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# Socioeconomic status and global physical self-concept of adolescents: a multilevel structural equation modeling approach

Adolescence is a critical developmental period during the lifespan of an individual. Apart from physical changes, adolescents experience a plethora of emotional and social transitions which may influence how they perceive themselves (Barker & Bornstein, 2010). Positive perceptions about the self and one's abilities are essential for adolescents' physical and psychological well-being (Craven & Marsh, 2008). Self-perceptions have been conceptualized in the theoretical construct of the self-concept (Shavelson, Hubner, & Stanton, 1976). According to Marsh and Shavelson (1985), self-concept can be understood as an individual's evaluation of one's qualities and limitations. Early studies focused on global self-evaluation. However, the presumption that self-concept is a unidimensional construct has been revised over time. Current self-concept research is based on the assumption that self-evaluations are domain-specific and thus the self-concept is a multidimensional and hierarchically organized construct (Craven & Marsh, 2008). Self-esteem is at the apex of the hierarchy followed by second-order non-academic (e.g., emotional, social, and physical) and academic (e.g., English, Math) subdomains (e.g., Craven & Marsh, 2008). In particular, the non-academic subdomain of the physical self-concept (PSC) is known to be a central part of one's self-definition in adolescence (e.g., Harter, 1998).

PSC can be both global, a combination of related subcomponents (e.g.,

physical appearance, endurance, flexibility, coordination, strength, speed, and sport competence), or specific, focused on individual subcomponents (Fox, 1997; Marsh, 1994). Research suggests that the global physical self-concept (GPSC) in particular plays an important role in physical and psychological health (Babic et al., 2014; Rodriguez & Audrain-McGovern, 2005) and self-esteem in adolescence (Schmidt, Blum, Valkanover, & Conzelmann, 2015). For example, previous studies conducted in western societies have shown that a lower GPSC is related to disordered eating, depression, and general psychological distress in adolescence (Dishman et al., 2006; Goñi & Rodríguez, 2004). Whereas, for instance, Zsakai, Karkus, Utczas, and Bodzsar (2017) found that a positive GPSC of adolescents is associated with healthy weight status. Hence, it is important to identify factors that affect the positive development of adolescents' GPSC.

Considering the *expanded exercise and self-esteem model* (Sonstroem, Harlow, & Josephs, 1994) and previous research, it can be assumed that physical activity (Babic et al., 2014) and in particular physical exercise and sport activity (PESA) (e.g., Burrmann, 2004; Ekeland, Heian, & Hagen, 2005; Fox, 2000) has a positive effect on the development of GPSC in adolescence. PESA only includes those physical activities that follow a motivation towards health and fitness, conviviality, nature seeking,

and similar activities (physical exercise, e.g., jogging, back exercise, dancing) and leisure and performance sport in a narrow sense (sports activities, e.g., soccer, gymnastics, taek won do, skiing) (Fuchs, Klapperski, Gerber, & Seelig, 2015). According to the expanded exercise and self-esteem model, it can be assumed that an increased PESA is also accompanied by enhancing physical self-efficacy and corresponding physical competencies. The perception of enhanced competencies like, for example, sporting ability in turn goes hand in hand with the feeling of self-determination and personal control, which are tied to GPSC as well as self-esteem (Fox, 2000; Sonstroem et al., 1994). It should be noted that there are indications of reciprocal effects between GPSC and physical activity (Babic et al., 2014). Marsh, Papaioannou, and Theodorakis (2006) assumed in their reciprocal effects model that on the one hand a positive GPSC stimulates physical activity of a person and on the other hand increased physical activity in turn promotes the development of GPSC. However, Babic et al. (2014) concluded that there is sufficient evidence that specific PESA interventions can help to promote GPSC. Therefore, it stands to reason that numerous specific interventions have been developed to improve adolescents' PESA and to enhance GPSC (e.g., Lubans, Aguiar, & Callister, 2010; Rey, Vallier, Nicol, Mercier, & Maïano, 2017; Velez, Golem, & Arent, 2010). Some of these interven-

tions lead to positive effects on GPSC in adolescence. For example, Rey et al. (2017) found a significant increase in GPSC after a five-week vigorous interval training combined with a special diet. It appears that GPSC is closely related to the time and effort that adolescents invest in PESA and it is important to bear in mind that the SES of their parents has an impact on this time and effort (e.g., Stalsberg & Pedersen, 2010; Sterdt, Liersch, & Walter, 2014).

