the included studies in the present meta-analysis (Raudenbush, 2009).

For the main analyses, we were interested in the *d* per year within different age groups across the life span. To create these age groups, we used the mean age of the sample at the center of the time interval on which the effect size (i.e., *d* per year) was based rather than the mean age of the sample at time t or time $t - 1$. For example, if the mean age of a sample was 12 years at time $t - 1$ and 16 years at time t, the age at the center of the interval on which the effect size was based was 14. We argue that this procedure is especially beneficial for studies using larger time intervals between assessments (e.g., 5 or 10 years). It would have been ideal if all studies used relatively short time intervals between assessments. Though, as the number of studies with very broad time intervals was small in this meta-analytic data set, effect sizes could be mapped on age with sufficient precision. Despite these considerations, the determination of age groups is to some extent subjective. Although using a different set of age groups might result in slightly different trajectories, the general pattern of the trajectories would be unaltered and can accordingly be considered robust. We further elaborate on this topic in the Discussion section.

For each outcome measure (i.e., life satisfaction, positive affect, and negative affect), we created age groups that were narrow enough to reflect different developmental periods but broad enough to include at least five effect sizes. We created the following 12 age groups for each outcome: 9–12 years, 12–14 years, 14–16 years, 16–18 years, 18–22 years, 22–30 years, 30–40 years, 40–50 years, 50–60 years, 60–70 years, 70–80 years, 80 to the maximum age in years. We first estimated the overall *d* per year for each age group. These *d* per year effects were then cumulated across the life span.

Accounting for the Dependency of Effect Sizes

Generally, univariate meta-analytic techniques assume that effect sizes are independent (Moeyaert et al., 2017). Yet, studies with three or more waves of data, studies with multiple samples, and studies that use different measurement scales for the same construct produce multiple effect sizes within a study, resulting in dependency of effect sizes. Previous meta-analyses of longitudinal studies often solved the dependency of effect sizes by averaging effect sizes within samples before the meta-analytic computations (e.g., Orth, Erol, & Luciano, 2018). Still, this procedure loses information and makes the meta-analytic computations less precise. Moreover, there might also be a dependency between studies that this averaging procedure cannot handle. For example, study results from the same research group can be more similar than those from different research groups, or studies from the same country can be more similar than studies from different countries. There are many different ways to deal with the issue of dependent effect sizes in meta-analyses (for an overview, see Moeyaert et al., 2017). In the present meta-analysis, we applied robust variance estimation (RVE). The RVE approach adjusts the standard errors and does not require accurate knowledge of the within-study covariance structure (Tanner-Smith & Tipton, 2014). Therefore, this approach can be applied to any type of dependency, to any degree of dependency, and to any type of effect size. Consequently, a dependency that arises from multiple measurement scales used, multiple samples within a study, or multiple measurement occasions can be accommodated simultaneously using RVE (Tanner-Smith & Tipton, 2014). Therefore, we included all available measurement points in the present meta-analysis without averaging them while taking different dependencies into account.

Moderator Analyses

We estimated a series of mixed-effects metaregressions to test for moderators of mean-level change in SWB. As for some age groups, there were only a few studies, and because some moderators were sparsely distributed across age groups, we combined all age groups in the moderator analyses. Thus, in these analyses, we examined the full sample of studies covering the observed age range from 9 to 96 years (for life satisfaction), 9 to 94 years (for positive affect), and 9 to 87 years (for negative affect). In these models, we controlled for the mean age of the sample as a continuous variable (i.e., controlling for the linear effect of age; for a similar procedure, see Orth, Erol, & Luciano, 2018). To examine the effect of birth cohort, we computed the mean year of birth using the variable's mean age at Time 1 and year of Time 1 assessment. The mean year of birth was included as a continuous variable in our moderator analyses. Moreover, we included the percentage of women in the sample as a continuous variable in our moderator analyses. For all categorical variables (i.e., publication type, country of origin of the sample, ethnicity of the sample, sample type, and time frame of SWB measures), we focused on specific contrasts due to the low number of samples in some categories. We describe these contrasts in more detail in the Results section.

Outlier Analyses

We tested for outliers and influential cases in the effect sizes because they may affect the validity and robustness of our meta-analytic conclusions (Viechtbauer & Cheung, 2010). We performed these analyses separately for each SWB outcome and across all age groups using the *influence.rma.uni* function from the *metafor* package (Viechtbauer, 2010). No dependency of effect sizes could be considered in these analyses. We excluded effect sizes if the externally standardized residuals were greater than 1.96 or smaller than −1.96 and if the effect size was considered influential. Information on when an effect size is considered influential is provided by Viechtbauer and Cheung (2010).

Publication Bias Analyses

Studies with significant findings are more likely to be published than studies with nonsignificant findings (Dickerson, 2005), a phenomenon called publication bias. It is possible that studies with samples from certain age groups (e.g., older adults) are less likely to be published if they find certain effects (e.g., increases in SWB) that contradict theoretical assumptions. In this case, publication bias would be specific to an age group. An advantage of meta-analytic

techniques is the possibility to assess the extent to which the aggregated effects are affected by publication bias. To examine if there is evidence of publication bias, we tested the funnel plot asymmetry using Egger's regression test (Egger et al., 1997) separately for each age group and outcome. This analysis was performed after the exclusion of potential outliers. The basic idea of Egger's regression test is that a statistically significant association between the observed effect size and the standard error implies asymmetry in the funnel plot, which may indicate publication bias. In these analyses, we handled the dependency of effect sizes by using a multilevel metaregression with effect sizes nested within samples (i.e., by using the *rma.mv* function from the *metafor* package in R; Viechtbauer, 2010). Moreover, we tested whether the effect sizes differed depending on whether the means and *SD*s of the SWB outcomes were extracted from published journal articles (48%) versus any sort of gray literature (including dissertations, book chapters, unpublished data sets; 52%). The large proportion of unpublished effect sizes is due to including SWB information from multiple age groups (i.e., multiple independent samples) with many measurement occasions that have not been published in this form.

