

Students' sense of coherence after attending a university seminar on health literacy and salutogenesis in physical education

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Abstract:

Background: The salutogenic model of health, centered on the sense of coherence (SOC), offers a promising framework for health promotion through physical education and is therefore included in a university seminar for future physical education teachers at the German Sport University Cologne. This study investigates whether attending the seminar on health literacy and salutogenesis influences the students' own sense of coherence as a personal health resource. **Methods:** The study was conducted between October 2024 (t0) and January 2025 (t1). Students attending the seminar on health literacy and salutogenesis (IG, n=40) were compared to students attending a seminar on teaching and learning methods in sports without a specific focus on health topics (CG, n=23). The sense of coherence scale (SOC-29) of Antonovsky (1987) has been applied in both groups at t0 and t1. The total SOC-score and the subscales comprehensibility, manageability and meaningfulness have been considered. **Results:** Students of the IG had a higher total SOC-score compared to the CG at t0 (148.0 ± 13.5 vs. 137.3 ± 17.9 ; $p=0.009$) and a higher score in the subscale comprehensibility at t0 (50.7 ± 6.8 vs. 44.3 ± 7.4 ; $p=0.001$) and t1 (49.8 ± 7.5 vs. 45.3 ± 7.4 ; $p=0.026$). The total SOC-score at t1 and the subscales manageability and meaningfulness at t0 and t1 did not differ. No differences in the total SOC-score and the three subscales occurred in the IG or the CG between t0 and t1. **Conclusions:** Attending a seminar on health literacy and salutogenesis is not sufficient to impact students' own sense of coherence. More targeted interventions, following a holistic approach, should be developed. Nevertheless, health literacy and the salutogenic model of health are relevant topics in university education of future physical education teachers.

Key Words: Teacher education, health promotion, school sport, Antonovsky, SOC

Introduction

Physical education in German schools is guided by a multi-perspective view on physical activity. „Promoting health and developing health awareness“ is one out of six explicitly named relevant perspectives (MSW NRW, 2014). On this background, future physical education teachers studying at the German Sport University Cologne have to attend a seminar on health literacy dealing with the concept of salutogenesis (Antonovsky, 1996) in the context of physical education.

The underlying concept and structure of the seminar have been described in detail (Klein & Vogt, 2019; Klein & Vogt, 2024). Briefly, main topics are health and health literacy, salutogenesis, promotion of physical activity, postural training, motodiagnostics, developmental disorders regarding endurance, coordination and behaviour, chronic diseases and adapted physical activity (Klein & Vogt, 2024). The salutogenic model of health is transferred to physical education in schools (Klein & Vogt, 2019).

Herein the sense of coherence (SOC) is crucial (Eriksson, 2017), defined as “a global orientation that expresses the extent to which one has a pervasive, enduring though dynamic feeling of confidence that one’s internal and external environments are predictable and that there is a high probability that things will work out as well as can reasonably be expected” (Antonovsky, 1987, p. 123). SOC consists of three major factors: comprehensibility, manageability and meaningfulness (Antonovsky, 1996), which may well be addressed in physical education, if teachers focus on strengthening health-orientated resources instead of deficit-orientated risk-factors and try to empower and motivate their pupils to live a healthy and physically active life (Klein & Vogt, 2019). Due to positive relations between physical activity and health, physical education is a predestined subject to apply a salutogenic approach in schools (Quennerstedt, 2008). Leading for teachers should be the principles that pupils have to understand the task (“What to do?”), have the physical and mental abilities to handle the task (“How to do?”) and make sense of the task (“Why to do?”) in physical education (Klein & Vogt, 2019). What remains unclear is the question, if dealing with salutogenic issues in a university seminar on physical education may promote the students' own SOC. If applicable, this could be a possible health resource for future physical education teachers. Research about the SOC of teachers in general is scarce (de Oliveira Olney & Kiss, 2021).