### Socioeconomic status and self-esteem

According to the indicator or salience model (Twenge & Campbell, 2002) it can be assumed that there is a relationship between self-esteem as a central part of an individual self-evaluation and SES as society's primary view of the individual. The social indicator or salience model is based on the assumption that the SES, which comprises prestige-based, social, and economic factors, indicates the status of an individual within social groups. If the SES acts as an indicator of status within social groups and an individual strives for success in terms of social status and achieves these goals, increased self-esteem should also result from increased SES (Pelham & Swann, 1989; Rosenberg & Pearlin, 1978). The following mechanism may explain this association: The SES of an individual is accompanied by certain expectations from the specific social group or social expectations in relation to the respective socioeconomic context (Gecas, 1982). If these expectations are fulfilled and the status is confirmed, higher self-esteem may result because self-esteem reflects the emotions that result from the assessment of the overall effectiveness of an individual (Coopersmith, 1967; Hewitt, 1998). It turns out that individuals with a higher SES perceive it as easier to fulfill the expectations placed on them, possibly because their socioeconomic context keeps a greater pool of resources and support to draw on (Boardman & Robert, 2000). Hence, for example, Gecas (1982), as well as Markus and Wurf (1987) suggested that self-esteem could be seen as a product of the interaction between an

individual, their behavior, and the socioeconomic context.

In the case of adolescents, it should be considered that their SES was not achieved by themselves and must be seen in relation to their parents' SES (Rosenberg & Pearlin, 1978). Therefore, factors like parental educational level, parental occupational status, and household income determine the access of adolescents to a specific socioeconomic context and corresponding social resources (Galobardes, Shaw, Lawlor, Lynch, & Smith, 2006). It is obvious that these factors may also be related to the self-esteem of adolescents. Indeed, Twenge and Campbell (2002) demonstrated that parental SES is positively related to the self-esteem of adolescents. In addition, Suárez-Álvarez, Fernández-Alonso, and Muñiz (2014), for example, found that parental SES is also related to subdomains of adolescents' self-esteem, such as their academic self-concept. Therefore, it is conceivable that adolescents' GPSC might be also affected by parental SES and its related factors.

For the relationship between SES and adolescents' GPSC, it can be assumed that the social expectations regarding, for example, healthy lifestyle, healthy weight status, physical capabilities or sports competences associated with parents' SES to a lesser extent also apply to their children or are transferred from parents to their children (Davis-Kean, 2005). Adolescents whose parents have a higher SES receive more parental support or support through their social context and have better access to more resources than adolescents with a lower SES (Fingerman et al., 2015). Hence, adolescents with a higher SES might more easily fulfill expectations placed on them. This allows them to experience themselves as more effective and competent which in turn may positively influence GPSC.

### Socioeconomic status, physical exercise and sport activity, and global physical self-concept

Considering the relevance of PESA for GPSC and because adolescents' PESA is also affected by the parental SES (e.g., Stalsberg & Pedersen, 2010; Sterdt et al.,

2014), it is conceivable that adolescents' PESA plays a mediating role in the relationship between parental SES and adolescents' GPSC. It has been shown, for example, that adolescents whose parents have a higher educational level, a higher occupational status, and more material and social resources are more likely to pursue a correspondingly sporty and healthy lifestyle (Fradkin et al., 2015). Trost et al. (2003) also found that parental support is positively associated with both adolescents' PESA and adolescents' self-efficacy. In addition, De la Torre-Cruz, López-Serrano, Ruiz-Ariza, and Martínez-López (2019) showed that parental support perceived as affirmative can contribute to improving certain physical self-concept dimensions. It should be noted that parental support and affection are again strongly dependent on their educational level as well as on material resources (e.g., Fingerman et al., 2015). Furthermore, exercising or sporting parents may serve as a frame of reference for the development of adolescents' (perceived) physical abilities (Bois, Sarrazin, Brustad, Trouilloud, & Cury, 2005). For example, parents act as role models within the family for their children's PESA and sports behavior and parental sport participation in particular offers essential socialization opportunities for adolescents to participate in sport (Beets, Cardinal, & Alderman, 2010; Hayoz, Klostermann, Schmid, Schlesinger, & Nagel, 2017). Parental sport participation in turn depends on the respective socioeconomic context and is related to factors like educational level and occupational status (Vollmer et al., 2019).

### The present study

Given the empirical evidence and the aforementioned assumptions, it is likely that socioeconomic factors are directly and indirectly related to adolescents' GPSC via processes of parental support and family socialization as well as via the socioeconomic context and associated social resources. However, much less is known about how socioeconomic factors are related to adolescents' GPSC. Therefore, the present study investigates the

relationships between socioeconomic factors, specifically parental educational level, parental occupational status, and family income, and GPSC in adolescence. It also considers how these relationships are mediated via parental sport participation, adolescents' social resources, and adolescents' PESA. In contrast to previous studies, we examine mediated relationships. We, thus, contribute to PSC research by adding new knowledge about the interdependencies of socioeconomic factors concerning their relation to adolescents' PESA and GPSC. Furthermore, we derive implications for the development of suitable interventions focused on the improvement of adolescents' PESA and GPSC.

