BACKGROUND

School children experience several transitions during their progress through the educational system: first from home to preschool, then to elementary, middle and secondary schools, university/college and finally employment. Parallel to these academic transitions children undergo natural development process (aging and growth) marked by considerable individual physical, intellectual and emotional change, as well as the socialization processes of learning and adapting to function as part of a group or school class [1], [2]. Transition can be described as a period between two relatively stable states, as a process of adaptation and habituation to a new situation or as “to be somewhere in between”, which implies a lack of control and belonging [3]. How individuals experience and perceive the transition process could be crucial to transition progression and outcome. Transition within the school system could be viewed as a potentially point at which a child’s future is decided. School system transitions usually progress from pre- and elementary schools, typically small units close to home, with only a few teachers and where parents are often well known to the school staff, to middle school/junior high schools, which are often larger, located at a distance from home and requiring a daily commute, with less contact between parents and school staff. These transitions are part of a broader range of transitions that children experience during schooling, such as switching between teachers, room changes between lessons, moving between various social groups, increasing academic demands, responsibility and independence. Together with the physical, mental and social developmental changes accompanying the child-adolescent-adult transitions, academic transitions can raise existential questions regarding identity and liberation from the adult world (Table 1).

(Insert Table 1)
Adolescents often turn away from their traditional family support and prefer to test their own abilities. Meanwhile the adolescents enter a period of emotional intensity, and will become cognitively mature until 20-25 y [4-6]. The combination of these factors creates high demands upon adolescents, creating the need for a systematic approach for support and intervention in schools. Adolescent might perceive such an approach as “neutral”, thus making it more likely to be accepted and to have impact.

Changing of roles and positions and the accompanying uncertainty can be considered the greatest transition encountered by children. This transition was evident from Kvalsund’s study of 6th grade school children. It was found that as children reach the peak of one social/academic stage they are swiftly presented with an apparently much steeper and more demanding challenge [7]. Indeed, can be one of the most difficult periods in a child’s life and children that undergo poor transitions have increased rates of poor emotional health, truancy and behavior problems [8]. Academic performance has also been shown to decrease during transitions, especially during the transition from middle to secondary school (often described as the toughest) [8, 9]. Moreover, an unhappy child may become disengaged or disruptive, may lose motivation to learn and enter a spiral downwards [7, 10]. In extreme cases this can lead to children dropping out of the school system, which has been shown to be associated with low health [8].

Compared to other countries, a larger proportion of Swedish pupils leave primary school without authorization to enter high school. Of these, male students who immigrated to Sweden after school starts and students with parents with only compulsory school or upper secondary education are overrepresented [11]. Similar problems exist in several other countries [12], with males and pupils from underprivileged families again overrepresented, while drug use has also been identified as increasing the risk of dropout [13]. However, no
single factor can account for school dropout, rather it is a slow context dependent process [14]. Perceived security, academic success and feeling at ease in school have been shown to promote positive health and school performance [15]. As such, good transition becomes vital for ensuring children are secure and settled, and therefore better able to engage in academic work. When investigating the student’s perspective of transitions, Topping (2011) identified a sense of belonging as a key promoter of learning and academic achievement [16]. Indeed, it is well known among teachers and school staff that learning and health are strongly interdependent [15] [17] [18]. To address the lack of adequate measures of child to adolescents health [19, 20], educational research efforts are aiming to reduce the risk of school dropouts during transitions [1]. To achieve this important to identify and support the positive health factors which can impact on children’s maintained positive self rated health during transitions. To our knowledge there are no reported school based children’s positive self reported health (SRH) studies focused on the impact of transitions. The aim was to explore three school based transitions in a long-term prospective population based study; preschool to elementary school (6-10 y), elementary school to middle school (10-13y), and middle school to high school (13-16y). Specifically positive variables before the transitions and their potentially predictive strength and impact on positive self-reported health (SRH).

**METHODS**

**Context**

In Sweden it is compulsory for all children age 7 to 16 to attend school, and although preschool class (at the age of 6) is not compulsory, practical all children attend. In the Therefore the Swedish educational system contains as many as six major systematic transitions: (1) home to preschool; (2) to primary school; (3) to middle/junior high school; (4)
to secondary school; (5) to upper secondary/high school; (6) to university or college and finally to work. Schools are coeducational and the school system is public financed. All public schools (including meals) are free of charge. The Swedish School Health Services (SHS) and school nurses are based within schools and are considered a natural element of the school environment. The role of the school nurse is to monitor children’s development, preserving and improving their mental and physical health, to promote healthy lifestyles among the children throughout their school years and to foster a positive relationship based on availability, absence of share and non-compulsory [21, 22]. One approach used by the SHS and school nurses in the county of Västernorrland is the Health Dialogue (HD) concept, which consists of three parts: (a) a HD questionnaire; (b) a meeting between children, parents (in the case of 6-year olds) and the school nurse, in which the HD questionnaire is used as a basis for dialogue and; (c) registration of the HD questionnaire results in the child’s medical record and in an epidemiological database (provided that the parents have given their written consent) [23]. The HD approach differs from other child health research approaches in that the HD concept originates from clinical practice and is conducted solely by the school nurse, who is based within the school and shares the school environment with the school children on a daily basis. The HD questionnaire represents a cross-sectional snapshot of a child’s SRH but also allows longitudinal studies of child development throughout their schooling [24].