Results

Study Characteristics

For life satisfaction, we included 363 unique samples with 415,423 participants with an average sample size of $N = 1{,}144$ ($SD = 6{,}031.42$, $Mdn = 282$). For the positive affect, we included 128 unique samples with 88,162 participants with an average sample size of $N = 688.77$ ($SD = 3{,}354.59$, $Mdn = 270.5$). For the negative affect, we included 129 unique samples with 65,274 participants with an average sample size of $N = 506$ ($SD = 709.11$, $Mdn = 247$).

Supplemental Table S1 shows the sample characteristics of the included studies. Across components of SWB, females and males were on average almost equally represented in the samples ($M =$ 55% females, $SD = 31$, $Mdn = 53$). Most of the samples were from Europe (56%), followed by North America (United States and Canada; 23%). The remaining 21% came from other countries (e.g., China, Brazil, Australia). A total of 61% were community samples, 6% were college/university student samples, and 32% were nationally representative samples. The remaining 1% used other sample types (e.g., schoolchildren, sample type not specified). Of all included samples, 54% were predominantly White/European sample, 8% were predominantly Asian, 2% were predominantly Native American, 1% was predominantly Black, and 1% was predominantly Hispanic/Latin American. The rest of the samples were described as mixed ethnicity (19%), or no ethnicity information was provided for the sample (15%). Across components of SWB, the first measurement occasion of the included studies was between 1975 and 2020 ($M = 2{,}006.63$, $SD = 7.99$, $Mdn = 2{,}008$). Mean year of birth ranged from 1,907.16 to 2,005 ($M = 1{,}970.21$, $SD = 25.39$).

As described above, we included samples that had a maximum *SD* of age of 5. We chose this criterion to ensure that effect sizes can be mapped with sufficient precision on age (for a similar procedure, see Orth, Erol, & Luciano, 2018). Across all included samples, the average *SD* of age was 1.36 years. The meta-analytic data set can be assessed at OSF (https://osf.io/wn7vm/).

Preliminary Analyses

For each outcome, we investigated whether the distribution of effect sizes suggested that there were influential outliers. We excluded 15 effect sizes for life satisfaction, five for positive affect, and five for negative affect because they were identified as influential outliers. Nonetheless, as a robustness check, we also estimated mean effect sizes by retaining all effect sizes in the meta-analytic data set (see Supplemental Table S2 and Figure S1). The results suggested that the overall pattern of findings was almost the same, regardless of whether influential outliers were excluded or included.

Next, we assessed whether there was evidence of publication bias in the different age groups analyzed in this meta-analysis. We did not expect publication bias to be a major issue in this meta-analysis because most studies included did not focus on the development of SWB but simply reported the relevant descriptive statistics (i.e., means and *SD* of life satisfaction, positive affect, or negative affect). To test for publication bias, we used three different approaches.

First, we visually inspected the funnel plots, which display the association between the observed effect size and the standard error. Most funnel plots exhibited a symmetrical shape typical of nonbiased meta-analytic data sets (see Supplemental Figure S2–Figure S7).

Second, Egger's regression tests (Sterne & Egger, 2005) were conducted. Because of the large number of tests (12 age groups for each of the three outcomes, resulting in 36 tests in total), we adjusted the significance level to .001, following the Bonferroni method (i.e., dividing .05 by 36). The results of Egger's regression tests are shown in Table 1. Overall, the findings suggested that in most age groups, the funnel plots of the outcomes did not deviate significantly from a symmetrical shape, speaking against publication bias.

Third, we tested whether effect sizes from unpublished data (including dissertations) differed significantly from effect sizes from articles published in peer-reviewed journals. This analysis was performed across all age groups, because for some age groups, the amount of gray literature was too low to interpret this comparison. The unstandardized results of a mixed-effects metaregression model indicated that effect sizes from unpublished data (coded as 0) and journal articles (coded as 1) did not significantly differ for any of the outcomes (life satisfaction: $B = -0.013$, $p = .148$; positive affect: $B = -0.007$, $p = .758$; negative affect: $B = 0.040$, $p = .073$). In sum, the different publication bias analyses suggested that there is little evidence of publication bias.

Effect Size Analyses

The main aim of this meta-analysis was to map mean-level change in life satisfaction, positive affect, and negative affect on age. Therefore, we conducted the effect size analyses within age groups. Table 2 provides an overview of the age groups across the observed age range.

The relatively narrow age groups were created to maximize precision in estimating age-dependent mean-level changes. Although the power of significance tests of mean-level changes would be greater if we created broader age groups with a larger number of samples, we emphasize that null hypothesis significance tests of mean-level changes were not a central goal of this meta-analysis (Cumming, 2014; Fraley & Marks, 2007; Greenwald,

Table 1
Egger's Regression Test of Funnel Plot Asymmetry

Outcome	Age group	*z*	*p*
Life satisfaction	9–12 years	1.16	.247
	12–14 years	−0.15	.882
	14–16 years	2.51	.012
	16–18 years	−0.33	.740
	18–22 years	0.62	.533
	22–30 years	0.61	.539
	30–40 years	−0.87	.386
	40–50 years	−0.35	.727
	50–60 years	1.40	.161
	60–70 years	1.39	.165
	70–80 years	0.25	.804
	80–96 years	−0.11	.913
Positive affect	9–12 years	0.08	.939
	12–14 years	0.74	.458
	14–16 years	1.16	.244
	16–18 years	−0.53	.593
	18–22 years	−0.16	.869
	22–30 years	−0.78	.437
	30–40 years	−0.15	.880
	40–50 years	0.07	.942
	50–60 years	0.52	.604
	60–70 years	1.70	.089
	70–80 years	−0.59	.553
	80–94 years	−0.99	.320
Negative affect	9–12 years	−0.72	.468
	12–14 years	−0.60	.546
	14–16 years	−0.11	.910
	16–18 years	1.21	.227
	18–22 years	−0.27	.785
	22–30 years	−1.21	.227
	30–40 years	−3.04	.002
	40–50 years	−1.51	.130
	50–60 years	−0.94	.347
	60–70 years	0.28	.781
	70–80 years	1.37	.171
	80–87 years	4.39	<.001[a]

Note. Computations were made using mixed-effects metaregression models.
[a] Indicates statistical significance based on the Bonferroni-adjusted significance level of .001.

