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YOUNG FEMALE HANDBALL PLAYERS AND SPORT SPECIALIZATION: HOW DO THEY COPE WITH THE TRANSITION FROM PRIMARY SCHOOL INTO A SECONDARY SPORT SCHOOL?

ABSTRACT

Objective

The aim of the present study was to examine how six young female handball players (aged 13-14 years) perceived the transition from primary school to a sport specialized secondary school.

Methods

Physical and physiological data as well as data from questionnaires were collected at baseline and after the first year at the sport school, and qualitative interviews were performed retrospectively after the first year at school.

Results

Evidence of competition related stressors, organizational stressors (sport and school balance), and personal stressors (social life and sport balance, lack of sleep and severe injuries) was found. Three girls developed long lasting musculoskeletal injuries (> 3 months out of ordinary training) and one experienced repeated short periods (≤ 2 weeks out of ordinary training) of injuries during the first year. Onset of menarche and a length growth between 6 and 8 cm during the first year were characteristic traits of the four injured girls.

Conclusion

From our small study, it appears that young athletes attending a specialized secondary sport school experienced many stressors due to a significant increase in training volume, reduction in

sleeping time and development of severe and long lasting injuries. Hence, trainers at sport schools, club trainers and parents need to communicate and support them in order to prevent this.

Summary box

- Fatigue, lack of sleep and experiencing injuries were related to the increased total load after sport specialization
- Length growth and age of onset of menarche were physical characteristics of the injured female handball players
- Progressive training volume and intensity and deliberate recovery should be emphasised during puberty
- Collaboration between teachers/trainers at sport schools, club coaches/trainers, and parents is important in order to monitor young athletes' workload when they enter a secondary sport school

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BACKGROUND

When pursuing an *athletic career*, a person commits to an activity and strives for excellence with the aim of peaking in athletic performance.[1] There are different levels of careers. Early sport specialization may lead to an international and professional career, but many young and aspiring athletes end up with a local or national career. A career proceeds through four stages and transition[2]—the initiation stage, the development stage, the mastery stage, and the discontinuation stage.[3] The focus in this article are athletes aged 13-14 years who attend a secondary sport school and who combine school and athletic training.[4] These are athletes in the development stage and they make a huge transition both school wise and sport wise, and the question is, to what degree does this transition influence young athletes' experience of the sport—how do they perceive and respond to early specialization and the following increase of work load?

Theoretical background: The training of young female athletes

Young athletes may not be in a position to make an informed decision about the consequences of being talented and pursuing an elite career. Are they aware of the long-term risk and consequences of almost doubling their training volume at the age of 13? In an editorial in BJSM, Bahr [5] discusses the negative effects of increased unilaterally training in youth in relation to acute and long term injuries in sports like volleyball. The International Olympic Committee and the American Orthopaedic Society for Sports Medicine (AOSSM) published recently consensus

statements on youth athletic development regarding their concerns about early sport specialization as well as giving recommendations of "best practices" for young athletes' psychological and physiological development.[6,7] Both physiological and psychological research support this.[7] Hall and colleagues [8] found that early sport specialization in female adolescents was associated with increased risk of anterior knee pain disorders, including different knee diagnoses, while psychological research focus on drop-out.[9,10]

Girls reach puberty about two years earlier than boys, and the mean age of menarche in Norway is 13.3 years.[11] In addition to length growth, the unfavourable distribution of fat and muscle mass results in reduced relative muscle strength and endurance in girls. This may reduce their adaption to intensive and specialized training during puberty and cause more injuries than in boys.[12] In an evidence-based review, Jayanthi et al.[13] concluded that too much intensive training and early specialization should be delayed until late adolescence to avoid injuries and psychological stress. Bieber and Gregory [14] report on overuse injuries in youth sports caused by stresses, such as inappropriate increases in training and unfavourable training surfaces or improper equipment.

Chronic lack of sleep is associated with increased risk of sports injuries [15] and previous studies have reported on the negative effect of sleep restriction on physical performance [16] as well as mental skills such as cognitive function, mood, daytime sleepiness, reaction time, and learning and memory tasks.[10-11] The optimal duration of sleep per night for adolescence is individual, but 8.5-9.5 hours per night are recommended by the Adolescent Sleep Working Group [19].

