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Subjective well-being and academic achievement: A meta-analysis

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ABSTRACT

Is the subjective well-being (SWB) of high-achieving students generally higher compared to low achieving students? In this meta-analysis, we investigated the association between SWB and academic achievement by synthesizing 151 effect sizes from 47 studies with a total of 38,946 participants. The correlation between academic achievement and SWB was small to medium in magnitude and statistically significant at $r = 0.164$, 95% CI [0.113, 0.216]. The correlation was stable across various levels of demographic variables, different domains of SWB, and was stable across alternative measures of academic achievement or SWB. Overall, the results suggest that low-achieving students do not necessarily report low well-being, and that high-achieving students do not automatically experience high levels of well-being.

1. Introduction

Subjective well-being (SWB) and academic achievement are both central indicators of positive psychological functioning (Suldo, Riley, & Shaffner, 2006) and both are variables of interest in identifying the characteristics of high-performing education systems (OECD, 2017). According to the OECD (2017), successful students not only perform well academically but are also satisfied at school. Schools as well as higher educational environments are not just places where young people acquire academic skills, they are also places where people connect with others, develop their personality, experience all facets of society, all of which might influence their SWB.

SWB relates to how people feel and think about their lives (Diener, 1984). Individuals reporting high SWB are at lower risk for a variety of psychological and social problems such as depression and maladaptive relationships with others (e.g., Furr & Funder, 1998; Lewinsohn, Redner, & Seeley, 1991; Park, 2004). Among youth, SWB is positively correlated with physical health and healthy behaviors such as sensible eating and exercise (Frisch, 2000) and negatively related to drug use including alcohol, marijuana and smoking (Zullig, Valois, Huebner, Oeltmann, & Drane, 2001). For the educational context, SWB is important as higher SWB is associated with lower teacher ratings of school-discipline problems (McKnight, Huebner, & Suldo, 2002), an internal locus of control, high self-esteem and intrinsic motivation (Huebner, 1991). Additionally, people with a higher educational level are more likely to report higher levels of SWB (Diener, Suh, & Oishi, 1997; Nikolaev, 2016).

Traditionally, SWB and academic achievement have been investigated in different strands of the literature. Only recently, in investigating academic achievement, adolescents' SWB is an increasingly explored variable (e.g., Adelman & Taylor, 2006; OECD, 2017; Steinmayr, Crede, McElvany, & Wirthwein, 2015). There are a few cross-sectional studies that suggest an association between SWB and academic achievement (e.g., Crede, Wirthwein, McElvany, & Steinmayr, 2015; Kirkcaldy, Furnham, & Siefen, 2004; Suldo, Shaffer, & Riley, 2008). Some results indicate that higher academic functioning leads to higher SWB and lower levels of psychopathology (Suldo & Shaffer, 2008) and that students' great point average (GPA) positively predicts changes in life satisfaction (Steinmayr et al., 2015). However, in other cases, SWB and academic achievement were not statistically significantly correlated (e.g., Huebner, 1991; Huebner & Alderman, 1993). In sum, single studies provide mixed evidence on the relationship between SWB and academic achievement. To obtain a more precise estimate of this relationship, we conducted a comprehensive meta-analysis of studies providing data on the correlation between SWB and academic achievement.

Although our study is the first to meta-analytically examine the relationship between SWB and academic achievement, a number of meta-analyses exist that investigated related constructs. A recent meta-analysis by Huang (2015) revealed a weak negative

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correlation between academic achievement and subsequent depression. However, Huang (2015) focused on studies investigating depression as clinically relevant outcome measure, which is distinct from SWB. Moreover, most studies included by Huang (2015) used clinical samples and therefore cannot be generalized to the broader non-clinical population. Ford, Cerasoli, Higgins, and Decesare (2011) conducted a meta-analysis on the association between psychological well-being (defined here as a broad construct including fatigue, depression, anxiety or distress, life satisfaction, subjective well-being, and symptoms of psychological disorders) and job performance and found an average correlation of $r = 0.37$. Similarly, another large meta-analysis showed that life success causes SWB and SWB in turn causes life success in several life domains such as work, social relationships, prosocial behavior, creativity, and problem solving (Lyubomirsky, King, & Diener, 2005). However, these meta-analyses focused on adults and did not include measures of academic achievement, which is typically studied among children, adolescents, and young adults. Academic achievement was also not included in other meta-analyses on the correlates of SWB (e.g., Bowling, Eschleman, & Wang, 2010; Harter, Schmidt, Asplund, Killham, & Agrawal, 2010; Oishi, 2012; Pinquart & Sörensen, 2000).

To gain more insight in the relationship between SWB and academic achievement and in order to integrate the available empirical evidence, we conducted a meta-analysis on the association between SWB and academic achievement. We aimed at estimating the overall effect size, its statistical significance, and moderator variables of the relation. The remainder of the introduction is divided in three sections. First, we present conceptual definitions of SWB and academic achievement. Second, we state theoretical arguments suggesting an overall positive relation between these two constructs. Third, we discuss potential moderators that might influence the association between SWB and academic achievement.

1.1. Subjective Well-Being (SWB)

SWB refers to how people evaluate their lives and is defined as an individual's overall state of subjective wellness (Diener, 1984). It is a broad concept commonly divided into two components (Busseri & Sadava, 2011; Diener, 1984; Eid & Larsen, 2008): Affective well-being (AWB) reflects the presence of pleasant affect (e.g., feelings of happiness) and the absence of unpleasant affect (e.g., depressed mood). Cognitive well-being (CWB) refers to the cognitive overall evaluation of life satisfaction (i.e., global life satisfaction) as well as of specific life domains (e.g., job satisfaction or marital satisfaction) (Diener, Inglehart, & Tay, 2013). Domain-specific levels of SWB can be aggregated to obtain an overall SWB score (e.g., Kahneman, Krueger, Schkade, Schwarz, & Stone, 2004) and allow the assessment of possible bottom-up influences of specific domains on overall SWB (e.g., does a bad experience in a particular life domain affect the overall sense of well-being?). It has been suggested that three facets of SWB – life satisfaction (LS), positive affect (PA), and negative affect (NA) – should be measured separately (Andrews & Withey, 1976; Lucas, Diener, & Suh, 1996), because, for example, the presence of PA does not necessarily comprise the absence of NA. In the current study, we distinguished between overall and domain-specific well-being and between affective and cognitive well-being.