We developed the theoretical model as shown in **Fig. 1**. In detail, this research sets forth the following hypotheses:

### Direct relationship hypotheses

Twenge and Campbell (2002) showed that the educational level in particular is important for the relationship between SES and self-esteem. Hence, we hypothesize that the parental educational level is directly and positively related to adolescents' GPSC (H1). Considering previous research (Burrmann, 2004; Ekeland et al., 2005; Fox, 2000) we also expected that adolescents' PESA is directly and positively related to adolescents' GPSC (H2). Moreover, Mishna et al. (2016) demonstrated that adolescents' self-perception depends on social resources (e.g., support from significant others). Thus, we assumed that adolescents' social resources are directly and positively related to adolescents' GPSC (H3).

### Mediated relationship hypotheses concerning parental support and family socialization

Various studies show that both parental educational level and parental occupational status are positively related to parental sports behavior (Author Citation, 2019; Finger, Mensink, Banzer, Lampert, & Tylleskär, 2014; Pugliese & Tinsley, 2007). Considering that parental sport participation, in turn, is positively related to the adolescents'

PESA, we assume the following: The relationship between parental educational level and adolescents' GPSC is mediated via parental sport participation and adolescents' PESA (H4). Furthermore, the relationship between parental educational level and adolescents' GPSC is mediated via parental occupational status, parental sport participation, and adolescents' PESA (H5). Finger et al. (2014) also found that parental occupational status is positively related to adolescents' PESA. Accordingly, we expect that the relationship between parental educational level and adolescents' GPSC is mediated via parental occupational status and adolescents' PESA (H6).

### Mediated relationship hypotheses concerning socioeconomic context and access to resources

According to Twenge and Campbell (2002), apart from educational level, factors such as occupational status and, to a lesser extent, family income play an important role in the relationship between SES and self-esteem. These factors determine access to specific socioeconomic contexts and thus also define access to appropriate social resources (Galobardes et al., 2006). Previous studies have found that social resources in adolescence are positively related to parental educational level, parental occupational status, and family income (e.g., Mirowsky, 2017). Based on these findings and in consideration of the assumed relationship between social resources and adolescents' GPSC, we put forward the following additional hypotheses. We expect that the relationship between parental educational level and adolescents' GPSC is mediated via adolescents' social resources (H7). We also assume that the relationship between parental educational level and adolescents' GPSC is mediated via family income and adolescents' social resources (H8). Further, we hypothesize that the relationship between parental educational level and adolescents' GPSC is mediated via parental occupational status and adolescents' social resources (H9).

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## J. Vollmer · J. Lohmann · P. Giess-Stüber Socioeconomic status and global physical self-concept of adolescents: a multilevel structural equation modeling approach

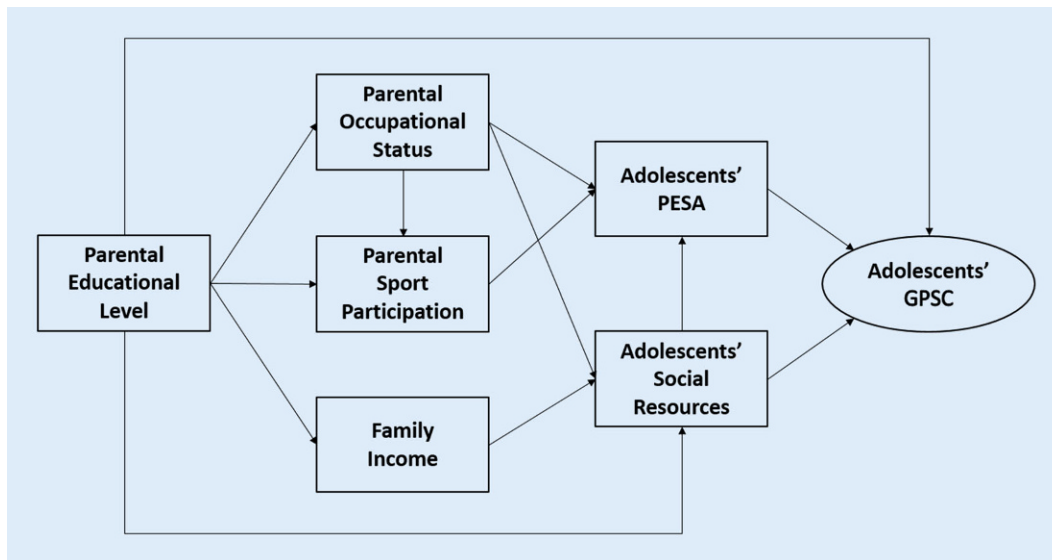
### Abstract

The global physical self-concept (GPSC) is a central part of one's self-definition in adolescence and plays an important role in adolescents' physical and psychological health. Socioeconomic status (SES) can be assumed to have an impact on GPSC, but this relationship has received little attention thus far. We investigated, therefore, the direct and indirect relationships between SES factors, such as parental educational level, occupational status, and family income, and adolescents' GPSC. A sample of 966 adolescents from 47 9th-grade classes was examined. Multilevel structural equation modeling was used for the analyses. The results revealed an indirect positive effect of parental educational level on adolescents' global physical self-concept. The effect was completely mediated by parental occupational status, parental sport participation, adolescents' social resources, and adolescents' physical exercise and sport activity. The tested model explained 28% of the variance in adolescents' global physical self-concept. Implications for the development of suitable interventions to improve the global physical self-concept of adolescents are derived.