Therefore, the aim of this study is to investigate, if a seminar on health literacy and salutogenesis in physical education may have an impact on the SOC of attending students. The SOC scale (SOC-29) of Antonovsky (1987) is applied at the beginning and at the end of the course. The participants of a seminar of another study program of the German Sport University Cologne, not dealing with health literacy or salutogenesis, serve as control group.

Material & methods

Participants

The study has been conducted at the German Sport University Cologne between October 2024 (t0) and January 2025 (t1) during the winter semester 2024/25. Three seminars, each comprising $n=30$ students, have been included. Every seminar consisted of 15 classes lasting 90 minutes. Two seminars served as intervention group (IG) and one seminar as control group (CG).

The seminars of the IG were part of the study program for future physical education teachers and dealt with health literacy and salutogenesis. The detailed concept and structure of the course are described in Klein & Vogt (2019; 2024). The seminar of the CG was part of the bachelor degree study program “Sport and Movement Mediation in Leisure and Recreational Sports”, not dealing with health literacy or salutogenesis but teaching and learning methods in sports. The first author of this paper conducted the seminars of both IG and CG.

Participation in the study was voluntary for the students. Altogether, $n=87$ students took part at t0 and/or t1. In four cases, the questionnaires for t0 were missing, in 19 cases the questionnaires for t1 were missing and in one case the questionnaire for t0 has been answered incompletely. Therefore, complete data is available for $n=63$ students (IG: $n=40$, CG: $n=23$). Mean age at t0 was 24.3 ± 4.0 years in the IG and 22.8 ± 2.3 years in the CG (difference not significant, $p=0.104$).

Test instrument

The SOC scale (SOC-29) of Antonovsky (1987) has been applied in a paper and pencil version in German translation (Abel et al., 1995; Schumacher et al., 2000a; Schumacher et al., 2000b). It comprises 29 items; respondents are asked to indicate agreement or disagreement for each on a 7-category rating scale. Eleven items are assigned to the subscale comprehensibility, ten items to the subscale manageability and eight items to the subscale meaningfulness. The values of 13 items must be inverted. A score for each subscale and the total SOC-score are calculated and compared to the German standardisation sample (Schumacher et al., 2000a).

Statistical analysis

Descriptive statistics are shown as mean values (mean) and standard deviations (SD). Normal distribution has been tested by Shapiro-Wilk test. Differences between groups are calculated by the independent t-test, comparisons between t0 and t1 by the paired t-test.

The value of $p<0.05$ represents the probability of error for interpretation of the results. All analyses are done by using the program SPSS 30.0.

Results

At t0 the mean score was 48.4 ± 7.6 for the subscale comprehensibility, 53.4 ± 7.0 for the subscale manageability, 42.3 ± 4.8 for the subscale meaningfulness and 144.1 ± 16.0 for the total SOC-score. Significant differences between IG and CG were shown in the subscale comprehensibility and in the total SOC-score with a higher score in the IG compared to the control group. In the subscales manageability and meaningfulness, no differences occurred between IG and CG at t0 (see Table 1).

Table 1: SOC-scores at t0

t0	group	n	mean	SD	p-value*
comprehensibility	IG	40	50.7	6.8	0.001
	CG	23	44.3	7.4	
manageability	IG	40	54.2	6.1	0.250
	CG	23	52.0	8.4	
meaningfulness	IG	40	43.1	4.4	0.079
	CG	23	40.9	5.3	
total SOC-score	IG	40	148.0	13.5	0.009
	CG	23	137.3	17.9	

*independent t-test

At t1 no significant differences were shown between the IG and the CG regarding the subscales manageability, meaningfulness and the total SOC-score. In the subscale comprehensibility, a higher score was observed in the IG compared to the CG (see Table 2).