1.2. Academic achievement

Academic achievement is one performance outcome of instruction and is an important factor for shaping a person's outlook on life (Steinmayr et al., 2015). It is associated with lower stress (Zajacova, Lynch, & Espenshade, 2005), higher self-concept (Guay, Marsh, & Boivin, 2003), higher self-efficacy (Zajacova et al., 2005), and positive health behavior and health (Eide, Showalter, & Goldhaber, 2010; Sigfúsdóttir, Kristjánsson, & Allegrante, 2007). Academic achievement is essential for mastering several central developmental goals across the life span, especially during the school years and young adulthood (Heckhausen, Wrosch, & Schulz, 2010). Engagement with educational goals is related to more positive developmental outcomes in terms of both SWB and educational attainments (Heckhausen & Chang, 2009). In addition to its relevance on an individual level, academic achievement forms a base for the wealth of a nation (Steinmayr, Meißner, Weidinger, & Wirthwein, 2014) and is closely linked to national economic growth (Cheung & Chan, 2008).

Academic achievement can be measured with a wide range of indicators (Steinmayr et al., 2014). To ensure comparability across studies, we restricted the present meta-analysis to achievement measures with a criterion-oriented reference standard such as grades or academic achievement tests, and excluded measures with an individual reference standard such as performance compared to other students in class.

1.3. Relation between SWB and academic achievement

High subjective well-being and high academic achievement are both values that are desirable within our western society. However, no existing meta-analysis investigated if and how these two often reported indicators of societal prosperity are related to each other. SWB and academic achievement could be associated because (a) academic achievement has a causal effect on SWB, (b) SWB has a causal effect on academic achievement, or (c) both SWB and academic achievement are influenced by common third variables. The first mechanism is consistent with self-determination theory (SDT; Ryan & Deci, 2000), which posits that three innate psychological needs (competence, relatedness and autonomy) are essential for intrinsic motivation, personality growth, social development, and personal well-being. Academic achievement may therefore lead to SWB through fulfilling the need for competence (e.g., Neubauer, Lerche, & Voss, 2017). The second mechanism is consistent with the broaden-and-build theory of positive emotions (Fredrickson, 1998, 2001) which posits that the experience of positive emotions broadens one's awareness and allows building new skills and resources, which may ultimately lead to enhanced academic achievement. Indeed, positive emotions are associated with better self-regulated learning, higher motivation, and better examination grades (Mega, Ronconi, & De Beni, 2014) and have a positive effect on memory and attention processes (Fiedler & Beier, 2014). Moreover, experiencing positive emotions is associated with adopting goals oriented towards approach and mastery rather than goals oriented towards avoidance (Linnenbrink & Pintrich, 2002). Pursuing mastery-oriented goals is in turn associated with positive outcomes (see Anderman & Wolters, 2006, for a review). Mastery-oriented students persist longer at academic tasks, are more engaged with their work, use more effective cognitive processing strategies, use less self-handicapping, and continue to engage with tasks in the future when possible (Tuominen-Soini, Salmela-Aro, & Niemivirta, 2008). Moreover, some studies indicate that negative emotionality is negatively related to school achievement (Gumora & Arsenio, 2002). However, this finding could not be replicated with different measures of affect and emotionality (e.g., Supplee, Shaw, Hailstones, & Hartman, 2004).

Finally, the two variables may also be correlated because they are influenced by a common third variable. In the case of SWB and academic achievement, potential confounding variables are intelligence and socioeconomic status. Intelligence and socioeconomic status are not only positively related to academic achieve-

ment (e.g., Deary, Strand, Smith, & Fernandes, 2007; Leeson, Ciarrochi, & Heaven, 2008; Sirin, 2005), but also to SWB. Meta-analytic results show a small positive relation between general mental ability and life satisfaction (Gonzalez-Mulé, Carter, & Mount, 2017) and a small to medium positive relation between socioeconomic status and life satisfaction (Pinquart & Sörensen, 2000). However, empirical studies indicate that SWB and academic achievement are associated even after controlling for these variables (e.g., Crede et al., 2015; Ng, Huebner, & Hills, 2015). When investigating the relationship between academic achievement, intellectual giftedness, and SWB in adults, Pollet and Schnell (2017) found that being intellectually gifted was associated with lower well-being compared to high academic achievers (without intellectual giftedness).

In sum, although different studies make different assumptions about the causal direction and the underlying mechanisms of the association between academic achievement and SWB, they agree that such an association should exist and that it should be positive. The strength of this association, however, is less clear and may in fact vary as a function of various moderator variables. In the largest study on this question to date, Kirkcaldy et al. (2004) examined data from 30 countries to determine correlates of SWB and academic achievement in youth at the national level. They found that countries with high performance in the PISA survey (academic achievement in terms of scientific, mathematical and reading literacy) also had the highest average SWB scores and the strongest association between SWB and reading achievement ($r = 0.63$) within the country. However, a limitation of the study is that economic or social indicators such as high income or small family size were not statistically controlled. Other studies failed to replicate the strong correlation found by Kirkcaldy and colleagues. For example, in a study of adolescents in the UK, Cheng and Furnham (2002) found a smaller but still statistically significant association between school grades and happiness ($r = 0.25$), PA ($r = 0.29$), and NA ($r = -0.29$), controlling for age and gender.

One goal of the present meta-analysis is therefore to examine how and why the strength of the association between academic achievement and SWB varies across samples and studies. For this purpose, we examine both demographic and methodological moderators.

1.4. Potential demographic moderators

1.4.1. Age and gender

The strength of the relation between SWB and academic achievement may vary as a function of age and gender. The relation between reading achievement and subsequent depression was found to vary with age (e.g., Topitzes, Godes, Mersky, Ceglarek, & Reynolds, 2009). This might also be true for the relation between academic achievement and SWB. Furthermore, life satisfaction decreases during adolescence (e.g., Goldbeck, Schmitz, Besier, Herschbach, & Henrich, 2007). It is likely that academic achievement becomes more important at the age of 17–18 (typical age when applying for university) compared to younger age. This might lead to a dynamic relationship between SWB and academic achievement with a lower association in children and a stronger association in adolescents and young adults.