1975). For completeness, Table 2 also includes 95% confidence intervals of mean effect sizes.

Figure 2 illustrates the trajectories of life satisfaction, positive affect, and negative affect, on the basis of the meta-analytic effect sizes reported in Table 2. Given that the age groups covered more than 1 year, the estimate of yearly change (e.g., $d = -0.141$ for life satisfaction in the age group 9–12 years) was used for each year included in the group (e.g., 3 years for the age group 9–12, resulting in a cumulative change of $d = -0.423$ from age 9 to 12 years). Using these procedures, we plotted the trajectories across the observed age range for the three constructs of SWB. Life satisfaction (Figure 2A), on average, decreased from age 9 until age 16 ($d = -0.56$). From age 16 onward, life satisfaction increased slightly until age 70 ($d = 0.16$) and then decreased again ($d = -0.24$), which corresponds to a small effect size based on Cohen (1992). More recent guidelines for interpreting effect sizes criticize Cohen's conventions as too conservative (Funder & Ozer, 2019). Consequently, effects of such size may also be considered moderate.

Positive affect (Figure 2B) decreased, on average, from age 9 to age 70 ($d = -1.64$). From age 70 to age 80, positive affect increased ($d = 0.20$). This increase was followed by a decrease until age 94 ($d = -0.27$). Overall, the difference between age 9 and 94 corresponds to a large effect of $d = -1.71$ based on Cohen (1992).

Negative affect (Figure 2C) showed ups and downs between childhood and early adulthood. It decreased from age 9 to age 12 ($d = -0.12$), followed by an increase from age 12 to age 22 ($d = 0.20$). After age 22, negative affect decreased until age 60 ($d = -0.92$), corresponding to a large effect based on Cohen (1992), after which it increased again until age 87. The difference between age 60 and 87 corresponds to a medium effect of $d = 0.58$ based on Cohen (1992). On average, negative affect reached the lowest point at age 60 years, with a cumulative $d = -1.00$ (i.e., relative to age 9, which was the first age for which data on negative affect were available).

Moderator Analyses

We used mixed-effects metaregression models to test whether certain study characteristics are significant moderators of the effect sizes. For categorical variables, we focused on specific contrasts because the number of effect sizes in some of the categories was too low to draw meaningful conclusions. More specifically, for sample type, we contrasted effect sizes from nationally representative samples with effect sizes from other samples. For country, we contrasted effect sizes from European samples with effect sizes from other samples and with effect sizes from North American samples. For ethnicity, we contrasted effect sizes from White/European samples with effect sizes from other samples. For the type of SWB measure, we contrasted effect sizes based on versions of the Satisfaction With Life Scale (Diener et al., 1985) with effect sizes based on other measures (for life satisfaction). Regarding positive and negative affect, we contrasted effect sizes based on versions of the PANAS questionnaire (Watson et al., 1988) with effect sizes based on other affect measures. Moreover, we tested whether effect sizes based on PANAS versions measuring trait-like affect (i.e., the time frame "in general" was the reference category in these contrasts) differed from effect sizes based on PANAS versions with more short-term time frames (e.g., "last few months", "last few weeks", "momentary", "past month", "past week", or "past year"). The frequencies of the different time frames used to measure positive and negative affect are presented in Supplemental Table S5. As metric moderators, we included the percentage of females, age, and year of birth. We grand-mean centered age and year of birth. Because of the large number of tests in the moderator analyses (i.e., seven tests for each outcome plus one additional test of the time frame for positive affect and negative affect each, resulting in 23 tests), we adjusted the significance level to .002 (i.e., dividing .05 by 23).

In the first step of the moderator analyses, we tested each moderator separately, controlling for the mean age of the sample. We report these results in the Supplemental Material (Supplemental Table S3 and Table S6). In the second step, we tested all moderators simultaneously, again controlling for age, to examine whether the moderators had unique effects. Table 3 reports the results of this second step. We found no significant moderating effects for any of the outcomes using the adjusted significance level of .002, suggesting that the pattern of findings was robust across studies with different sample characteristics. Moreover, the nonsignificant

Table 2
Meta-Analytic Results for Life Satisfaction, Positive Affect, and Negative Affect in Each Age Group