Table 2: SOC-scores at t1

t1	group	n	mean	SD	p-value*
comprehensibility	IG	40	49.8	7.5	0.026
	CG	23	45.3	7.4	
manageability	IG	40	53.3	6.7	0.959
	CG	23	53.3	8.0	
meaningfulness	IG	40	43.2	5.2	0.293
	CG	23	41.6	6.3	
total SOC-score	IG	40	146.3	15.3	0.171
	CG	23	140.3	18.2	

*independent t-test

In the subscale comprehensibility, no significant differences could be shown from t0 to t1 in the IG ($p=0.334$) and the CG ($p=0.349$) (see Figure 1).

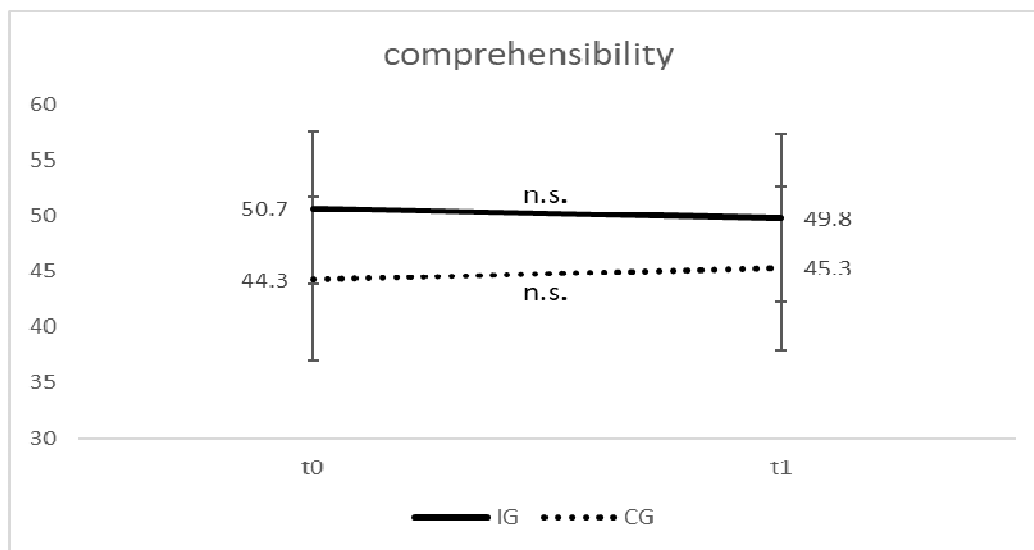


Figure 1: Subscale comprehensibility; n.s.: not significant

In the subscale manageability, no significant differences could be shown from t0 to t1 in the IG ($p=0.113$) and the CG ($p=0.263$) (see Figure 2).

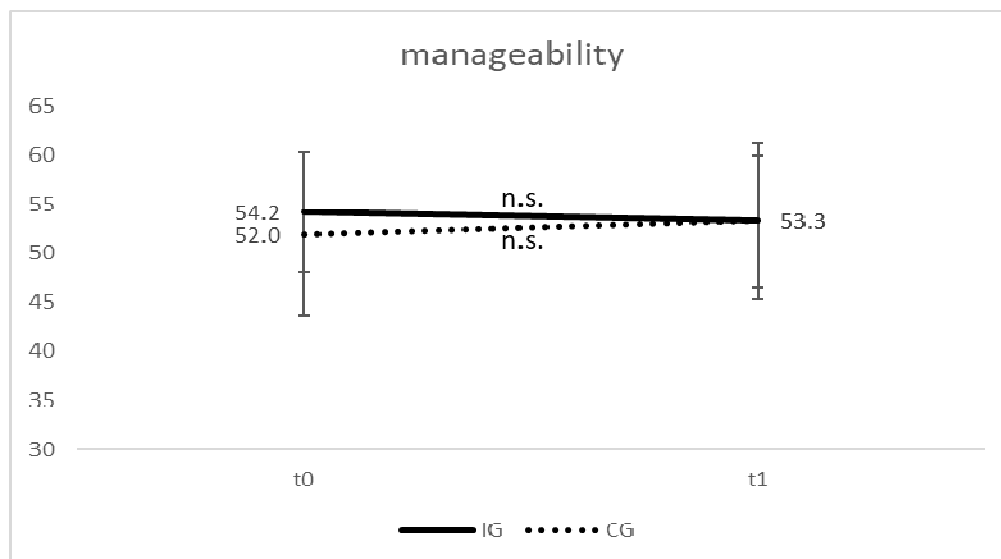


Figure 2: Subscale manageability; n.s.: not significant

In the subscale meaningfulness, no significant differences could be shown from t0 to t1 in the IG ($p=0.940$) and the CG ($p=0.412$) (see Figure 3).