With respect to gender, girls tend to obtain higher grades in school than boys (e.g., Berger, Alcalay, Torretti, & Milicic, 2011). Despite the better school performance in girls, they also experience greater internal distress than boys, evaluate themselves more negatively than boys, and are more prone than boys to worry about their performance at school (Pomerantz, Altermatt, & Saxon, 2002). This suggests the possibility of a gender difference in the relation between SWB and academic achievement. However, there also is evidence indicating that gender does not moderate the link between academic achievement and SWB (e.g., Crede et al., 2015; Huang, 2015; for an exception see Herman, Lambert, Reinke, & Ialongo, 2008). In sum, both age and gender may moderate the association between SWB and academic achievement and were therefore included as moderators.

1.4.2. Country and cultural differences

People tend to be happier if they have the characteristics that are valued in their culture (Diener, Oishi, & Lucas, 2003; Oishi, Diener, Suh, & Lucas, 1999). For instance, self-esteem is a stronger predictor of life satisfaction in individualistic than in collectivistic cultures (Diener & Diener, 1995). The values-as-moderator hypothesis (Oishi et al., 1999) suggests that domains that are value-congruent should be more important for SWB than domains that are value-incongruent. Indeed, the strength of the relation between life domains and SWB is moderated by country-level values (e.g., Oishi et al., 1999). Because the value of academic achievement might differ between different countries and cultures, country and cultural differences were examined as moderators of the link between SWB and academic achievement.

1.4.3. Educational level

The relationship between academic achievement measures and SWB may depend on the educational level of the students. For instance, Chang, McBride-Chang, Stewart, and Au (2003) found that academic test scores obtained from official school records (Chinese, English and mathematics) were statistically significantly correlated with SWB ($r = 0.38$) among a sample of 2nd grade students in Hong Kong, but not among a sample of 8th grade students. Although educational level and age are highly correlated, they are not the same, particularly not on the university level where student populations tend to be heterogeneous with respect to age. For example, some studies using university samples report a mean age of almost 26 years (e.g., Grunschel, Schwinger, Steinmayr, & Fries, 2016) whereas others report a mean age of 18 years (e.g., Schmitt, Oswald, Friede, Imus, & Merritt, 2008). Therefore, we examined not only age, but also education level as a potential moderator of the association between SWB and academic achievement.

1.5. Potential methodological moderators

1.5.1. Study characteristics

The studies included in our meta-analyses were conducted during the last four decades. To test if the magnitude of relation between SWB and academic achievement changed over the time, we examined *publication year* as potential moderator.

We included studies using a correlational design (measuring both constructs at the same occasion) or a longitudinal design (measuring either SWB or academic achievement first). For longitudinal designs, the time between assessments differed from study to study. To examine the stability and directionality of the relation between SWB and academic achievement, we investigated the *measurement order* (SWB measured first, academic achievement first, or both measured at the same time) as a moderator of longitudinal effects.

1.5.2. Measurement of academic achievement

The majority of studies used objective or self-reported GPA as measures of achievement. Alternative measures include standardized achievement tests (e.g., TIMSS; Trends in International Mathematics and Science Study). The *achievement measurement type* is a plausible moderator of the relation between SWB and academic achievement because despite the strong correlation between self-reported and actual GPA ($r = 0.97$; Cassady, 2001), PA is only related to objective but not to self-reported measures of college success (Nickerson, Diener, & Schwarz, 2011). In addition, we

explored the *content of achievement* (general, STEM, language, social science) as a moderator of the association between SWB and academic achievement.

1.5.3. Measurement of SWB

To examine differential relations between different types of measures of SWB and academic achievement, we considered three independent characteristics of SWB measures as moderators: component, life domain, and time frame (Lischetzke & Eid, 2006). With respect to *component*, we distinguished between measures of affective well-being and measures of cognitive well-being. With respect to *life domain*, we distinguished between measures referring to life overall, measures referring to academic well-being, and measures referring to other life domains (Daig, Herschbach, Lehmann, Knoll, & Decker, 2009; Diener, 1994). Academic well-being refers to "how students subjectively evaluate and emotionally experience their school lives" (Tian, Yu, & Huebner, 2017; p. 2). We expected academic well-being to be more strongly related to academic achievement than measures tapping into other life domains (e.g., financial satisfaction, overall life satisfaction). Finally, we examined whether the *time frame* of the SWB measure (general, momentary, precise time frame) moderates the relation between academic achievement and SWB. Note that the studies included in this meta-analysis did not always report information on all three dimensions. For some studies, we only received information about the SWB component (e.g., cognitive) and the time frame (e.g., general) but not about the life domains (overall vs. specific) or even only information about one of the three dimensions. Effect sizes for which no information on a particular dimension of SWB was given were therefore not included in the respective moderator analysis.

1.6. Overview of the present meta-analysis

In the present meta-analysis, we examined the association between SWB and academic achievement and explored demographic and methodological moderators of this association. The meta-analysis was guided by the following hypotheses:

Hypothesis 1. SWB is positively associated with academic achievement.

Hypothesis 2. The association between SWB and academic achievement differs among achievement measurement types.

Hypothesis 3. The association between academic achievement and academic satisfaction is stronger than the association between academic achievement and overall life satisfaction or satisfaction with non-academic domains.

2. Method

2.1. Literature search and study selection

We conducted a literature search in the database PsycINFO in winter 2016 and in ERIC in winter 2017. The search process is visualized in Fig. 1. We restricted the search to studies on human and non-disordered populations that had been published in a peer reviewed journal in English language. The keyword combination with the stated restrictions provided, based on the title, 457 studies in total. Additionally, we performed an explorative search via cross-references. The exploratory search provided two more articles. In total, we screened 459 titles and abstracts for eligibility. Our inclusion criteria were the following:

1. **Quantitative data.** Articles that were purely theoretical or that reported qualitative data only were excluded.
2. **Mainly non-disordered and non-disabled sample.** Only studies assessing a non-disordered and non-disabled population were included. Studies with samples of, for example, clinically depressed or learning-disabled people were excluded.
3. **Measurement of relevant constructs.** Only studies were included that reported both SWB and academic achievement measures.
4. **Unduplicated data.** Only one publication per data set and only original empirical findings were included. Priority was given to publications reporting (a) more time points, (b) larger sample sizes, and (c) more descriptive statistics. Re-analyses of already reported findings or reviews were excluded.
5. **Definition and measurement of SWB.** Studies were included that used Diener's (1984) definition of SWB or a comparable one (see above). Measures of affective well-being were only included if they captured the full range of positive or negative affect, rather than a sub-dimension. Therefore, studies only focusing on specific emotions (e.g., anxiety or anger) or using a different SWB definition were excluded.
6. **Definition and measurement of academic achievement.** Only studies were included that operationalized academic achievement according to the definition by Steinmayr et al. (2014; see above). Studies reporting only other non-academic performance measures (e.g., job performance measurements) or reporting measures such as academic engagement were excluded.
7. **Statistical sufficiency.** Standardized effect sizes had to be reported or alternatively one of the following statistics was necessary to calculate effect sizes: means and standard deviations for each time point, the retest correlation of the outcome variable (e.g., correlation between SWB at T1 and SWB at T2) or a zero-order correlation coefficient, a t or F statistic, or the mean and standard deviation of the group or pre-post difference variable. If covariates (such as parents' education) were reported in an ANCOVA or multiple regression analysis, effect sizes could only be coded if also a bivariate correlation between SWB and academic achievement (e.g., without examining the moderating effect of parents' education) was reported.

Study eligibility for our meta-analysis was determined in a two-step procedure. In a first step, the titles and abstracts of the 459 articles were screened for study-relevant characteristics only by two independent coders and inclusion criteria 1–4 were applied. In that first step, we applied the inclusion criteria rather liberally to minimize the chance of falsely excluding a relevant article based on title and abstract. A total of 342 publications were excluded due to failing to meet one or more criteria. Interrater Agreement (IA) was assessed as the percentage of agreement between the coders. Agreement for the first step was high (93%). In a second step, the full texts of the remaining 117 articles were screened for inclusion or exclusion by the same two independent coders and criteria 5–7 were applied. Seventy publications were excluded because they failed to meet our inclusion criteria, resulting in a total of 47 studies included in this meta-analysis. The IA for the second step was again high (95%). Disagreements between the coders in step 1 and step 2 were resolved by discussion and by consulting the original publication.

2.2. Coding

Coding of the 47 studies was done independently by the first and the second author. The coded moderators are listed in Table 1. Before beginning, the coders received detailed coding instructions and were trained in using them. The coding results were recorded

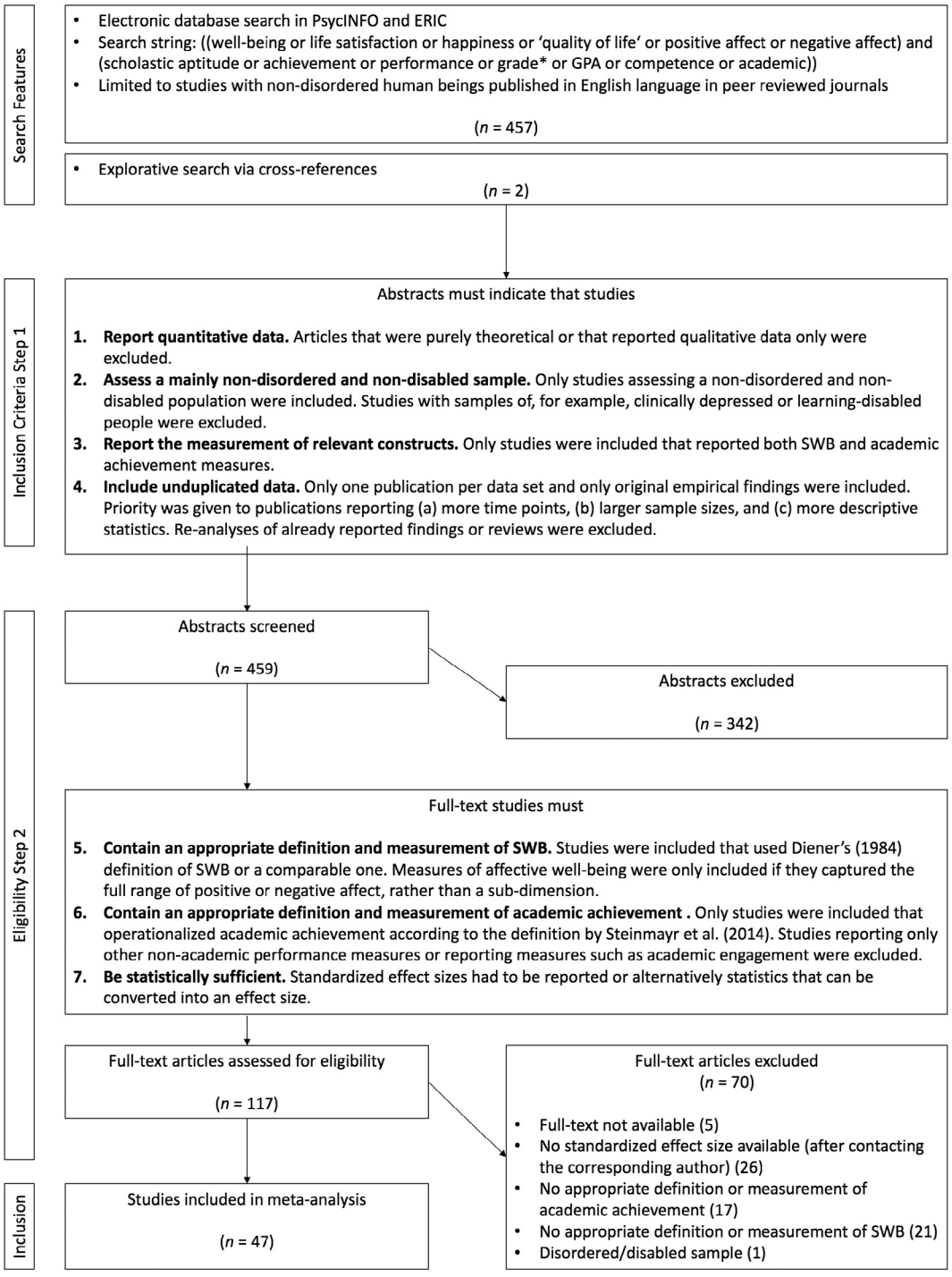

Fig. 1. Flow chart for the literature search process.

in a standardized coding sheet. Interrater Agreement for the coding was 90% on average and ranged from 78% to 100% for the different moderating variables (see Table 1). In the rare case when relevant information for coding was missing or unclear in an article, we contacted the authors via email.