Doran et al. [20] showed a dose response pattern between sleep and coping with psychological and physiological tasks after three weeks with respectively four, six, and eight hours sleep per night. The more they slept the better they were to solve problems.[20]

How to cope with sport, school and a social life

When entering a specialized sport school with dual demands of both academics and elite sport, [21], *coping* becomes vital. Coping is the way athletes deal with injuries, high expectations, and coping mechanisms are learned behavioural responses that successfully lower arousal by neutralizing or minimizing the importance of a threatening condition.[22] Fletcher and colleagues suggest that stress should represent the overall *process* incorporating stressors, appraisals, strains, and coping responses. In the transactional framework, *strain* is defined as an individual's negative response to stressors. Further, *stressor* is the environmental demand or stimulus encountered by an individual.[23] When defining these three major types of stressors, the individual's ongoing transaction with environmental demands is associated with 'competitive performance,' 'the organization which he she operates within,' and 'personal life events' respectively [see ,24]. Fletcher and colleagues underline that personal and 'nonsporting' life events like family "should not be considered aspects of the organizational stress process" [23] see also[25–27].

Previous studies have revealed a link between general coping resources and athletic injury [e.g., ,28], and also highlighted that the needed coping resources may come from personal resources or the environment.[29] Because the former, e.g., healthy diet, social competence, may be limited due to their young age, the environment become more important. Csikszentmihalyi et al.[30] argue that schools are valuable resources due to young athletes' access to coaches and teachers

who create a positive environment for development, and that specialized sport schools have made life easier for many athletes.[4,31] Furthermore, parents, club coaches and peers are all perceived as valuable support persons for young athletes coping with stress.[2,32,33] Parents are of major importance, and family life is often strongly focused on the young athletes' needs.[34] Even at this age, to pursue a dual career is a choice that involves extensive commitment and support from the family.[35] It is tough to maintain the fragile balance between the two extremes of athletics and academics, and the participants of the present investigation have just started on this journey.

Social support is important for young athletes as it facilitates problem-focused (manage and alter the problem) and emotion-focused (maintain hope and optimism) coping.[36] Lazarus and Folkman [22] suggest that social support is the opposite of social demands, and both the demands and the social resources vary in severity and intractability. Used in the sport setting, Bianco and Eklund define it as social interactions with positive outcomes.[36] A distinction between three types of functions of social support also makes sense: emotional (i.e., making one feel loved and cared about), informative (i.e., advise, feedback), or tangible (direct aid such as money) support.[37] Social support is often considered among the emotion-focused coping strategies after the Lazarus and Folkman dichotomy, and the lack of social support from a coach may be perceived as stressful.[24]

Furthermore, these young athletes in the development stage [3,38–40] transition into an intensive level of training and experience both normative (psychosocial, psychological and predictable academic-vocational development) and non-normative (less predictable such as injury)

changes.[3] Effective coping is needed in order to be successful for these young athletes in their transition. The number of secondary sport schools in Norway is increasing and presumably resulting in earlier sport specializing and increased training volume among the young athletes. Hence, more research is needed to examine how young female and male athletes respond to the total load in order to promote a healthy development, avoiding overuse injuries, burnout and overtraining, and retain the talents. The purpose of the present study was therefore to explore how six young female handball players psychologically and physically perceive the transition from primary school into a specialized secondary sport school.

METHODS

Design and participants

After the study was reviewed by the Regional Committee for Medical Research Ethics, South-Eastern Norway Regional Health Authority, and approved by the Norwegian Social Science Data Services, a convenient and purposeful sampling procedure [41] was conducted to recruit six young female handball players before entering a sport specialized secondary school program in Norway. Club coaches helped us gain access to the girls, and after permission was received from gatekeepers, the researchers contacted players and their parents to provide information about the research project and to elicit their participation. Players and at least one parent signed a written informed consent form before inclusion. The athletes were approximately 13 years old when they volunteered to take part in this investigation. We collected physical and physiological data at baseline (13 years) and after one year at the sport school. The interviews were performed retrospectively after one year at the sport school. In addition, they reported injury experiences once a week on Short Message Service (SMS) (not injured, still injured and/or new injuries).