### Keywords

Physical exercise · Sport activity · Self-esteem · Sport participation · Social resources

Given the evidence for a positive association between adolescents' social resources and PESA reported for example by Baskin, Dulin-Keita, Thind, & Godsey (2015), this research finally sets the following hypotheses: We expect that adolescents' social resources are directly and positively related to adolescents' PESA (H10) and further that the relationship between parental educational level and adolescents' GPSC is mediated via adolescents' social resources and adolescents' PESA (H11). Moreover, we assume that the relationship between parental educa-



**Fig. 1** ◀ Hypothesized model in the present study. PESA physical exercise and sport activity, GPSC global physical self-concept

tional level and adolescents' GPSC is also mediated via family income, adolescents' social resources, and adolescents' PESA (H12) as well as via parental occupational status, adolescents' social resources, and adolescents' PESA (H13).

## Methods

### Sample and procedure

The sample consisted of 966 9th-grade students ( $M_{\text{age}} = 14.80$ ,  $SD = 0.75$ ;  $n = 524$  female) recruited from secondary schools located in the city of Freiburg. The Regional Administrative Council of Freiburg supported the recruitment and invited all 23 public secondary schools of Freiburg to participate in this study. Except for one school, all 47 9th-grade classes from the remaining 22 secondary schools (seven general schools, six intermediate schools, and nine higher schools) took part in the study.

Our study addresses 9th-grade students because the common age range of these students is between 14 and 16. According to the adolescent-emergent model, in this age adolescents begin to shape their health-related behavior, and the parents usually no longer decide about their children's leisure time activities (Chen, Matthews, & Boyce, 2002). Furthermore, in Germany, after primary school children may choose between three secondary school types (general to higher) which reflect dif-

ferent educational levels. The choice is strongly influenced by the SES of the parents (Drossel & Eickelmann, 2018). The highest grade that may be achieved in general schools is grade 9. To cover a broad spectrum regarding parental SES, we wanted to sample adolescents from all three secondary school types. For this reason, we also recruited 9th-grade students instead of 10th-grade students or higher.

The study was approved by the Ethics Committee of the Medical Faculty of the University of Freiburg and the Regional Administrative Councils. Data was collected from October 2016 to February 2017 using paper-pencil self-administered questionnaires. To guarantee the high quality of the data, questionnaires were administered by trained research assistants. Before data collection, parents (or guardians) gave their written consent for the participants to take part in the study. Participants were treated following the American Psychological Association's ethical guidelines regarding confidentiality and anonymity. The average time required to complete the questionnaire was 30 min.

### Measures

#### Adolescents' GPSC

To measure adolescents' GPSC, we used the German Physical-Self-Concept Questionnaire (PSCQ-C) by Lohbeck, Tietjens, and Bund (2017). The

PSCQ-C consists of 21 items reflecting the seven specific facets of PSC (physical appearance, endurance, flexibility, coordination, strength, speed, and sport competence). Each facet was assessed by three items. Sample items are: "I am very good at sports" (i.e., sport competence) and "I am satisfied with my appearance" (i.e., physical appearance). Items were rated on a 4-point Likert scale from 1 = *strongly disagree* to 4 = *strongly agree*. All facets showed acceptable levels of internal consistency: physical appearance  $\alpha = 0.73$ ; endurance  $\alpha = 0.85$ ; flexibility  $\alpha = 0.82$ ; coordination  $\alpha = 0.72$ ; strength  $\alpha = 0.84$ ; speed  $\alpha = 0.84$ ; sport competence  $\alpha = 0.83$ . In our analyses, GPSC was modeled as a latent variable. To model GPSC, we considered the approach by Dishman et al. (2006) and used the three items of each of the seven facets to form appropriate item parcels. The item parcels were used as corresponding manifest indicators for the latent variable GPSC.

#### Adolescents' PESA

We used the German Physical Activity, Exercise, and Sport Questionnaire (BSA-F) by Fuchs et al. (2015) to assess adolescents' PESA. Participants were instructed to name a maximum of three physical exercises and sport activities they practiced during the last week. Furthermore, the participants had to indicate the frequency and duration of each episode in hours and



minutes for each activity. A total PESA index in hours per week was calculated.

### Adolescents' social resources

We used a short German version of the Resource Generator proposed by Stocké, Blossfeld, Hoenig, and Sixt (2011) to measure adolescents' social resources. This version of the Resource Generator consists of 14 items reflecting four different aspects of individual resources: prestige and education, political and financial skills, personal support, and personal skills. The item stem was "Do you know someone who ..." and sample items were "has a higher vocational education?" (prestige and education), "has knowledge about financial matters?" (political and financial skills), "can give advice concerning conflict with family members?" (personal support), and "reads a professional journal?" (personal skills). Response options were 1 = *No*, 2 = *Acquaintance*, 3 = *Friend* and 4 = *Family member*. Since multiple answers were allowed we used the highest indicated value per item and calculated an average score among these items. Internal consistency was acceptable (ordinal  $\alpha = 0.80$ ).