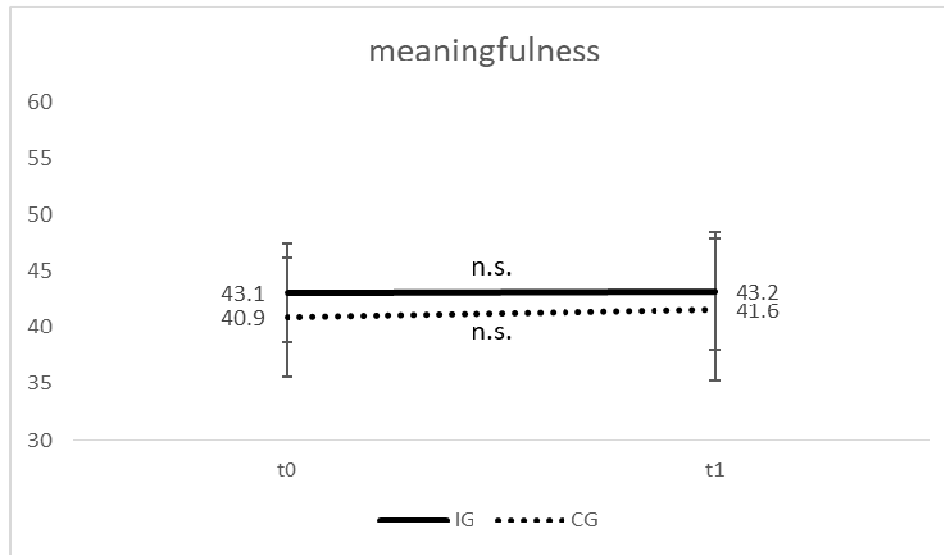


Figure 3: Subscale meaningfulness; n.s.: not significant

Finally, in the total SOC-score, no significant differences could be shown from t0 to t1 in the IG ($p=0.325$) and the CG ($p=0.200$) (see Figure 4).