2.3. Preparation of effect sizes

As all included studies reported a zero-order Pearson correlation (r) between SWB and academic achievement, this meta-analysis used the correlation coefficient itself as the effect size and synthesized all Pearson correlations. Prior to meta-analytic aggregation, all effects were recoded so that positive effect sizes indicated that higher SWB was associated with higher academic achievement. We then transformed all correlations using Fisher's Z_r-transformation to approximate a normal sampling distribution (Lipsey & Wilson, 2001). As correlations can be biased by measurement error, the effect sizes were corrected for measurement unreliability using Spearman's correction for attenuation (Hunter & Schmidt, 2004) whenever the reliabilities of the measures were available. In case of missing reliabilities, the reported correlations were not corrected. As the majority of included studies reported

Table 1
Summary of coded characteristics, interrater agreement in percent (IA), number of coded studies (j), and effect sizes (k).

Variable and coding options	IA	*j*	*k*
Sample Characteristics			
Age (*M*)	0.93	36	125
Sample size (*N*)	0.94	47	151
Percentage of females	0.88	45	146
Predominant ethnicity	0.90		
White/Caucasian		14	63
African American		1	3
Asian		1	2
Country of education/achievement	0.90		
North America		19	83
Europe		11	37
Asia		7	9
Oceania		6	16
Educational Level	1.0		
Higher education		25	83
Secondary School		20	64
Primary School		2	4
Study Characteristics			
Publication Year	1.0	47	151
Measurement Order	0.94		
Simultaneous		41	116
SWB first		6	20
Academic Achievement first		8	15
Time between assessments (days)	0.84	44	154
Design	0.94		
Correlational		40	113
Longitudinal		11	37
Academic Achievement			
Content	0.81		
General		37	100
Language		7	13
STEM		6	8
Social Science		6	19
Measurement Type	0.78		
Objective Grades/GPA		25	87
Self-reported Grades/GPA		13	30
Achievement Test		12	32
Reliability of Measurement	0.96	47	151
SWB/Life Satisfaction			
Component	0.84		
Cognitive		21	36
Affective		16	55
Life domains	0.99		
Overall		31	81
Domain-specific - Academic		20	44
Domain-specific - Other Domains[a]		8	26
Time Frame of Measure	0.87		
General		26	66
Momentary		2	3
Precise		9	36
Reliability of Measurement	0.85	47	151

[a] Including friends/acquaintances, leisure activities/hobbies, income/financial security, health, housing/living conditions, occupation/work, family life/children.

several relevant effect sizes and we included all of them, the effect sizes in our meta-analysis were not statistically independent (cf. Hedges, Tipton, & Johnson, 2010). Classical fixed-effects or random-effects meta-analysis rely on the assumption that all included effect sizes are independent. Ignoring the effect size dependency in our meta-analysis would lead to an underestimation of the effect size variance, of the width of the confidence intervals, and to inflated Type I error rates when testing effect sizes against zero (Borenstein, Hedges, Higgins, & Rothstein, 2009). We accounted for this problem by using robust variance estimation (RVE, Hedges et al., 2010; Tanner-Smith & Tipton, 2014; Tanner-Smith, Tipton, & Polanin, 2016). Using RVE for meta-regression permits the inclusion of statistically depended effect size estimates without requiring information about the effect size covariance structure. RVE mathematically adjusts the standard errors of the effect sizes to account for the dependency in a data set of effect sizes.

2.4. Statistical analyses

Given the presumed heterogeneity, random-effects statistical models were used for all analyses (Raudenbush, 2009). Mean effect sizes and meta-regression models using robust variance estimation were estimated using a weighted least squares approach (cf. Hedges et al., 2010; Tanner-Smith & Tipton, 2014). To estimate the overall strength of the correlation of SWB and academic achievement, we estimated a simple RVE meta-regression model:

$$y_{ij} = \beta_0 + u_j + e_{ij}$$

where y_{ij} is the ith correlation effect size in the jth study, β_0 is the average population effect of the correlation, u_j is the study level random-effect such that $\mathrm{Var}(u_j) = \tau^2$ is the between-study variance component, and e_{ij} is the residual for the ith effect size in the jth study. To estimate the variability in the effect size due to moderator variables, we estimated a mixed-effects RVE meta-regression model where each moderator represents a continuous or specific dummy coded level of an included moderator variable (for example academic specific satisfaction or other domain-specific satisfaction; for more details see Tanner-Smith & Tipton, 2014). All dummy coded moderators were tested against a reference category. The reference categories are indicated as "REF" in Table 2. We used the *robumeta* package (Fisher & Tipton, 2014) in the R statistical environment (R Core Team., 2014) to perform the meta-analysis.

Each meta-analysis is at danger of yielding results that are distorted by a publication bias (Borenstein, 2005). We estimated publication bias visually and statistically. First, we conducted visual and statistical analyses using funnel plots and Egger's regression test (Egger, Smith, Schneider, & Minder, 1997) available in the *metafor* package (Viechtbauer, 2010) to assess for possible publication bias. We are not aware of methods to assess publication bias for dependent effect sizes. Therefore, we conducted the analyses once for all effect sizes (assuming independence) and once for all studies with the study-average effect size. Second, we performed PET and PEESE using the *metafor* package in R. Both approaches are meta-regression models for the adjustment of publication bias or other forms of small-study effects (Stanley & Doucouliagos, 2014) using a conditional estimator (referred to as PET-PEESE). Depending on the statistical significance of the intercept in the PET model, one interprets either the intercept from the PET model (if the PET intercept $p > .05$) or from the PEESE model (if the PET intercept $p < .05$) (see Stanley & Doucouliagos, 2014, for a full description of the logic behind the conditional nature of PET-PEESE).

We deliberately did not include unpublished studies or data because including unpublished studies may in fact increase publication bias, presumably because unpublished research is often not representative regarding quality (Ferguson & Brannick, 2012; but see Rothstein & Bushman, 2012).

All reported confidence intervals are at the 95% level. The raw data and R scripts are available via the Open Science Framework: https://osf.io/mazp6/?view_only=55346f7b91ac45b585edac909be61cdf.