### Parental educational level

According to Kunter et al. (2002), we developed an index to measure parental educational level. First, we asked for the highest level of their general education. Second, we asked for the type of vocational training or higher education for each parent. Answers were combined and coded with six levels: 0 = *no school graduation and no vocational training*, 1 = *general secondary school without vocational training or vocational training but no school graduation*, 2 = *general secondary school with vocational training or intermediate secondary school without vocational training*, 3 = *intermediate secondary school with vocational training or high school graduation without vocational training and no university degree*, 4 = *high school graduation with vocational training*, 5 = *high school graduation with a university degree*. Following Finger et al. (2014), only the highest educational level in the family was used

to avoid distortions regarding possible single parents.

### Parental occupational status

Parental occupational status was operationalized by the reputation of their occupation as well as their occupational position (Züll, 2016). First, participants reported their parents' occupational titles. Second, they reported their parents' exact position in the company or institution. We used the broadest aggregate level of major groups by the International Standard Classification of Occupations (ISCO-08; International Labour Organization, 2012) to classify the occupational status. Following Baltisberger and Nagel (2016), the occupations and positions were coded into nine major groups, assuming lowest status for group 1 and highest status for group 9: 1 = *elementary occupations*, 2 = *plant and machine operators and assemblers*, 3 = *craft and related trades workers*, 4 = *skilled agricultural, forestry and fishery workers*, 5 = *services and sales workers*, 6 = *clerical support workers*, 7 = *technicians and associate professionals*, 8 = *professionals* and 9 = *managers*. As previously explained, only the highest level of parental occupational status in the family was used as well.

### Family income

The material situation in the parental home was used to operationalize family income. We used a ten-item scale offered by Kunter et al. (2002) to measure the material situation in the parental home. Participants specified how many cost-intensive household items like cars, computers/laptops, and flat-screen TVs, etc. their family owned. For each of the ten household items, responses ranged from 1 = *zero* to 4 = *three or more*. The internal consistency in the current study was  $\alpha = 0.68$ .

### Parental sport participation

We used two items to assess parental sport participation (Anderssen & Wold, 1992). The first item referred to mothers' sport participation, the second item referred to fathers' sport participation: "How often does your mother/father participate in sport activities?" Responses

were recorded on a 5-point Likert scale and response options were 1 = *never*, 2 = *rarely (approximately once a month)*, 3 = *rather rarely (approximately twice a month)*, 4 = *rather often (approximately three times a month)*, and 5 = *often (four times a month or more)*. As previously explained, only the highest score of parental sport participation in the family was used as well.

### Control variable

Gender is related to physical self-concept in adolescence (e.g., Hagger, Biddle, & John Wang, 2005). Therefore, to prevent potential confounding effects we controlled for gender in our analysis. Gender was coded as 1 = male and 0 = female.

### Data analysis

Data in this study is hierarchically structured because students are not randomly assigned to groups and the individual characteristics of students are confounded with classroom characteristics. To consider the hierarchical data structure and to avoid liberal statistical tests as well as possible biased standard errors through clustering effects, multilevel structural equation modeling (MSEM) was used in our analyses (Raudenbush & Bryk, 2002). To control for potential clustering effects and to investigate the effects at an individual level, we used a two-level modeling approach and set *class* as the clustering variable in our analysis.

We computed all analyses with the software Mplus 7.11 (Muthén & Muthén, 1998–2017). The delta method was used to test for indirect effects in our model because of the two-level modeling approach. For the total, direct, and indirect effects, we report the standardized path coefficient  $\beta$ , standard errors (SE), *p*-values, and 95% confidence intervals (95% CI). To evaluate the model fit we used the root mean square error of approximation (RMSEA), Comparative Fit Index (CFI), and the standardized root mean square residuals (SRMR). According to Hooper, Coughlan, and Mullen (2008), the model was determined to have an acceptable fit to the data if  $RMSEA \leq 0.08$ ,  $CFI \geq 0.90$ , and  $SRMR \leq 0.08$ .