**HD section a: the HD questionnaire**

The HD questionnaire is structured to a positive salutogenetic health promoting approach, consisting of health-related questions, each phrased in a positive manner, and covering physical, mental and social dimensions of health. The physical dimension includes nutrition (eating breakfast every day, drinking soft drinks once a week or less), somatic problems (allergies, headache, stomach ache, back/neck/shoulder pain), self reported health and sleep
habits. The mental dimension includes well-being (feeling low/sad, worried/afraid, irritable/bad tempered and having an adult to talk to), school environment (satisfaction in school, having the ability to concentrate and work in peace, stress over school work) and bullying (knowledge about a friend being bullied and being bullied personally). The third dimension is social health and includes leisure (time spent watching TV and using computers) and physical activity, both in school and during leisure time (active participation in PE classes, daily physical activity, part time work, smoking habits at home, use of tobacco, alcohol and drugs). As well as these three principal dimensions, an additional section including six sub-questions addresses the physical school environment (e.g., perceptions of classrooms, school yard and restrooms). The HD questionnaire is offered to all school children at four occasions (at 6, 10, 13 and 16 y), and although content repeats, the questions, content and question numbers are reformulated to be age appropriate [24].

**HD section b: the meeting**

At 10 years of age the school nurse measures the school children’s height and weight, and calculates iso-body mass indexes [25]. The nurse then leads a dialogue with each child using the HD questionnaire as a guide. The HD concept is inspired by "Motivational Interviewing" (MI), a method based on short meetings (>20 min) and focused on increasing motivation for change. This approach is suitable for children whose concentration and endurance may be limited [26, 27].

**HD section c: the registration**

After conducting the a- and b- parts of the HD concept, the school nurse performs a registration of the results in the digital medical journal and in a national database (if parental
sample has been given). The school nurse then communicates written and/or verbal feedback to the school children and parents, including the results of the physical measurements.

Sample
The data consist of 6693 HD questionnaires conducted in the county of Västernorrland, Sweden during 2007-2012. All HD’s had been conducted on at least two occasions with the same individuals. Three cohorts has been created: cohort A, pre-school (6 y) to fourth grade (10 y); cohort B, fourth grade to seventh grade (13 y); and cohort C, seventh grade to first year of upper secondary school/high school (16 y). All schools within Västernorrland County were included. Västernorrland has approximately 250,000 inhabitants and is characterized by large rural areas with few cities. For ethical reasons it is impossible to further investigate the dropouts or the reasons for dropping out. Distributions of the content in the cohorts and response rates are illustrated in Table2.

(Insert Table 2)

Ethics
Parental consent was granted for all HD’s in the study, which was approved by the Ethics Committee at the Medical Faculty, Umea University (no. 2008-122M, 2013/91-31) and was conducted according to the ethical principles recommended by the Research Council.

The variables
HD has a positive health promotive approach, and in accordance with this all variables have been coded and dichotomized consistently as positive (coded 1) and negative (coded 0). SRH was used as the dependent variable (e.g., My health is...) and was answered with the following
five options: very good and rather good (coded 1), neither good/poor, rather poor and poor (coded 0). A model for each cohort A, B, C was created including the variables which showed significant differences in SRH between the two occasions (before and after the school transition, see Appendix 1 for variable coding). The cut off points of the variables were tested and validated (face validity) according to practice from several group discussions with school nurses in one of the municipals in the county.

**Statistical analyses**

In order to assess the independent association between different positive variables in HD and SRH after transitions in the three cohorts, gender (a potential confounder) was controlled for before the transition. The first step of the analyses was to explore the prevalence of the variables among boys and girls in the three cohorts before and after the transitions (Table 2). A Chi-2 test was conducted and all positive health related variables that proved statistically significant were thereafter included in a model.

Multivariate analyses were then conducted with potential confounders included in the analyses. A series of multiple-predictor models estimated the impact of earlier positive variable exposures on positive (SRH) outcomes in school transitions. Multivariate analyses were conducted using logistic regression with a 95 percent confidence interval with dichotomized variables [28]. The statistical package SPSS version 21.0 was used for all statistical analyses.