Age group	Number of studies	Number of effect sizes	*d* per year	95% CI	Heterogeneity I^2	Heterogeneity τ^2
Life satisfaction						
9–12 years	7	17	−0.141	[−0.271, −0.010]	73.205	0.016
12–14 years	31	48	−0.131	[−0.174, −0.087]	94.120	0.013
14–16 years	36	65	−0.008	[−0.041, 0.026]	89.958	0.006
16–18 years	30	45	0.002	[−0.032, 0.036]	86.587	0.002
18–22 years	40	77	−0.004	[−0.027, 0.019]	84.889	0.001
22–30 years	52	142	0.004	[−0.013, 0.021]	86.760	0.001
30–40 years	49	149	0.007	[−0.007, 0.021]	98.903	0.004
40–50 years	38	117	−0.003	[−0.035, 0.029]	95.360	0.002
50–60 years	38	124	0.007	[−0.005, 0.019]	83.100	0.001
60–70 years	32	111	0.004	[−0.010, 0.017]	80.584	0.001
70–80 years	37	112	−0.013	[−0.039, 0.013]	90.994	0.001
80–96 years	29	107	−0.007	[−0.028, 0.015]	82.285	0.001
Positive affect						
9–12 years	9	16	−0.068	[−0.190, 0.055]	88.451	0.043
12–14 years	22	33	−0.059	[−0.118, 0.001]	93.156	0.022
14–16 years	17	29	−0.042	[−0.105, 0.020]	74.967	0.009
16–18 years	7	7	−0.057	[−0.172, 0.057]	25.085	0.003
18–22 years	13	22	−0.044	[−0.117, 0.029]	93.400	0.011
22–30 years	11	27	−0.034	[−0.118, 0.050]	81.486	0.007
30–40 years	11	35	−0.043	[−0.096, 0.011]	80.590	0.004
40–50 years	15	41	−0.013	[−0.029, 0.003]	61.030	0.000
50–60 years	16	40	−0.007	[−0.020, 0.007]	38.379	0.000
60–70 years	9	24	−0.011	[−0.061, 0.039]	53.802	0.001
70–80 years	11	24	0.019	[−0.035, 0.074]	94.131	0.004
80–94 years	10	17	−0.019	[−0.064, 0.025]	85.556	0.002
Negative affect						
9–12 years	15	26	−0.059	[−0.176, 0.057]	93.547	0.029
12–14 years	27	38	0.029	[−0.018, 0.075]	94.833	0.014
14–16 years	24	40	0.035	[−0.007, 0.076]	74.208	0.005
16–18 years	13	17	0.012	[−0.180, 0.203]	93.920	0.035
18–22 years	14	31	0.013	[−0.064, 0.090]	98.655	0.034
22–30 years	11	36	−0.042	[−0.150, 0.065]	84.347	0.010
30–40 years	8	33	−0.044	[−0.083, −0.005]	58.057	0.003
40–50 years	8	33	−0.022	[−0.065, 0.021]	68.581	0.001
50–60 years	12	41	−0.009	[−0.061, 0.043]	78.745	0.005
60–70 years	8	30	0.014	[−0.028, 0.056]	56.143	0.002
70–80 years	10	31	0.025	[−0.043, 0.093]	58.061	0.002
80–87 years	6	25	0.027	[−0.019, 0.073]	63.233	0.001

Note. CI = confidence interval.

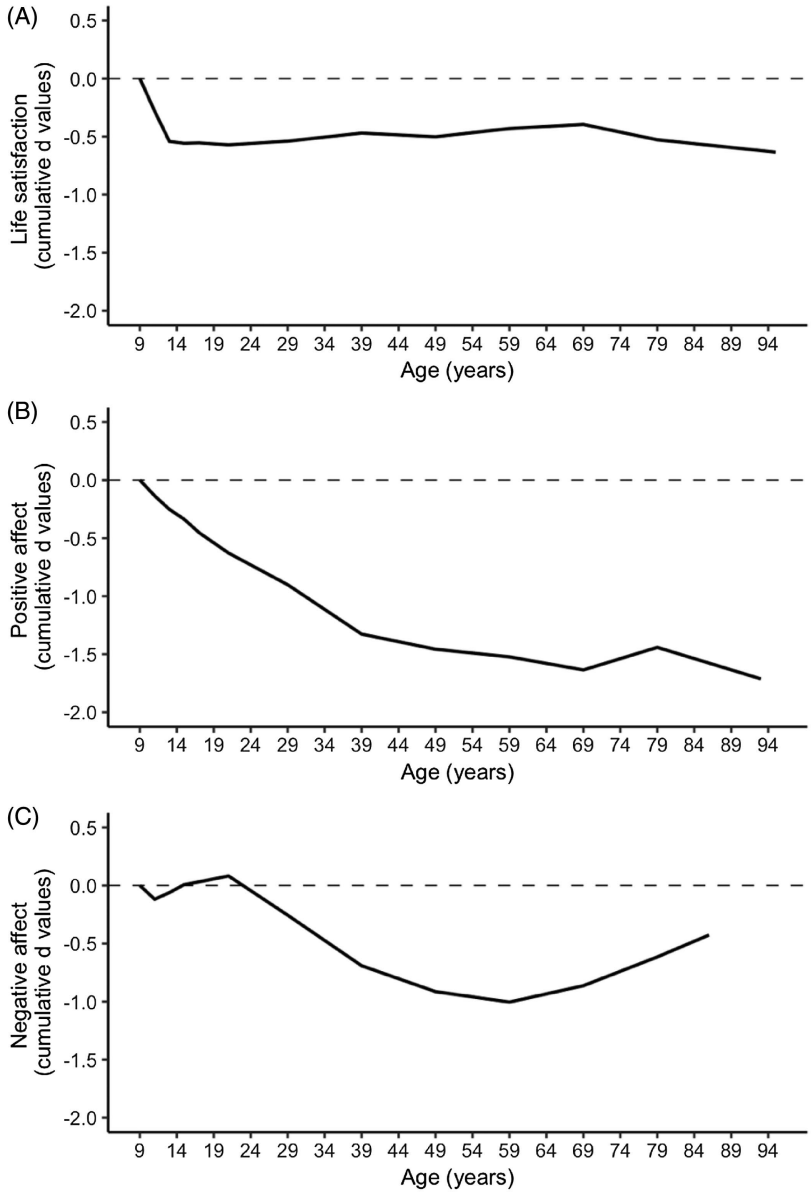
effect of mean year of birth indicates no evidence of cohort effects. For each moderator (except time frame due to the large number of categories), we also tested whether it interacted with the mean age of the sample in predicting the effect sizes. This analysis was included because the effects of some variables (e.g., gender) on SWB might be more pronounced in certain phases in life (i.e., at a certain age) than in others. Nevertheless, none of the interaction effects were statistically significant (see Supplemental Table S4).