Test methods

We measured all girls' body composition and maximal oxygen uptake twice, at baseline (13 years) and before the interviews (14 years). All girls completed a validated questionnaire measuring puberty status according to Tanner's classification of puberty stage [42] and in addition they answered questions about training volume, sleeping time, injuries and number of participating sports.

Height was measured standing barefooted to the closest cm and weight was measured with light clothes on to the nearest 0.5 kg. *Body composition* was performed with the BIA device Inbody 720 (Body Composition Analyzer, Biospace Co. Ltd., Seoul, Korea) with standardized procedures including a minimum of two-hour fasting and no drinking before measurement.

Maximal oxygen uptake was measured on a treadmill with a stepwise protocol, the Oslo protocol [43] until exhaustion. The subjects were breathing through a mouthpiece with a one-way valve wearing a nose clip. The Oxygen Pro, Würtzburg, Germany analyser, analysed the expired gas (VO_2 and VCO_2) and gas volume.

Interviews

The face-to-face interviews were conducted at the end of their first year at the school, and the interviews were carried out at the training location. All girls belonged to the same team. The interview consisted of four main sections: (a) demographic background; (b) experiences of playing team sport at their level and the combination with school ('describe a normal day?'); (c) why they chose to enter a sport school ('Has the school system helped you to become a better athlete?'); (d) types of stressors perceived by the players ('what do you perceive to be the main demands from school, club, parents...'); and (e), coping with the aforementioned stressors ('how

do you cope with this/these demands' and 'who do you perceive as supportive?'). Follow-up questions were used in order to elicit in-depth responses from the participants. The interview lasted between 40-55 minutes.

Data Coding, Theming, & Analysis Procedures

The interviews were transcribed verbatim and were content analysed using the procedures recommended by Miles and Huberman.[44] We read and reread the transcripts in order to become familiar with the data. Themes, quotes, and paraphrased quotes representing a meaningful point/thought were individually identified. Next, researchers from different sport fields such as psychology, sport management, and physiology had a meeting to discuss and consensually validate themes and quotes into patterns of responses in the data (such as the importance of recovery, injuries) and a summary label for the category (physical and physiological issues) was determined. All transcribed interviews are enclosed as supplements.

Trustworthiness

In accord with Lincoln and Guba's criteria for trustworthiness,[45] we spent prolonged time in the field to build trust with the participants. Further, we used analysis triangulation to help establish accuracy in the interpretations.[46] Emerging findings were compared again with the data to verify understanding, and these were discussed in a university research workshop (i.e., a group of scholars independent of the research). This procedure was conducted in order to curb bias.[47] Finally, a thick description of the context and other aspects of the research setting were made in order to provide evidence for transferability.

RESULTS

The findings revealed that young female athletes have a busy schedule and that they experience several daily stressors, which we will elaborate on in the first part of the results. We will then present the physical and physiological results in combination with the athletes' perception of their own situation.

The daily schedule and group perceptions of stressors

In the interviews, the numerous hours of training (especially in the evening), lack of sleep and associated fatigue, and injuries were issues they brought up right away (see Table 1).

Table 1

Activities, recovery and competitive schedules for the 14 years old student-athletes

	Responses from interviews and survey
Hours' sleep	Mean: 7.2 hours
School day	8 hours
School practices in the morning	4 (two handball specific, 2 stabilization/strength)
Team practice in the afternoon	5 different venues and usually around 7-9 pm
Average hours organized activities	14 + matches
Season	September-April
Matches	1-2 weekends
Playful activities	Not mentioned in interview (Netflix)
Preparation of food	Must prepare approximately half of the meals themselves
Continue within the sport school system	Yes, all six are currently pursuing an elite career

The girls get up at 7:00 am, eat, and leave for an eight-hour school day. The school is organized so when they leave at 4.15 pm, all assignments and homework are completed. Some of them have time to go home for dinner, while others have not. This depends on where they live and

parents' schedule (and availability to drive them) and the time of the training, which varies over the week. If there are no tournaments, then the weekend is devoted to rest, recovery, and preparing for a new week. Naturally, some periods are harder than others, as one of them expressed in the interview: 'There was a period where I would not eat, I was hungry but did not have the energy to eat, and I really had to force myself to start eating again.' This quote underscores the level of fatigue experienced and why they constantly emphasize the need for recovery (see Table 2 and 3).