**RESULTS**

The prevalence of school children reporting positive SRH in the three cohorts was relatively unchanged and remained stable at 88-98%, with small differences according to age and gender (Table 3). (Insert Table 3)
Factors having a significant impact on positive SRH among children were identified in all cohorts. No single factor could account for changes in positive SRH during school transitions, but rather several factors depending on age and gender (Table 4).

**Cohort A**

For all children age 6-10 y there appears to be a link between experiencing good sleep [3.5; 1.2-10], a non-smoking home [2.4; 1.0-8.1], feeling comfortable in school [2.2; 0-6.9], not feeling afraid or worried [1.9; 1.0-4-6] and not having been bullied [1.9; 1.0-4.2], and reporting a positive SRH in 4\(^{th}\) grade. For 6 y old girls, experiencing the school yard positively [5.7; 2.0-17], a non-smoking home [4.2; 1.2-15], and good sleep [4.2;1.1-16] were associated with reporting a positive SRH as 10 y olds. Among 6 y old boys feeling comfortable in school [3.8;1.1-14], an ability to concentrate [2.2;1.0-6.1] and not feeling sad [2.0;1.0-5-6] was associated with reporting a positive SRH (Table 4).

**Cohort B**

In cohort B (children aged 10-13 y) the following factors were significantly associated with reporting a positive SRH in the 7th grade: not feeling sad [2.9;1.7-5.2], experiencing the school yard positively [1.9;1.1-3.3], a non-smoking home [1.8; 1.0-3.6], and having good sleep [1.4;1.0-2.6].

Not feeling sad [2.7;1.4-5.5], having good sleep [2.0;1.0-4.2], and positive experience of the schools rest rooms [1.6;1.0-2.8] as 10 y old girls was associated with reporting a positive SRH as 13 y olds, while among 10 y old boys not feeling sad [3.6;1.1-12] and being physical active every day [2.9;1.0-10] were significant factors for a positive SRH (Table 4).

**Cohort C**
For children age 13-16 y, not experiencing pains from the back/neck/shoulders [1.8;1.2-2.7], not feeling sad [1.8;1.0-3.0], daily physical active [1.6;1.0-2.6], feeling comfortable in school [1.5;1.0-2.7] and positive experience of the school yard [1.1;1.0-1.6] were identified as significant factors for reporting a positive SRH in the 1st year of high school.

For 13 y old girls, being daily physical active [2.6;1.0-7.2], experiencing the school yard positively [2.3;1.0-6.2] and not feeling afraid or worried [2.0;1.0-6.4] were associated with reporting a positive SRH as 16 y olds. While among 13 y old boys, experienced ability to concentrate [2.8;1.0-11], having good sleep [2.6;1.0-9.0] and reporting a positive SRH were significant factors (Table 4). (Insert Table 4)

DISCUSSION

The results show that the HD is able to identify factors impacting school children’s SRH during transitions. Though analysis of self reported experiences of school life we have identified many significant factors relevant for SRH and learning, including being safe and secure at school, not feeling sad, not feeling afraid or worried, experiencing the schoolyard and restrooms positive (especially girls), not experiencing being bullied, having a good sleep, being physical active, having the ability to concentrate (especially boys).

As differences in the key factors were identified between the cohorts, this allows interpretation of how children’s age and development, as well as school organization and the pedagogical curriculum affect SRH.

Feeling safe and secure

We interpreted that it was vital for children of 6-10 y to have the courage and inner security to experience a larger world, including a partial separating from parents. Furthermore, it is
important that the schools physical and mental environment supports the children’s natural curiosity, without damaging the children’s trust.

Achieving a good start to school was found to be important for reporting positive SRH for 6 y old children.

**Experiencing social belonging**

Experiencing social belonging was found to be vital for children 10-13 y, with it important that the school brings joy and fun, provides opportunities to engage in play, fosters feelings of social belonging and develops pupil’s skills. For all 10 y old children it was important to make a good transition from middle to junior high/secondary school in order to report positive SRH as 13 y old.

**Health**

The health of 13-16y olds can be divided into several components such as healthy body, security within oneself and in relation to others. A positive SRH was significantly associated with a broad spectrum of variables reflecting physical, mental and social factors, and can be interpreted as good and robust self esteem being the key factor across positive physical, mental and social factors. Almost all variables had to have a positive outcome in order to report a positive SRH as this reflects a complex process in a sensitive period in children’s lives. This corresponds well with earlier research among adolescents which conceptualize health as a construct related to medical, psychological, social and lifestyle factors. Positive health ratings were affected in a similar manner to negative ratings, however, the absolute importance of hampering positive health may be greater because of the high prevalence of such ratings [29].