**Table 1** Means, standard deviations, medians, ranges, missing values, and bivariate correlations for study variables

Variable	Mean	SD	Median	Range	Missing values (%)	2	3	4	5	6	7	8
1 Gender	–	–	–	–	0.00	0.23**	0.21**	–0.10**	–0.02	–0.05	–0.08*	–0.04
2 Adolescents' GPSC	2.92	0.48	–	–	9.20	–	0.49**	0.20**	0.11**	0.05	0.13**	0.13**
3 Adolescents' PESA	5.68	4.59	–	–	3.60	–	–	0.15**	0.15**	0.08*	0.12**	0.20**
4 Adolescents' Social Resources	2.93	0.49	–	–	14.30	–	–	–	0.44**	0.29**	0.22**	0.24**
5 Parental Educational Level	–	–	5.00	5.00	3.80	–	–	–	–	0.45**	0.06	0.27**
6 Parental Occupational Status	–	–	8.00	8.00	8.30	–	–	–	–	–	0.05	0.17**
7 Family Income	2.65	0.43	–	–	4.30	–	–	–	–	–	–	0.13**
8 Parental Sport Participation	4.11	1.30	–	–	1.90	–	–	–	–	–	–	–

Bivariate correlations represent Spearman's rank correlation

GPSC global physical self-concept, PESA physical exercise and sport activity, SD standard deviation

\*\* $p < 0.01$ ; \* $p < 0.05$  (two-tailed)

**Table 2** Proportion of variance explained for the model on the individual level

Variable	R <sup>2</sup>	SE	p-value
Adolescents' GPSC	0.28	0.03	<0.001
Adolescents' PESA	0.06	0.02	<0.001
Adolescents' Social Resources	0.24	0.04	<0.001
Parental Occupational Status	0.22	0.04	<0.001
Family Income	0.01	0.01	0.041
Parental Sport Participation	0.10	0.02	<0.001

Two-tailed  $p$ -values are reported

Gender is controlled for in every regression

GPSC global physical self-concept, PESA physical exercise and sport activity

Missing values are displayed in **Table 1**. Little's MCAR test indicated that the data were missing completely at random ( $\chi^2(50) = 59.90$ ;  $p = 0.16$ ). To treat the missing values, we used the maximum likelihood estimation with robust standard errors (MLR). The MLR standard errors are generated using a sandwich estimator. Therefore, MLR-standard errors are robust to non-independence and non-normality of observations (Muthén & Muthén, 1998–2017).

## Results

Descriptive statistics and bivariate correlations for all study variables are provided in **Table 1**.

The model fit for the measurement model of the latent construct of GPSC was acceptable (RMSEA = 0.078, 90% CI: 0.063, 0.093, CFI = 0.944, SRMR = 0.035). All indicators made a substantial contribution to defining the latent construct. The invariant standardized factor loadings were medium to high and all were statistically significant (**Fig. 2**).

The hypothesized multilevel structural equation model demonstrated an acceptable fit to the data (RMSEA = 0.058, 90% CI: 0.050, 0.065, CFI = 0.928, SRMR = 0.041). Controlling for gender, the model explained 28% of the variance in adolescents' GPSC (**Table 2**).

**Figure 2** illustrates the developed research model. All direct effects were significant and in accordance with our assumptions, with only one exception: the path from parental occupational status to adolescents' PESA was not significant at the 5% level ( $\beta = 0.06$ ,  $p = 0.067$ , 95% CI: –0.005, 0.132).

**Table 3** shows the results of the hypotheses tests and provides standardized path coefficients, standard errors,  $p$ -values, and 95% confidence intervals.

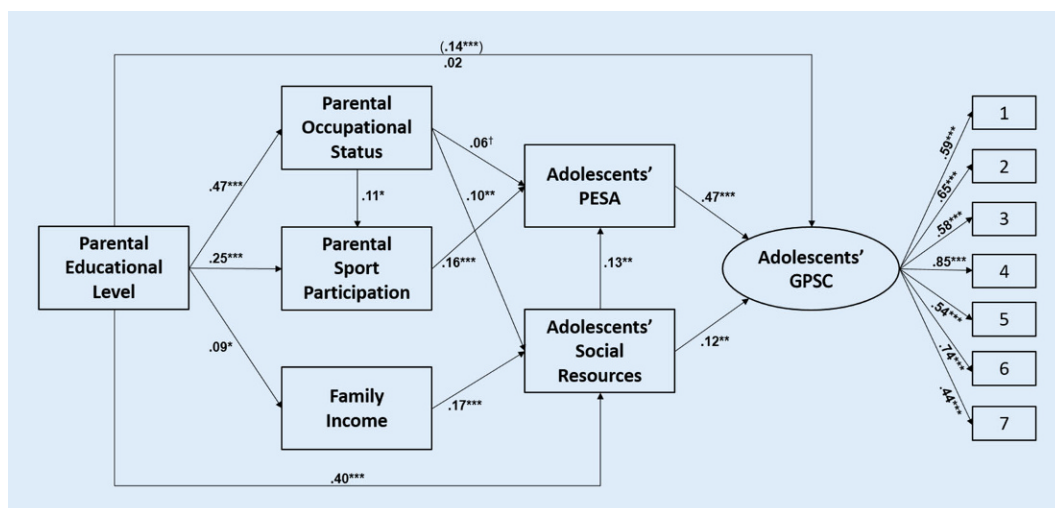
The total indirect effect of parental educational level on adolescents' GPSC was significant ( $\beta = 0.12$ ,  $SE = 0.02$ ,  $p < 0.001$ ,

95% CI: 0.072, 0.169). Moreover, there was no significant direct effect of parental educational level on adolescents' GPSC when estimating the whole model ( $\beta = 0.02$ ,  $SE = 0.04$ ,  $p = 0.656$ , 95% CI: –0.054, 0.086). Hence, it can be supposed the total effect was completely mediated.