3. Results

3.1. Study characteristics

The inclusion criteria were met by 47 articles which reported results from 49 independent samples with 151 relevant effect sizes obtained from 38,946 participants. All included articles were published between 1978 and 2017 with a median publication year of 2012. Of the included articles, 70% where published in the last 10 years and 38% in the last three years, indicating that the

Table 2
Number of studies (j), number of effect sizes (k), relation between academic achievement and SWB corrected for measurement error (r^+), 95% confidence interval, measure of heterogeneity τ^2, significance for moderator analyses for all included studies.

Variable and Coding Options	*j*	*k*	r^+	*95% CI*	τ^2	*Moderator*
Overall	47	151	0.164	[0.113, 0.216]	0.027	
Sample Characteristics						
Age in years (*M*)	36	125				*ns*
Sample size (*N*)	47	151				*ns*
Percentage of females	45	146				*ns*
Predominant ethnicity						
White/Caucasian	14	63	0.125	[0.066, 0.183]	0.015	–
African American	1	3	–	–	–	–
Asian	1	2	–	–	–	–
Country of education/achievement						
North America	19	83	0.171	[0.105, 0.236]	0.025	*ns*
Europe	11	37	0.126	[0.083, 0.169]	0.003	*ns*
Asia	7	9	0.150	[−0.171, 0.442]	0.104	*ns*
Oceania	6	16	0.179	[0.018, 0.331]	0.140	REF
Educational Level						
Higher education	25	83	0.163	[0.095, 0.230]	0.028	*ns*
Secondary School	20	64	0.158	[0.063, 0.250]	0.028	*ns*
Primary School	2	4	–	–	–	–
Study Characteristics						
Publication Year	47	151				*ns*
Measurement Order						
Both measured simultaneously	41	116	0.145	[0.089, 0.199]	0.278	*ns*
SWB first	6	20	0.172	[−0.046, 0.375]	0.051	*ns*
Academic Achievement first	8	15	0.198	[0.087, 0.304]	0.012	REF
Time between Assessments (days)	44	145				*ns*
Study Design						
Correlational	40	113	0.141	[0.088, 0.194]	0.026	*ns*
Longitudinal	11	37	0.162	[0.061, 0.258]	0.019	*ns*
Academic Achievement						
Content						
General	37	100	0.161	[0.099, 0.220]	0.036	*ns*
Language	7	13	0.117	[0.347, 0.197]	0.008	*ns*
STEM	6	8	0.133	[0.040, 0.224]	0.007	*ns*
Social	6	19	0.302	[0.056, 0.515]	0.067	REF
Measurement Type						
Objective reported Grades/GPA	25	87	0.194	[0.124, 0.261]	0.027	REF
Self-reported Grades/GPA	13	30	0.147	[0.074, 0.217]	0.017	*ns*
Achievement Test	12	32	0.152	[0.077, 0.280]	0.011	*ns*
Reliability of Measurement	47	151				*ns*
SWB/Life Satisfaction						
Component						
Cognitive	21	36	0.196	[0.156, 0.236]	0.006	*ns*
Affective	16	55	0.155	[0.076, 0.232]	0.029	*ns*
Life Domains						
Overall	31	81	0.166	[0.115, 0.217]	0.018	*ns*
Domain-specific - Academic	20	44	0.180	[0.076, 0.277]	0.036	REF
Domain-specific - Other Domains[a]	8	26	0.072	[−0.024, 0.165]	0.012	*ns*
Time Frame of Measure						
General	26	66	0.171	[0.122, 0.220]	0.011	*ns*
Momentary	2	3	–	–	–	–
Precise	9	36	0.145	[0.033, 0.254]	0.038	*ns*
Reliability of Measurement	47	151				*ns*

[a] Including friends/acquaintances, leisure activities/hobbies, income/financial security, health, housing/living conditions, occupation/work, family life/children. REF = reference category.

research on the relation between academic achievement and SWB is a quickly growing field of research. The coded effect sizes ranged from $r = -0.47$ to $r = 0.68$. The sample sizes ranged from 62 to 11,061 with a median of 411.

Sample mean age ranged from 11 to 26 ($M = 18.5$, $SD = 3.86$). Of the included effect sizes, 3% were from primary school, 42% from secondary school, and 55% from higher education. The mean percentage of females in the included samples was 55.4% ($SD = 19.63$). In most studies, the predominant ethnicity was White/Caucasian (30%). However, 66% of the included studies did not report the ethnicity of their sample. Regarding the country of education, 40.4% of studies were based on samples educated in North America, 23.4% in Europe, 12.8% in Australia or New Zealand, 14.9% in Asia, and 2.1% in South America.

About 75% of the effects were obtained using a correlational study design measuring SWB and academic achievement at one measurement point. A longitudinal design was used in about 25% of the cases either measuring SWB first (14%) or measuring academic achievement first (9%). The time intervals for the longitudinal studies varied between 14 days (approximately 2 weeks) and 420 days (approximately 14 months). However, not every longitudinal study reported a time interval (16% of information on time intervals were missing).

The measures of academic achievement were objective GPA/-grades (67.6%), self-reported GPA/grades (19.9%), and academic achievement tests (21.2%). One study used a parent-report of GPA as measure (0.6%). For SWB, 36.4% of effect sizes were obtained from measures that focused on the affective component of SWB (e.g., PANAS; Watson, Clark, & Tellegen, 1988), 23.8% from measures that focused on the cognitive component of SWB (e.g., SWLS; Diener, Emmons, Larsen, & Griffin, 1985), and 39.7% could not be assigned definitely. About 53% of the SWB measures indi-

cated overall well-being, 46.3% were domain-specific SWB measures (29.1% academic specific measures and 17.2% other domain-specific measures). Most measures used a general time frame (43.7%), 23.8% used a precise time frame (e.g., PA during the last two months), and 2% assessed momentary SWB (moment-to-moment variation of SWB). The remaining 30.5% did not report the time frame of measure.