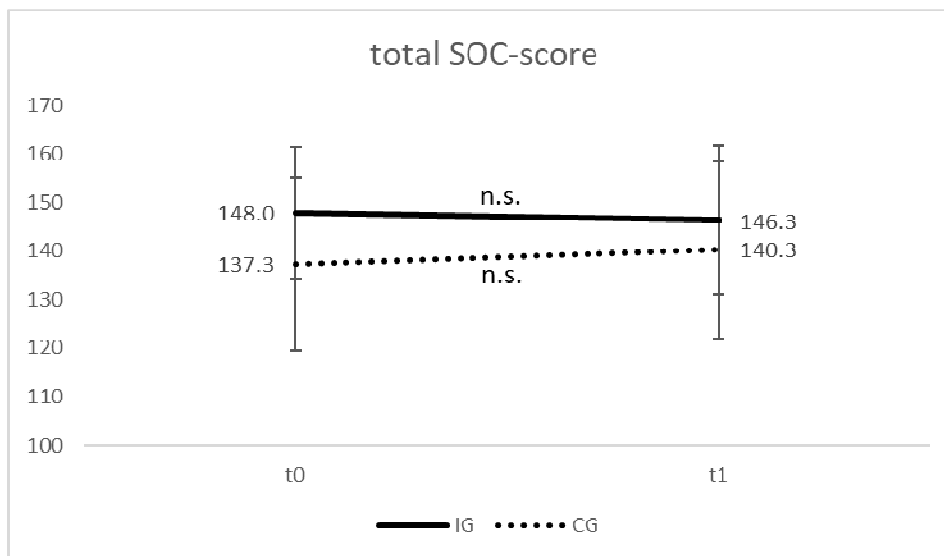


Figure 4: Total SOC-score; n.s.: not significant

Discussion

The sense of coherence (SOC) is a key factor in Antonovsky's concept of salutogenesis (Antonovsky, 1987; 1996). It "reflects a person's view of life and capacity to respond to stressful situations. It is a global orientation to view life as structured, manageable, and meaningful." (Eriksson, 2017, p. 95). A strong SOC is expected to promote individual health.

The SOC scale (SOC-29) of Antonovsky (1987) is widely used to measure SOC. Its possible total score ranges from 29 to 203 points (Eriksson & Mittelmark, 2017). In the present study, the German translation of the original SOC-29 has been applied (Abel et al., 1995; Schumacher et al., 2000a; Schumacher et al., 2000b). The mean total SOC-score of the study sample was 144.1 at t0; it was significantly higher in the IG (148.0) compared to the CG (137.3). The mean total score in the German standardisation sample of SOC-29 was 145.7 (Schumacher et al., 2000a), but this value is related to all adult age groups. In the age group of 18-40 years, the total SOC-score was 148.1 (Schumacher et al., 2000b). Therefore, the total SOC-score in the IG nearly equalled the score of the German standardisation sample while the total SOC-score in the CG was lower. Regarding the three subscales, only comprehensibility was significantly higher in the IG compared to the CG at t0 and at t1.

The reasons for these differences remain unclear. In the German educational system, future teachers have the prospect of a very secure job whereas the free labour market for other degrees is more competitive. This may be associated to a higher comprehensibility and SOC in students becoming physical education teachers (IG), but this is highly speculative and contradictory to the fact, that at least no differences in the total SOC-score between IG and CG occurred at t1.

No differences in the total SOC-score and the three subscales (comprehensibility, manageability, meaningfulness) could be shown from t0 to t1, neither in the IG nor in the CG. Therefore, the present study cannot document any impact on students' own SOC after attending a university seminar on salutogenesis in physical education. The SOC is a global life orientation and interrelated to generalized resistance resources and life experiences (Antonovsky, 1987).

The participation in just one seminar on health literacy and salutogenesis seems not be sufficient to induce a change in this system. It has to be stated, that this in fact is not the aim of the seminar. Instead, students shall develop a holistic understanding of health and transfer this to the context of physical education in schools. However, in the spirit of Antonovsky (1996, p. 16), the following seems reasonable: To „prevent damage, perhaps add a little strength and, in some cases, create an opening for the beginning of a major change in life circumstances“. For measurable effects in their own SOC, targeted interventions for physical education students should be developed. A longitudinal study of Cao & Luo (2024) showed the importance of SOC in promoting emotional well-being in university students and that the emotional benefits of physical activity may be enhanced by a strong SOC.

It has been proven that the following life experiences can have a positive influence on the SOC: the experience of consistency, a good balance between underload and overload, the participation in socially valued decision-making processes and the experience of belonging (Antonovsky, 1996; Mittelmark et al., 2017). These could be general principles for curricula in both health promoting schools and universities, respectively. Moreover, universities should aim to “create conditions that support well-being, cohesion, inclusion, sustainability and social justice” on a holistic and multilevel approach (Dooris et al., 2017).

The application of salutogenesis in schools has been described before in general (de Oliveira Olney & Kiss, 2021; Jensen et al., 2017) and focused on physical education (Klein & Vogt, 2019; Quennerstedt, 2008). Further studies related SOC to physical activity. A systematic review shows positive associations between a strong SOC and a higher level of physical activity (da-Silva-Domingues et al., 2022). Bronikowski et al. (2017) found significantly higher SOC in male adolescents with higher levels of moderate to vigorous physical activity. Moreover, physical activity is a potentially health-causing factor regarding cardiovascular health, fitness, motor development, mental health, self-concept and academic performance (Gao et al., 2018; Strong et al., 2005). Schools are an excellent setting for health promotion through physical education (Klein & Vogt, 2019). This underlines the necessity, to prepare future physical education teachers to plan and implement health promoting physical education lessons focussing on health literacy.