## Discussion

The purpose of the present study was to investigate how parental SES and adolescents' GPSC are related. Therefore, we examined the extent to which socioeconomic factors determining parental SES are directly and indirectly related to adolescents' GPSC via processes of parental support and family socialization as well as via the socioeconomic context and associated social resources.

We found an indirect positive relationship between parental educational level and adolescents' GPSC, which was completely mediated by parental occupational status, parental sport participation, adolescents' social resources, and adolescents' PESA. These findings indicate that the parental educational level is decisive for both parental support and family socialization. In addition, the parental educational level is relevant for access to social resources associated with specific socioeconomic contexts. This way the parental educational level is an important determinant of the adolescents' GPSC. However, our assumptions on mediated



**Fig. 2** ▲ Model of hypothesized associations. *PESA* physical exercise and sport activity, *GPSC* global physical self-concept, *Numbers* represent standardized path coefficients for factor loadings, direct and, in parentheses, total effects. Effects are examined at the individual level. *Squares* with numbers represent indicators for the latent variable *GPSC* (1. strength, 2. speed, 3. endurance, 4. sport competence, 5. flexibility, 6. coordination, 7. physical appearance). \*\*\* $p \leq 0.001$ , \*\* $p \leq 0.01$ , \* $p \leq 0.05$ , † $p < 0.10$  (two-tailed)

relationships via parental support and family socialization were only partially confirmed. Thus, our data suggest that the relationship between parental educational level and GPSC is mediated via parental sport participation and PESA (H4). These findings might be similarly interpreted to findings from research on the academic self-concept. Eccles (2005), for example, reported that the effect from the parental educational level on their children's academic self-concept was mediated via parents' beliefs and practices. As an explanation for this mediated effect, Eccles (2005) suggested that factors like educational level influence parents' beliefs and expectations which, in turn, are related to their behavior. Through socialization processes within the family (e.g., orientation towards parental behavior and expectations) and parental support, adolescents' PESA might be affected. It can be assumed that adolescents whose parents have a higher educational level will receive more support for their PESA or that their parents will act as more appropriate role models through their sport participation. As a result, these adolescents may develop a more positive perception of their ability to fulfill social expectations, e.g., concerning a healthy lifestyle, physical abilities, or sporting skills. This may enable them to experience themselves as more effective

and competent, which in turn may positively influence their GPSC.

Our results suggest that parental occupational status is related to the adolescent GPSC more through its relationship to the socioeconomic context and the associated access to social resources (H9, H13) than through its relationship to parental support and family socialization (H5, H6). Moreover, our results indicate that the socioeconomic context and the related social resources play an important role for the GPSC in adolescence. Our findings show that adolescents' social resources are a substantial mediator for the relationship between parental educational level and GPSC (H7, H9, H11, and H13). Further, adolescents' social resources are directly positively related to GPSC (H3) as well as to PESA (H10). It appears that adolescents' social resources are very useful for practicing PESA (e.g., Baskin et al., 2015) and may, therefore, contribute to forming a positive GPSC. Regarding the positive relationship between social resources and GPSC, it can be suggested that extensive social resources also go hand in hand with an increase in social support. Both greater social resources and more social support could make it easier for adolescents to fulfill the social expectations placed on them, and thus, they experience themselves as being more effective

and competent. This experience may be leading to a more positive GPSC.

It appears that family income might be of minor importance for adolescents' GPSC. Our results do not support the hypothesized role of family income as a mediator (H8, H12). Twenge and Campbell (2002) also found a stronger association of self-esteem with parental educational level and parental occupational status, whereas income had the smallest effect on self-esteem.

### Limitations and future research

Several limitations of the present study must be mentioned. Our model is based on empirical evidence and theoretical assumptions, but we conducted a cross-sectional study which precludes us from drawing any causal conclusions. Furthermore, due to the study design, reciprocal relationships between PESA and GPSC as assumed for example by Marsh et al. (2006) for the *reciprocal effects model* concerning physical self-concept and exercise behavior cannot be excluded. Similar reciprocal effects could also be assumed for the relationship between adolescents' social resources and adolescents' PESA, as suggested by Tonts (2005). Thus, certain forms of PESA, which can be carried out jointly with others, could also contribute to the generation of social