Discussion

The present meta-analysis aimed to draw a precise and comprehensive picture of the normative trajectories of SWB (as indicated by life satisfaction, positive affect, and negative affect) across the life span. Our meta-analytic data set included 443 unique samples with a total of 460,902 participants across all outcomes. Overall, the mean-level trajectories differed substantially among the three components of SWB. Life satisfaction decreased from age 9 to 16 ($d = -0.56$), increased slightly until age 70 ($d = 0.16$), and then decreased again until age 96 (i.e., the oldest age for which data on life satisfaction were available; $d = -0.24$). Positive affect declined from childhood for almost the entire time until age 94 ($d = -1.71$). Negative affect showed smaller ups and downs between age 9 and 22. After age 22, negative affect declined until age 60 ($d = -0.92$), after which it increased again until age 87 ($d = 0.58$). Average changes in positive and negative affect were more pronounced than in life satisfaction. Overall, the maximum of cumulative change for life satisfaction corresponds to a moderate effect ($d = -0.56$), whereas the maximum of cumulative change for positive affect ($d = -1.71$) and negative affect ($d = -1.00$) corresponds to a large effect based on Cohen (1992). A similar effect size ($d > 1$) has also been found for self-esteem and the Big Five traits of emotional stability and openness (Bleidorn et al., 2022; Orth, Erol, & Luciano, 2018).

Figure 2

Mean-Level Change in Life Satisfaction (A), Positive Affect (B), and Negative Affect (C) Across the Life Span



Note. The vertical axis shows cumulative *d* values relative to age 9 (thus, the point of origin [i.e., zero] is arbitrary; for a similar way of illustrating meta-analytic findings on mean-level change, see Orth, Erol, & Luciano, 2018 and Roberts et al., 2006). For age groups that covered more than 1 year (e.g., ages 18–22), the estimate of the yearly change was used for each year included in the age group.

Development of SWB Across the Life Span

Most theoretical perspectives reviewed in the introduction predict that SWB changes in normative ways across the life span. Only the set point theory suggests that SWB is stable across the life span, an idea that is clearly challenged by our meta-analytic results. In this section, we discuss the meta-analytic findings separately for the different phases of life. We discuss the findings against the background of the hypotheses derived from theoretical perspectives relevant to these phases of life.

Childhood and Adolescence

The disruption hypothesis (Brandes et al., 2021; Soto & Tackett, 2015) suggested a temporary decrease in life satisfaction and positive affect and an increase in negative affect in the period from

Table 3
Moderator Analyses

Outcome	Estimate	*B*	*SE*	*p*
Life satisfaction (k = 662)	Intercept	−0.02	0.03	.457
	Age at T1	−0.00	0.00	.682
	Year of birth	−0.00	0.00	.341
	Sample type (representative)	0.01	0.01	.257
	Country (North America)	0.00	0.02	.933
	Country (other)	−0.02	0.03	.420
	Ethnicity (White/European)	0.01	0.02	.731
	Percentage of females	−0.00	0.00	.967
	Type of SWB measure (SWLS)	0.00	0.01	.774
Positive affect (k = 148)	Intercept	−0.01	0.05	.838
	Age at T1	0.00	0.00	.960
	Year of birth	0.00	0.00	.447
	Sample type (representative)	−0.02	0.02	.184
	Country (North America)	−0.05	0.04	.197
	Country (other)	0.03	0.04	.572
	Ethnicity (White/European)	−0.01	0.04	.788
	Percentage of females	0.00	0.00	.790
	Type of SWB measure (PANAS)	0.00	0.02	.950
Negative affect (k = 256)	Intercept	0.03	0.07	.696
	Age at T1	0.00	0.00	.625
	Year of birth	0.00	0.00	.440
	Sample type (representative)	0.04	0.03	.191
	Country (North America)	−0.07	0.06	.265
	Country (other)	−0.11	0.10	.280
	Ethnicity (White/European)	−0.05	0.06	.410
	Percentage of females	0.00	0.00	.829
	Type of SWB measure (PANAS)	0.03	0.03	.380

Note. Computations were made using mixed-effects metaregression models, in which all predictors were added simultaneously. Mean age was included as a control variable in all models. Mean age and mean year of birth were grand-mean centered. The following variables were dichotomous: sample type (1 = representative, 0 = other), ethnicity (1 = White/European, 0 = other), type of SWB measure (1 = SWLS [for life satisfaction] or PANAS [for positive and negative affect], 0 = other). For country, we used two dummy variables representing three categories of the country variable (Europe vs. North America vs. other countries). The reference category was Europe. k = the number of effect sizes, B = unstandardized regression coefficient from the mixed-effects metaregression model, including study characteristics as predictors of effect sizes. *SE* = standard error; SWB = subjective well-being; T1 = Time 1; PANAS = Positive and Negative Affect Scale; SWLS = Satisfaction With Life Scale.

middle childhood to late adolescence (i.e., between age 9 and age 18). For life satisfaction, our meta-analytic findings are consistent with this hypothesis. For positive and negative affect, however, the interpretation is less clear. Positive affect decreased from childhood on. Still, our meta-analytic results do not suggest that this decrease in positive affect is a disruption (i.e., a temporary dip) because the decreasing trend continued until late adulthood. In contrast, negative affect tended to increase from age 12 until age 22. After that age, the negative affect decreased. Thus, this finding is consistent with the idea of disruption during adolescence and early adulthood. Across all three outcomes, the findings suggest that SWB worsens during adolescence, consistent with the disruption hypothesis. Yet, this deterioration does not appear as temporary for all outcomes as suggested by the disruption hypothesis.

Several mechanisms could be responsible for this developmental trend. For example, the transition from childhood to adulthood is characterized by different physical, psychological, and social changes (Goldbeck et al., 2007), which may lead to a decrease in SWB in adolescence. Neurobiological theories suggest that age-related changes in the morphological structure of the brain (Giedd, 2004) and in the neurotransmitter system (Wahlstrom et al., 2010) lead to losses in SWB during adolescence. Moreover, certain developmental tasks such as moving toward independence (Geuzaine et al., 2000) may confront adolescents with emotional challenges that result in decreases in SWB. These emotional challenges fall into a period of life where the repertoire of emotion regulation strategies is still relatively small, which is a risk factor for low SWB (Zimmermann & Iwanski, 2014). Our meta-analytic findings are also in line with previous cross-sectional findings suggesting lower levels of life satisfaction and quality of life during adolescence (Goldbeck et al., 2007).