The present study has several limitations. First, the sample size is small and more students took part in the IG (n=40) than in the CG (n=23). Second, no gender-specific analysis was possible due to just four women in the CG. Third, SOC as a global life orientation is dependent on many possible factors that the present study could not take into account. In addition, the three SOC subscales comprehensibility, manageability and meaningfulness correlate highly in the standardisation sample (Schumacher et al., 2000b), which leads to doubts about the empirical separability of the three theoretically derived subscales (Eriksson & Mittelmark, 2017). Nevertheless, the SOC-29 questionnaire is a widely used measure and shows good internal consistency (Schumacher et al., 2000b). For the total SOC-score, criterion validity ranges from slight to good, predictive validity is relatively good and reliability is medium to high (Eriksson & Mittelmark, 2017).

Conclusions

The sense of coherence (SOC) is a crucial factor in the salutogenic model of health (Antonovsky, 1987; Antonovsky, 1996). Physical activity is associated with a higher SOC (Cao & Luo, 2024) and health literacy is one important aim of physical education in schools. Therefore, future physical education teachers should deal with the concept of salutogenesis to plan and implement a health promoting physical education (Klein & Vogt, 2019; Klein & Vogt, 2024).

The present study aimed to investigate, if a university seminar on health literacy and salutogenesis in physical education may influence the students' own SOC. No differences before and after attending the seminar in the total SOC-score and in the three subscores comprehensibility, manageability and meaningfulness could be shown. Therefore, more targeted interventions should be developed to promote students' SOC, for example by using a holistic whole university approach (Dooris et al., 2017). Nevertheless, salutogenesis and SOC are important learning objectives in the context of university education of future physical education teachers.

Conflicts of interest: The authors declare no conflicts of interest.

References:

- Abel, T., Kohlmann, T., & Noack H. (1995). *Eine deutsche Übersetzung des SOC [A German translation of the SOC]*. Universität Bern.
- Antonovsky, A. (1987). *Unraveling the Mystery of Health*. Jossey-Bass.
- Antonovsky, A. (1996). The Salutogenic Model as a Theory to Guide Health Promotion. *Health Promotion International*, 11(1), 11-18.
- Bronikowski, M., Laudanska-Krzeminska, I., Tomczak, M., & Morina, B. (2017). Sense of Coherence, Physical Activity and Its Associations with Gender and Age among Kosovar Adolescents: A Cross-Sectional Study. *The Journal of Sports Medicine and Physical Fitness*, 57(7-8), 1023-1032.
- Cao, Y., & Luo, L. (2024). A longitudinal examination of the effect of physical exercise on the emotional states of college students: exploring the sense of coherence as a mediator through cross-lagged panel analysis. *Frontiers in Behavioral Neuroscience*, 18, <https://doi.org/10.3389/fnbeh.2024.1428347>.
- Da-Silva-Domingues, H., Del-Pino-Casado, R., Palomino-Moral, P.A., Lopez Martinez, C., Moreno-Camara, S., & Frias-Osuna, A. (2022). Relationship between sense of coherence and health-related behaviours in adolescents and young adults: a systematic review. *BMC Public Health*, 22(1), 1-13.
- De Oliveira Olney, R., & Kiss, E. (2021). The application of salutogenesis to teaching and learning – A systematic Review. *Developments in Health Sciences*, 4(3), 58-68.
- Dooris, M., Doherty, S., & Orme, J. (2017). The Application of Salutogenesis in Universities. In M. B. Mittelmark, S. Sagy, M. Eriksson, G. F. Bauer, J. M. Pelikan, B. Lindström, & G. A. Espnes (Eds.), *The Handbook of Salutogenesis* (pp. 237-245). Springer.
- Eriksson, M. (2017). The Sense of Coherence in the Salutogenic Model of Health. In M. B. Mittelmark, S. Sagy, M. Eriksson, G. F. Bauer, J. M. Pelikan, B. Lindström, & G. A. Espnes (Eds.), *The Handbook of Salutogenesis* (pp. 91-96). Springer.
- Eriksson, M., & Mittelmark, M. B. (2017). The Sense of Coherence and Its Measurement. In M. B. Mittelmark, S. Sagy, M. Eriksson, G. F. Bauer, J. M. Pelikan, B. Lindström, & G. A. Espnes (Eds.), *The Handbook of Salutogenesis* (pp. 97-106). Springer.
- Gao, Z., Chen, S., Sun, H., Wen, X., & Xiang, P. (2018). Physical Activity in Children's Health and Cognition. *BioMed Research International*, Article ID: 8542403, <https://doi.org/10.1155/2018/8542403>.
- Jensen, B. B., Dür, W., & Buijs, G. (2017). The Application of Salutogenesis in Schools. In M. B. Mittelmark, S. Sagy, M. Eriksson, G. F. Bauer, J. M. Pelikan, B. Lindström, & G. A. Espnes (Eds.), *The Handbook of Salutogenesis* (pp. 225-235). Springer.
- Klein, D., & Vogt, T. (2019). A Salutogenic Approach to Physical Education in Schools. *Advances in Physical Education*, 9(3), 188-196.
- Klein, D., & Vogt, T. (2024). Salutogenetisch orientierter Sportunterricht: Theoretische Überlegungen und deren exemplarische Implementation in die Sportlehrerinnen- und Sportlehrerbildung [Salutogenetically oriented physical education: Theoretical considerations and their exemplary implementation in physical education teacher training]. *Der Mensch - Zeitschrift für Salutogenese und anthropologische Medizin*, 62/63(1-2), 29-35.
- Mittelmark, M., Bull, T., Daniel, M., & Urke, H. (2017). Specific Resistance Ressources in the Salutogenic Model of Health. In M. B. Mittelmark, S. Sagy, M. Eriksson, G. F. Bauer, J. M. Pelikan, B. Lindström, & G. A. Espnes (Eds.), *The Handbook of Salutogenesis* (pp. 71-76). Springer.
- MSW NRW [Ministry of School and Continuing Education, North-Rhine Westphalia] (2014). *Rahmenvorgaben für den Schulsport in Nordrhein-Westfalen [Framework requirements for school sports in North Rhine-Westphalia]*. MSW NRW.
- Quennerstedt, M. (2008). Exploring the Relation between Physical Activity and Health - A Salutogenic Approach to Physical Education. *Sport, Education and Society*, 13(3), 267-283.
- Schumacher, J., Gunzelmann, T., & Brähler, E. (2000a). Deutsche Normierung der Sense of Coherence Scale von Antonovsky [German standardization of Antonovsky's Sense of Coherence Scale]. *Diagnostica*, 46(4), 208-213.
- Schumacher, J., Wilz, G., Gunzelmann, T., & Brähler, E. (2000b). Die Sense of Coherence Scale von Antonovsky. Teststatistische Überprüfung in einer repräsentativen Bevölkerungsstichprobe und Konstruktion einer Kurzskaala [Antonovsky's Sense of Coherence Scale. Test statistics in a representative population sample and construction of a short scale]. *Psychotherapie, Psychosomatik, Medizinische Psychologie*, 50(12), 472-482.
- Strong, W. B., Malina, R. M., Blimkie, C. J. R., Daniels, S. R., Dishman, R. K., Gutin, B., Hergenroeder, A. C., Must, A., Nixon, P. A., Pivarnik, J. M., Rowland, T., Trost, S., & Trudeau, F. (2005). Evidence Based Physical Activity for School-Age Youth. *The Journal of Pediatrics*, 146(6), 732-737.