3.2. Overall effect

The overall mean effect size and the mean effect sizes for the levels of the moderator variables are presented in Table 2. The overall correlation between academic achievement and SWB was $r = 0.164$ with a 95% confidence interval ranging from 0.113 to 0.216. The overall effect with uncorrected effect sizes differed only slightly on the second decimal from the one with corrected effect sizes according to Hunter and Schmidt (2004). We therefore used the corrected effect sizes. The measure of heterogeneity $I^2 = 93.964$ ($\tau^2 = 0.027$) indicates substantial heterogeneity, implying that the relation between academic achievement and SWB might be moderated by third variables.

The funnel plots in Fig. 2 do not indicate the presence of a publication bias, as the plots resemble symmetrical inverted funnels such that effect sizes from smaller studies scatter widely at the bottom and effect sizes from larger studies scatter more narrowly towards the top (Sterne & Egger, 2001). The absence of a publication bias in our data was also confirmed by a test for funnel plot asymmetry (Egger et al., 1997) testing the null hypothesis that symmetry in the funnel plot exists. The Egger test revealed no indication of publication bias on both study level ($z = 0.562$, $p = .574$) and on effect size level ($z = 0.645$, $p = .519$). Additionally, the true effect size estimated using PET-PEESE was statistically significant and comparable in strength to our originally reported effect size (see our online material on OSF). Together, these analyses suggest that there is little evidence for a file-drawer problem in the present meta-analysis.

3.3. Moderator analyses

The results of moderator analyses are shown in Table 2. The heterogeneity measure τ^2 ranged between 0.006 and 0.278 for the different moderators. Regarding our Hypotheses 2 and 3, we obtained the following results.

3.3.1. Demographic variables as moderators

None of the demographic moderators such as age, age squared, gender, country of education or level of education had a statistically significant moderating effect, indicating that the relation between SWB and academic achievement was similar in different age and gender groups.

3.3.2. Methodological variables as moderators

Moderator analysis revealed that the magnitude of the association between SWB and academic achievement was not influenced by publication year. The association between the two constructs was not statistically significantly different when measuring both constructs at the same measurement point or when measuring SWB or academic achievement first. It made no difference how much time lay between the assessments or whether the study design was correlational or longitudinal.

None of the three investigated characteristics of measurement of academic achievement reached significance. The correlation between SWB and academic achievement was neither moderated by measurement type nor by the reliability of measurement. Thus, our second hypothesis assuming that the association between SWB and academic achievement differs for different achievement measurement types could not be confirmed.

It did not make a difference if well-being was measured focusing on the cognitive or the affective component of SWB. Additionally, the correlation between academic specific well-being measures and academic achievement was only descriptively slightly higher ($r = 0.180$; CI [0.076, 0.277]) than between overall SWB ($r = 0.166$; CI [0.115, 0.217]) or other domain-specific well-being measures ($r = 0.072$; CI [−0.024, 0.165]) and academic achievement. However, this difference did not reach statistical significance, which is not concordant with our third hypothesis.

4. Discussion

The current meta-analysis synthesized the published findings on the relation between SWB and academic achievement. Across all 151 effect sizes, the average strength of the association was $r =$

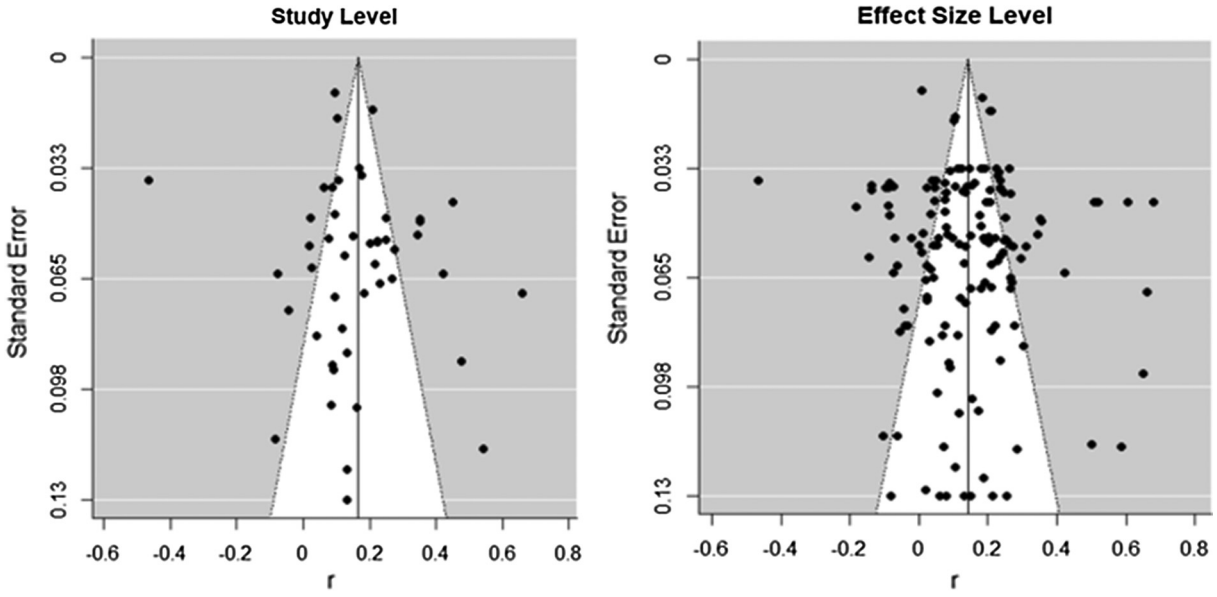

Fig. 2. Funnel plots of the 47 studies and the 151 effect sizes by standard error.

0.164, 95% CI [0.113, 0.216]. According to Gignac and Szodorai (2016), this effect size can be interpreted as relatively small to medium. This association is slightly lower but still comparable in magnitude to the ones reported between SWB and other success outcome measures. For example, the correlation between SWB and job performance was $r = 0.22$ (DeLuga & Mason, 2000) and the correlation between SWB and income $r = 0.20$ (Lucas, Clark, Georgellis, & Diener, 2004). The relatively small effect for the relation of SWB and academic achievement in the present meta-analysis was not surprising. Huang (2015) conducted a meta-analysis of longitudinal studies on academic achievement and subsequent depression. He found a very similar but – because of depression as a negative dependent variable – negative overall effect of $r = -0.15$ In our meta-analysis, the moderator analyses did not provide any statistically significant effects, which indicates that the correlation between SWB and academic achievement is robust across different levels of the examined moderators. For some moderators, this finding was in line with other meta-analyses. For example, demographic moderators such as age or gender were also not significant in Huang's (2015) meta-analysis on academic achievement and depression. However, the absence of a significant moderator effect of the life domain of the SWB measure (academic vs. overall vs. other life domains) requires further discussion.