Moreover, the disruption hypothesis suggests greater losses in SWB for adolescent girls than for adolescent boys (Brandes et al., 2021; Soto & Tackett, 2015). In our meta-analysis, we did not find significant gender effects. In this regard, it should be noted that in the moderator analyses, we could only test for the effect of the average proportion of females or males in a sample. Thus, in this meta-analysis, the nonsignificant moderator effect refers to differences between samples, which does not necessarily generalize to differences between individuals. In future research, it would be worthwhile to test whether the nonsignificant gender effect holds when tested with individual-level data on the development of SWB.

Young Adulthood

For young adulthood (i.e., age 18–40 years), the theoretical perspectives led to conflicting hypotheses about the development of SWB. The maturity principle outlined in the neo-socioanalytic theory (Roberts & Robins, 2021; Roberts & Wood, 2006) suggests a decrease in negative affect and an increase in positive affect and life satisfaction in young adulthood. When considering normative changes and transitions during young adulthood (e.g., moving out, beginning of higher education or vocational training, starting a family), both losses and gains in SWB are plausible.

Regarding young adulthood, the meta-analytic findings do not clearly support one of the theoretical perspectives reviewed in the introduction. Regarding life satisfaction, we found an increase in line with the maturity principle and with studies showing that young adulthood is characterized by a high density of positive life events and life circumstances (Lüdtke et al., 2011). Yet, the average increase in life satisfaction was small. Regarding the affective component of SWB, we found that both positive and negative affect decreased during young adulthood.

At first sight, it might be surprising that positive and negative affect both decrease and that there is no complementary developmental course (e.g., a decrease in positive affect, accompanied by an increase in negative affect, or vice versa). Nonetheless, research has long shown that positive and negative affect are—although related—not opposite poles of the same construct but must be distinguished conceptually and empirically (Diener & Emmons, 1984). As described in the introduction, the general affect intensity (for positive and negative affect) seems to decrease from young adulthood until late adulthood (Larsen & Diener, 1987). Moreover, the present findings could also be explained by the ambivalence of changes in life circumstances during young adulthood. On the one hand, young adulthood is often described as the rush hour of life (Zannella et al., 2019), in which multiple and partly conflicting tasks need to be accomplished. These tasks typically involve making choices, for example, with regard to one's education, career path, romantic partner, and whether or not to start a family. The simultaneous demands in different life domains can be perceived as stressful, resulting in decreases in positive affect. On the other hand, although making choices can be stressful, this period in life is characterized by high perceived control, which is generally linked to lower negative affect (Drewelies et al., 2018). Additionally, the financial situation starts to stabilize in this developmental period (Bea & Yi, 2019; Knudson & Mazurik, 2021), and most young adults do not yet suffer from any major health problems. Taken together, young adulthood could be described as a period with high demands and possibly decreasing positive affect, but also with high resources (e.g., financial, social, physical, and psychological functioning) and possibly decreasing negative affect, which is what we found in this meta-analysis. The decreasing trend in both positive and negative affect is also in line with the idea of decreasing affect intensity across the life span (Bailen et al., 2019).

Middle Adulthood

For middle adulthood (i.e., age 40–65 years), neo-socioanalytic theory suggested an increase in SWB due to further maturation of people's personality traits. Consistent with this hypothesis, life satisfaction increased in middle adulthood, whereas negative affect decreased in this period. These findings may also be understood within the theory of dynamic integration (Labouvie-Vief, 2003), which postulates that the balance between the optimization of positive emotions and experiences and tolerance of negative emotions stabilizes in middle adulthood. Positive affect, however, decreased in middle adulthood, which is inconsistent with the prediction from neo-socioanalytic theory and the theory of dynamic integration. A possible explanation is that the size of people's social networks—which is associated with SWB (e.g., Litwin & Levinsky, 2022)—steadily becomes smaller in middle adulthood (Wrzus, Hänel, et al., 2013).

Late Adulthood

For late adulthood (i.e., 65 years and older), theoretical perspectives again proposed conflicting hypotheses. Neo-socioanalytic theory (Roberts & Robins, 2021; Roberts & Wood, 2006) and the terminal decline hypothesis (Gerstorf et al., 2008; Gerstorf & Ram, 2015) suggest a decrease in SWB in late adulthood. Similarly, the theory of dynamic integration (Labouvie-Vief, 2003) postulates that aging is associated with difficulties in integrating and tolerating negative affect, which may result in increases in negative affect. In contrast, socioemotional selectivity theory suggests an increase in SWB due to emotion regulation strategies that help the individual to select positive situations more efficiently and to compensate for losses. Moreover, the SAVI model (Charles, 2010) adds a differential perspective on changes in SWB during late adulthood by emphasizing that the SWB trajectory may strongly depend on one's age-related strengths and vulnerabilities. As late adulthood is, however, on average associated with situations in which strengths cannot be exploited, decreases in well-being can be assumed based on the SAVI model.

The present meta-analytic findings show that life satisfaction and positive affect decrease in late adulthood, whereas negative affect increases. Thus, these findings are consistent with the hypotheses from the neo-socioanalytic theory, the theory of dynamic integration, the SAVI model, and the terminal decline hypothesis and inconsistent with the hypothesis from the socioemotional selectivity theory. A possible explanation is that older adults (compared to young or middle-aged adults) typically experience more losses in important life domains such as health (Furman et al., 2019; Wilson et al., 2020) and social relationships (Buecker et al., 2021; Luhmann, Hofmann, et al., 2012). According to the SAVI model (Charles, 2010), the vulnerabilities outweigh the strengths. Furthermore, numerous studies have suggested that negative age stereotypes and perceived age discrimination may interfere with older adults' SWB (Kornadt & Rothermund, 2011; Kotter-Grühn & Hess, 2012; Wurm et al., 2017).

Is There a U-Shaped Trajectory of SWB?