**Table 3** Hypotheses testing results

Hypothesis	Path	$\beta$	SE	p-value	95% CI	Results
H1	Parental Educational Level → Adolescents' GPSC	0.14	0.03	<0.001	0.072, 0.201	Supported
H2	Adolescents' PESA → Adolescents' GPSC	0.47	0.03	<0.001	0.403, 0.526	Supported
H3	Adolescents' social resources → Adolescents' GPSC	0.12	0.04	0.004	0.039, 0.208	Supported
H4	Parental Educational Level → Parental Sport Participation → Adolescents' PESA → Adolescents' GPSC	0.02	0.01	<0.001	0.010, 0.028	Supported
H5	Parental Educational Level → Parental Occupational Status → Parental Sport Participation → Adolescents' PESA → Adolescents' GPSC	<0.01	<0.01	0.063	0.000, 0.008	Not Supported
H6	Parental Educational Level → Parental Occupational Status → Adolescents' PESA → Adolescents' GPSC	0.01	0.01	0.088	-0.002, 0.030	Not Supported
H7	Parental Educational Level → Adolescents' Social Resources → Adolescents' GPSC	0.10	0.02	0.007	0.013, 0.086	Supported
H8	Parental Educational Level → Family Income → Adolescents' Social Resources → Adolescents' GPSC	<0.01	<0.01	0.107	0.000, 0.004	Not Supported
H9	Parental Educational Level → Parental Occupational Status → Adolescents' Social Resources → Adolescents' GPSC	0.01	<0.01	0.027	0.001, 0.011	Supported
H10	Adolescents' Social resources → Adolescents' PESA	0.13	0.04	0.001	0.052, 0.200	Supported
H11	Parental Educational Level → Adolescents' Social Resources → Adolescents' PESA → Adolescents' GPSC	0.02	<0.01	0.003	0.008, 0.039	Supported
H12	Parental Educational Level → Family Income → Adolescents' Social Resources → Adolescents' PESA → Adolescents' GPSC	<0.01	<0.01	0.076	0.000, 0.002	Not Supported
H13	Parental Educational Level → Parental Occupational Status → Adolescents' Social Resources → Adolescents' PESA → Adolescents' GPSC	<0.01	<0.01	0.006	0.001, 0.005	Supported

Two-tailed *p*-values are reported

Effects are examined at the individual level and controlled for gender

GPSC global physical self-concept, PESA physical exercise and sport activity, SE standard error, 95% CI 95% confidence interval

resources. To draw causal conclusions as well as clarify questions regarding unidirectional or reciprocal relationships, further longitudinal studies are needed.

Another limitation is the self-report measurement of all variables. Overall, the measures used have shown to be valid and reliable for adolescents (e.g., Benzing, Heinks, Eggenberger, & Schmidt, 2016). Furthermore, they are easy to comprehend and also appropriate for participants with a low educational level (e.g., Fuchs et al., 2015). Nevertheless, self-report measures are vulnerable to bias. Future research should, therefore, address this problem by taking several perspectives into account (e.g., parental surveys and peer reports).

### Conclusion and implications

In contrast to previous studies, we found empirical evidence for the mediated relationships between factors of parental SES, parental sport participation, adolescents' PESA, and GPSC. Hence, this study elucidates interdependent mecha-

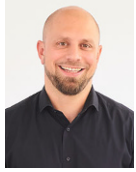
nisms of family socialization and social resources concerning the development of the adolescents' GPSC. We conclude that adolescents whose parents have a higher SES experience themselves as more self-effective because they find it easier to meet the social expectations placed on them. It can be assumed that the parents of these adolescents support them better and also act as suitable role models, for example for PESA. Moreover, adolescents whose parents have a higher SES are also able to access more social resources due to the socioeconomic context. These resources and the associated social support also seem to contribute to the adolescents' feeling that they can fulfill the expectations placed on them. This allows them to experience themselves as more effective, which in turn can lead to a more positive GPSC.

Finally, the findings of the present study promise practical applications. Given the fact that the relationship between parental educational level and adolescents' GPSC is mediated via parental sport participation and PESA, specific

programs could be developed and provided, for example, by local sports clubs. To achieve an "intergenerational transfer of a sport-related lifestyle within the family" (Hayoz et al., 2017, p. 1), these programs should aim for joint sporting activities between parents and their children. Considering the relevance of the parental educational level, these programs should also be low-threshold and particularly address people with a lower educational level. Moreover, due to the importance of social resources for adolescents' PESA and GPSC, it seems reasonable to propose that PESA programs for adolescents aim to connect adolescents from different socioeconomic contexts. This may lead to an increase in social resources and therefore to an increase in adolescents' PESA and GPSC, especially for socioeconomically disadvantaged adolescents.



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## Compliance with ethical guidelines

**Conflict of interest.** J. Vollmer, J. Lohmann and P. Giess-Stüber declare that they have no competing interests.

The study was approved by the Ethics Committee of the Medical Faculty of the University of Freiburg and the Regional Administrative Councils. Data were collected using paper–pencil self-administered questionnaires. Before data collection, parents (or guardians) gave their written consent for the participants to take part in the study. Participants were treated following the American Psychological Association's ethical guidelines regarding confidentiality and anonymity.

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