One explanation for this finding might be that because children and young adults spend a substantial amount of their time at school, students' overall life satisfaction and their academic satisfaction might be highly overlapping and not as distinct as we expected. Another explanation is that we might not have detected a significant moderator effect due to low statistical power, as only 17.2% of the included effect sizes referred to other domain-specific satisfaction measures such as financial satisfaction or health satisfaction.

4.1. Implications

Students' school experiences are important in inhibiting or facilitating successful development over the lifespan (e.g., Schaps & Solomon, 2003; Tian et al., 2017). School effectiveness research has mainly focused on cognitive outcomes, especially on mathematics, language, or science achievement. However, Noddings (2003) stated that "happiness and education are, properly, intimately connected. Happiness should be an aim of education, and a good education should contribute significantly to personal and collective happiness" (p. 1). According to the OECD (2015), "academic achievement that comes at the expense of students' well-being is not a full accomplishment" (p. 4). Correspondingly, cognitive outcomes such as academic achievement and non-cognitive outcomes such as student well-being should be considered as two different and distinctive aims of education (cf. Opdenakker & Van Damme, 2000).

In our meta-analysis, academic achievement and well-being are statistically significantly but only relatively weakly related. This suggests that low-achieving students do not necessarily report low SWB, and high-achieving students do not automatically report high SWB. Even if enhancing subjective well-being is discussed as an aim of education, it has been demonstrated that educational institutions have far more influence on academic achievement than on well-being (cf. Opdenakker & Van Damme, 2000). Additionally, not necessarily the individual achievement but the characteristics of classmates such as ability and gender have an impact on students' well-being. For example, a literature review on the effect of class composition on secondary school students' school well-being and academic self-concept concludes that the average achievement level of a class has an additional positive effect on students' well-being when controlling for initial achievement of the students (Belfi, Goos, De Fraine, & Van Damme, 2012). This indicates that being in a class with high-ability classmates is beneficial for students' school well-being. However, Belfi et al. (2012) also mention that ability-grouped classes have a positive impact on the school well-being of strong students, while they have a rather negative impact on the school well-being of weak students. Hence, not only the individual academic achievement but also the achievement level in a class seems to be important for students' SWB.

4.2. Limitations and future directions

Meta-analyses are always influenced by the quality of the included studies. We discuss the most important constraints and unanswered questions of previous research to provide directions for future studies on SWB and academic achievement. To test relevant moderators, a sufficient amount of single studies investigating those variables is necessary. Unfortunately, we were not able to examine an effect for predominant ethnicity since most studies had been conducted with predominantly White/Caucasian samples. The mean age of the samples included in the present meta-analysis ranged between 11 and 26 years ($M = 18.5$), which allows conclusions for childhood and young adulthood but also implies that further research on other age groups is necessary.

This study did not examine potentially relevant moderators such as ability level, intelligence, motives such as need for achievement, test anxiety, academic engagement, or socioeconomic status because most primary research did not collect or report data for these variables. These third variables might not only influence the levels of academic achievement and SWB, but also the strength of their relationship. Thus, future research should address the question whether the relationship between academic achievement and SWB still exists when including relevant third variables and whether the association found in the present meta-analysis is mediated by other factors. Ng et al. (2015) found that the relation between academic achievement and life satisfaction stays statistically significant even when controlling for socioeconomic status, but they did not investigate intelligence. It remains an open task for subsequent research to include variables like intelligence or socioeconomic status when investigating academic achievement and SWB to get a more precise picture of the unique relationship between these variables.

While the measures of academic achievement are largely homogeneous between studies with most of them reporting GPA, there is a broad number of different measures for SWB. Some studies assessed SWB with a single item whereas others used measures with 40 Items (e.g., Multidimensional Students' Life Satisfaction Scale; Huebner, 1994). Further research is necessary to clarify which SWB measure is most reliable and valid in different age groups. Measures are particularly heterogeneous for academic satisfaction. Some studies apply items originally developed to measure overall life satisfaction (e.g., Satisfaction With Life Scale; Diener et al., 1985) to university life (e.g., Ocal, 2016). Others use measures specifically developed to measure academic satisfaction (e.g., Academic Satisfaction Scale; Schmitt et al., 2008). Most studies used SWB measures that captured either the affective or the cognitive component of SWB. Future studies should collect measures of SWB that capture both components as well as additional measures of well-being such as parents' or peer reports.

Only 25% of the effect sizes included in our meta-analyses came from longitudinal studies. More longitudinal research using designs with three or more measurement points is needed to examine (a) how the relationship between the variables changes over time, (b) whether the strength of the relationship depends on the time lag between the measurements, and (c) the reciprocal relationships of these variables over time (cf. Marsh, Byrne, & Yeung, 1999). To reveal definite causal effects of SWB on academic achievement or academic achievement on SWB, experimental designs are needed.

Finally, Oishi, Diener, and Lucas (2007) showed that people who experience levels of happiness slightly below the maximum are the most successful in terms of income, education, and political participation, indicating that the relation between SWB and success may be non-linear. Applied to academic achievement, this notion implies that it is worthwhile to investigate a potential non-linear relation between SWB and academic achievement in future research.

To conclude, we outline the following three central recommendations for future research on the association between SWB and academic achievement. Future studies could profit from:

(1) Examining the relationship between SWB and academic achievement longitudinally using large samples to investigate the reciprocal (causal) relationship between the two constructs and its development over the life span.
(2) Including potential influencing third variables such as intelligence or socioeconomic status.
(3) Considering the possibility that the relation between SWB and academic achievement might not be non-linear (Oishi et al., 2007).

5. Conclusion

The present study provides an overview of the current state of research on the relation between SWB and academic achievement. We found a relatively small to medium correlation between both constructs. However, this effect is nevertheless relevant because the accumulating effects of academic success or failure combined with other factors can have long-term effects on a person's well-being and, in turn, on health and longevity (Diener & Chan, 2011). The relatively small overall effect means that high academic achievement does not always result in better quality of life for learners, and even more importantly that being bad at school does not automatically mean someone cannot be happy.

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