As reviewed in the introduction, researchers have debated whether SWB follows a U-shaped trajectory over the life course, with the nadir in middle adulthood (Blanchflower & Graham, 2021a; Galambos et al., 2020, 2021). A U-shape would be consistent with the idea that people experience, at least on average, some kind of midlife crisis, where SWB is the lowest. The present meta-analysis does not support the hypothesis of a U-shape, for neither life satisfaction, nor positive affect, nor negative affect. Specifically,

life satisfaction generally increased from age 16 to age 70, with a slight downturn between age 40 and age 50 (across these 10 years, the aggregated decrease corresponded to $d = -0.03$). The very small effect size of the midlife decrease in life satisfaction does not correspond to the hypothesis of a U-shaped trajectory of SWB, with a significant low point in midlife. Also, positive affect continuously decreased from age 9 to age 94, which again is inconsistent with the U-shape hypothesis. Finally, negative affect was lowest in midlife, which is the opposite of what would be expected on the basis of the U-shape hypothesis for SWB, and which is inconsistent with the idea of a midlife crisis. Thus, although many laypeople intuitively agree with the concept of the midlife crisis and although many people report that they have experienced a midlife crisis (Freund & Ritter, 2009), this subjective assessment is inconsistent with the longitudinal trajectory as determined in this meta-analysis. Still, even if the present research suggests no normative low point in SWB in midlife, the notion of a midlife crisis might refer to other experiences in people's lives. For example, a recent meta-analysis suggests that people's satisfaction with their romantic relationship shows the lowest point at age 40 (Bühler et al., 2021).

Moderator Results

We expected heterogeneity in SWB trajectories because SWB levels are determined by multiple factors, including personal characteristics (e.g., personality traits, genetic/biological factors, psychological resources), external context (e.g., general life circumstances, life events, geographical/cultural/historical context), and activities/behaviors (e.g., how people spend their everyday lives). In theory, changes in any of these factors might lead to changes in SWB. Since these factors do not change in unison for everyone, heterogeneity of SWB trajectories can be expected. We performed moderator analyses to test whether this heterogeneity could be explained by the variables coded in the meta-analysis.

These moderator analyses indicated that none of the moderators examined explained variability in the effect sizes. The nonsignificant moderator of the birth cohort appears to be particularly noteworthy. The mean year of birth ranged from 1907 to 2005 across the samples included in this meta-analysis. Consequently, the nonsignificant cohort effect indicates that the shape of the life span trajectory of SWB has not changed over the generations born during the 20th century when examining longitudinal studies. Such nonsignificant cohort effects are not uncommon in meta-analyses of longitudinal studies. For example, Bleidorn et al. (2022) also found no cohort effects in the development of the Big Five personality traits. Even still, this nonsignificant finding does not necessarily mean that there is no cohort effect in studies using other research designs (e.g., in cross-sectional data, developmental trends and cohort effects are confounded). Although samples that differed in their mean year of birth typically also differed in their mean age, we argue that our moderator analyses provide valid insights into cohort effects (i.e., because the analyses statistically controlled for the effect of age). Thus, the effect of birth year captured the unique cohort effect while holding age constant (and also while controlling for other variables, such as ethnicity or sample type, which otherwise could have confounded the effect).

Moreover, the nonsignificant cohort effect is required for valid interpretations of life span trajectories based on estimates across different birth cohorts (as done in this meta-analysis). For example, if more recent generations had experienced steeper decreases in life satisfaction during late adulthood compared to previous generations, these cohort differences would have confounded the overarching life span trajectory of life satisfaction, leading to invalid conclusions. Consequently, the nonsignificant cohort effects in this meta-analysis (for life satisfaction, positive affect, and negative affect) support the validity of the conclusions about the SWB trajectories. Importantly, this meta-analysis provides information only about cohort effects on mean-level *change* in SWB (i.e., cohort effects on the slope) but not the mean level of SWB itself. Thus, future research might examine whether more recent generations of people of certain ages show higher or lower levels of SWB.

The other nonsignificant moderator effects indicate that our overall conclusions regarding the life span trajectories of life satisfaction, positive affect, and negative affect can be considered robust across different samples and study characteristics. Nonetheless, this finding does not imply that there are no moderators but only that no significant evidence of moderators was found, based on the available meta-analytic data set (which was large and included several hundred studies).

Some theoretical perspectives focus on change in momentary, state-like SWB (e.g., affect regulation), while others draw on change in habitual SWB (e.g., maturation principle). A direct test of whether trajectories in SWB are different for state-like or trait-like SWB could not be performed in this meta-analysis. Instead, we examined the time frame of the measurement instruments as a moderator and did not find any evidence for a moderation effect. Still, it should be noted that the time frame does not always resolve whether SWB is state-like or trait-like (Robinson & Clore, 2002). For example, it has not yet been clearly clarified empirically whether a recall of one's own SWB in the past weeks refers more to state-like or trait-like aspects of SWB (compared to asking for SWB "in general" which more clearly refers to trait-like SWB).

Implications of the Present Findings for the Structure of SWB

In a landmark article, Diener (1984) had introduced the tripartite model of SWB, proposing that SWB consists of life satisfaction, positive affect, and negative affect and that these three constructs reflect distinct dimensions. Even though this model is very influential, it has been criticized by others as "premature" (Busseri & Sadava, 2011, p. 1). Specifically, Busseri and colleagues have argued that life satisfaction, positive affect, and negative affect might not be distinct constructs but rather reflect a hierarchical construct with SWB as a higher order factor and life satisfaction, positive affect, and negative affect as only partially independent lower order factors (Busseri, 2015; Busseri & Sadava, 2011). Clearly, the present meta-analysis did not examine the dimensional structure of SWB. Nonetheless, the meta-analytic findings indicate that, at least regarding the normative trajectory of SWB, it is crucial to distinguish between life satisfaction, positive affect, and negative affect. In fact, for each construct, the meta-analysis suggested a distinct developmental pattern across the life span, which speaks for the conceptual distinction of the three SWB components and for the need to assess

each of the constructs separately. We note that consistent with the results of the present meta-analysis, Busseri (2015) found that life satisfaction shows greater mean-level stability over time than positive affect and negative affect.