These findings identify health factors with a positive impact on SRH during transitions. These factors differed across ages and between genders, and thus contribute to the knowledge of the school nurses and support teams. This knowledge can now be applied to enhance
facilitation of school children during school transitions, which will be vital in preventing school failure and dropouts. Other researchers have found that there is no single factor that can account for school dropout; rather it is a slow context dependent process [14]. Our findings suggest that the HD concept could allow school nurses an opportunity to identify these factors and initiate intervention. HD results could also contribute valuable information to the children themselves, as well as their families. Overall we found that children’s positive SRH is largely dependent on the school environment, which must be are experienced positively. This corresponds well with the results of Awartani et al and Rising Holmström et al [15, 30], which show that perceived security and to feel at ease within school are important for academic success. Smoking remains one of the most important preventable causes of death in the world [31] and studies indicate that most adolescents begin using tobacco before 18 y old (as well as alcohol and other drugs). Indeed, rates of adolescent substance use are high in many Western countries, including Australia and the United States [32-34] and there are indications that some children begin tobacco use before 10 y of age [35].

The relationship between parental and peers smoking, family structure and parent-child relationship, and adolescent smoking indicate that all of these factors contribute to the onset of daily smoking in adolescents [36-39]. Shenghan Lai et al (2000) studied the association between cigarette smoking and drug abuse in the United States and suggest that cigarette smoking may act as a gateway drug to illegal drug use [40]. Developmental research shows that adolescent substance misuse (smoking, alcohol and drugs) can result in immediate and long-term health and behavioral problems [41], particularly substance dependence [42], mental and physical health problems [43] and disruption to family and social relationships [44]. To sleep well is important for school children and the association between inadequate sleep, wellbeing and various health problems have been well studied [45-48]. Our result shows that physical activity has an impact on positive SRH. This is in line with earlier
research which established that physical activity generates positive effects on children’s health, including regular nutrition habits, normal weight and health development [49-51]. Considering that health and learning are strongly interdependent, this result has relevance for children’s learning ability and suggests that successful transitions require teamwork between children, parents, teachers, school staff and school nurses.

**Methodological considerations**

This study was limited by the fact that all results are limited to three cohorts of Swedish school children; however, as a population based survey including all school children SRH from 6-16 years and the high total response rate (79%) provides considerable strength and increases the generalizability of the results. In all research concerning children it is always difficult to find methods that are valid and reliable and there has been criticism of this concept based on the assumption that young children's self-assessment of their own health is invalid due to the maturity and level of development, and that small children cannot verbalize their own health, and are instead influenced by their parents and surroundings. Riley’s (2004) study demonstrates adequate understanding, reliability and validity of child self reports at ages as low as 6, which increases after the age of 7 in general populations. Moreover, the reliability of reports by children (8–11 y old) was robust on health questionnaires developed especially for this age group [52]. In the HD concept questionnaires have been developed especially for each age group and includes images and visual estimation scales to enable and ensure the child’s participation. Furthermore, concrete examples and “thinking aloud” were used as strategies to interpret abstract concepts during meetings between the pupil and school nurse. Such an approach has been shown to be successful in research among children of 5 to 9 years old [53]. Earlier research has studied this and found that young children (6-year olds), have a concrete understanding of health that is focused on hurts, aches and nutrition [54-55] and that
children can reliably self-report their health [56]. While much effort has been invested into the development and validation of the HD questionnaire (Rising-Holmström et al, 2013, manuscript in submission). Furthermore the HD concept was developed and tested by end users (school nurses) and this effected the implementation as well as the response rate [57-59]. The HD was conducted in a systematically similar approach by school nurses within the county [23] and as it was repeated four times, enabled the school child and school nurse to establish a continuous health promotive relationship [23], contribution to efficient transition of gaps in the school system.

CONCLUSIONS

School children’s SRH provides viable means of monitoring individual experiences of health during childhood and adolescence, which can enhance understanding of health among school children. A better grasp of what contributes to school children’s positive SRH during transitions is vital for school nurses, school management, student health, teacher, parents and public health workers, as well as children themselves. These results provide an opportunity to learn and benefit from children's own experiences and a possibility to provide support and assistance at key phases. The study also reveals new perspectives of school children's knowledge of the important determinants of health and the relevance of this for their school performance.

ABBREVIATIONS

SRH - Self reported health
HD - The Health Dialogue concept
COMPETING INTERESTS

The authors declare that they have no competing interests. This study has received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors and there are no conflict of interest.

AUTHORS’ CONTRIBUTIONS

MRH participated in its design, coordination, and drafted the manuscript; NO participated in the design, carried out statistical analyses and interpretation of the data; LK and interpretation of the data. KA participated in the design. All authors read and approved the final manuscript.

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