Our meta-analytical findings showing that life satisfaction was more stable (or more precisely, changed more slowly) than positive and negative affect across the life span are also in line with meta-analytic evidence on changes in these components surrounding major life events (Luhmann, Hofmann, et al., 2012). Life satisfaction is typically conceptualized as people's overall evaluation of their global life circumstances. In contrast, affective well-being (i.e., positive and negative affect) is conceptualized as people's evaluations of recent activities or events, which are more transient than global life circumstances (Luhmann, Hawkley, et al., 2012). Consequently, it seems plausible that life satisfaction and affect differ in their temporal stability across the life span. One might argue that this difference is artificially enforced by differences in measuring the cognitive and affective domains of SWB (e.g., different time frames are used in the scales). Yet, multitrait–multimethod analyses indicated that life satisfaction and affective well-being were empirically distinct even if the same time frame in the measurement was used (Luhmann, Hawkley, et al., 2012), suggesting more substantive than methodological differences between the SWB components. The nonsignificant moderator effect of the time frame in this meta-analysis also supports this perspective.

Limitations

For all SWB outcomes, the pattern of findings was robust across several samples and study characteristics. This finding strengthens confidence in the generalizability of our results. Moreover, we used an analytical approach ensuring that—even if original studies from which the meta-analytic data were drawn had adjusted for covariates in their analyses—the effect sizes of the present meta-analysis were not adjusted for any covariates. Despite these strengths, some limitations still exist that need to be discussed.

First, although we included published and unpublished records from 32 countries and collected information on ethnicity, country of origin, and gender, one limitation of this meta-analysis is that most samples were from Western countries (e.g., Europe, North America) with predominantly White/European samples. Consequently, we were unable to test whether effect sizes from Asian or South American samples differed from effect sizes from Western countries. In line with the recommendations by Johnson (2021), we explicitly point out limitations regarding diversity in longitudinal studies on SWB and call for future research with samples from non-Western countries and more diverse samples in terms of ethnicity. We encourage studying the development of SWB across the life span in such samples and examining whether cultural characteristics may be a source of heterogeneity in trajectories of SWB or whether the trajectories reported in this meta-analysis replicate across different cultures. We emphasize that the trajectories of the various SWB components may also vary as a function of interindividual differences within cultures. To test the moderating effect of such interindividual differences on SWB trajectories, more longitudinal studies collecting data on these variables will be needed in the future.

Second, in this meta-analysis, we created 12 age groups for each outcome, estimated the average mean-level change in these age groups, and cumulated these changes to examine the trajectories across the life span. In creating the age groups, we pursued two goals: First, the age groups should be narrow enough to be able to represent theoretically relevant changes (e.g., during puberty). Second, the age groups should contain a sufficient number of effect sizes so that the mean effect size for this age group can be estimated with sufficient precision. Because we assumed complex nonlinear trajectories of SWB, we decided against modeling age as a continuous predictor in a metaregression. When life span trajectories are nonlinear, metaregression cannot capture the complex and subtle changes that are present in the data (e.g., the ups and downs of negative affect in adolescence).

Third, in a meta-analysis, one can estimate only the *average* trajectory across the life span and thus gain a broad overview of a field of research. The effects found in this meta-analysis were heterogeneous and average trajectories do not necessarily apply to every individual. We conducted several moderator analyses to explain this heterogeneity. None of the moderators tested were statistically significant, indicating the robustness of our findings. Even still, we could not test other potentially relevant moderators such as the socioeconomic status or the relationship status of the sample. Moreover, in a meta-analysis, moderator tests are performed on the level of samples (e.g., the proportion of females in a sample) not on the level of individuals (e.g., individual gender). It remains a task for future research to examine further moderators on the trajectory of SWB across the life span.

Finally, we would like to stress that the mean trajectories of the three SWB components reported in this meta-analysis (as shown in Figure 2) are based on cumulative effect sizes. For each of the estimated effect sizes (i.e., within age groups), the analyses provided a 95% confidence interval indicating the degree of uncertainty in the estimate (Table 2). It was not possible to compute confidence intervals for the cumulative effect sizes, although clearly there is some degree of uncertainty in the trajectories shown in Figure 2. The interpretation of these meta-analytic trajectories should, therefore, be done with appropriate caution. For example, even if Figure 2 shows a small increase or decrease in the trajectory in a given age period (e.g., the slight increase in life satisfaction from young to middle adulthood), the true trajectory could be flat rather than an increase or decrease. Nevertheless, given that the goal of the present research was to track the normative trajectory of SWB across the life span (by synthesizing the available longitudinal information), the point estimates of the effect sizes represent the best estimates for describing this average trajectory.

Conclusions

Based on longitudinal data from 443 samples with more than 460,000 participants, this meta-analysis provides a comprehensive overview of normative mean-level changes in life satisfaction, positive affect, and negative affect across the life span. We found that life satisfaction decreased during adolescence, increased in young and middle adulthood, and decreased again in late adulthood. Positive affect decreased almost the entire time until late adulthood. Negative affect showed ups and downs from age 9 to 22, decreased during young and middle adulthood, and

increased in late adulthood. Taken together, the results of the present meta-analysis suggest that the three components of SWB show distinct developmental patterns across the life span. When generalizing across the SWB components, we found a favorable developmental trajectory of SWB over large parts of life (i.e., from adolescence until about 70 years) for life satisfaction and negative affect but not for positive affect, which decreased over large parts of life. Beginning at age 70 years, the general trend became more negative and SWB worsened rather than improved. Consequently, the findings suggest that interventions aimed at maintaining or enhancing SWB might be particularly useful in late adulthood. Given that the evidence on the effectiveness of well-being interventions is still sparse (for a systematic review, see Owen et al., 2021), future research in this area is strongly needed.

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