Table 2

Athletes' perception of stressors revealed in the interview.

Main category	Type of stressor	Illustrative quote of perceived stress
Physiological issues	Injuries	I have a fatigue fracture in my back. Last year I continue to train hard during a rapid growth period. I do not like to talk about injuries to my coach, I feel like I am faking it
	Exhaustion	I am sometimes so tired that my mom let me sleep in and be home from school. I might even take some days off from training. Sometimes when I am really exhausted - I just lie down and cry
	Recovery	I am very good at resting – as soon as I am home, I good to bed and relax (sleep/TV etc.)
Logistical issues	Preparation of food	I usually prepare food for the next day before going to be in the evening.
	Parents as drivers	I can sleep a little longer than the others as my parents drive me to school.
	Schoolwork	My parents consider school as more important than sport, I prefer sport – but of course I understand that school is important
	Other sports	It is hard to combine two sports; it could have worked if my coaches actually communicated about the logistical issues.
	Late training	Once a week I am home very late... pick up sister tbc.
Enough sleep	I need at least 8 hours sleep, I do not function without it I am really good at resting, but I never get enough sleep It is great that school starts late on Wednesday, I need that sleep	

Team issues	Coach and injuries	You can easily see when coach think you are whining or injured or should simply work through it. I wish I knew how to talk about the difficult things with her/him.
	Team-school relationship	The sport school program and the opportunity we get here has helped me develop as a player. The school does a great job in adapting the workload for us, but the club coach is more sport focused.
	Social life limited to the club	It is hard to have time to other friends that the ones in the club.

Table 3

Anthropometric characteristics, age, height, bodyweight, percentage fat (%), and maximal oxygen uptake (VO_{2max}), number of sports (n), training volume (hours/week), sleeping time in the schooldays and weekends (hours/night) and number of injuries(n) at baseline (13.4 years) and after one year (14.4 years). Results are given individually and with mean \pm standard deviation, (SD). Age of menarche is given in the last row.

Variables at baseline and after one year / Subjects	1**	2	3	4	5	6**	Mean (SD)
Age (years)	13.4	13.4	13.1	12.7	13.0	13.4	13.1 (0.3)
	14.4	14.4	14.1	13.7	14.0	14.4	14.1 (0.3)
Height (cm)	159	161	152	160	162	158	158.7 (3.6)
	160	168	160	167	168	162	164.6 (4.2)
Weight (kg)	50.5	53.5	45.8	47.3	53.2	44.8	49.2 (3.8)
	53.2	56.5	51.0	52.4	58.8	49.0	54.4 (3.2)
Fat mass (%)	16.8	24.0	8.4	10.3	16.8	9.2	14.3 (6.1)
	17.4	20.8	9.4	12.5	17.5	12.1	15.4 (4.5)
VO_{2max} (mL·kg ⁻¹ ·min ⁻¹)	62.5	56.3	57.9	54.1	53.2	55.2	56.5 (3.4)
	64.8	59.4	56.8	54.8	49.2	53.9	57.0 (5.8)
Number of sports (n)	1	1	2	1	2	1	Nc
	1	1	2	1	2	1	Nc
Training volume (hours·week ⁻¹)	10	8	7	8	7	8	8.0 (0.8)
	16	14	12	14	12	14	13.6 (1.7)
ST schooldays (hours·night ⁻¹)	8.5	8	8.5	8	8.5	8.5	8.3 (0.3)
	7.0	7.5	7.5	7.0	7.0	7.0	7.2 (0.3)

ST weekends (hours·night ⁻¹)	nm 10.5	nm 10.0	nm 10.0	nm 10.5	nm 10.5	nm 9.5	10.3 (0.3)
Number of Injuries (n)	0 0	0 1	1 2	0 2	1 1	0 0	nc nc
Age of menarche (years)	11.5	14.2	13.2	13.6	13.1	&	13.1 (0.8)

ST= sleeping time
nc= not calculated
nm= not measured at age 13 years
&= not reached menarche
**= not injured

When talking about sacrifices they admitted that they missed their old friends; 'but if I want to be a good elite athlete, it is nothing I can do about it.' Or as another one admitted: 'we choose not to be with our former friends to pursue this dream. In order to make it to the top, we need to start now.' To make things even harder in this transition phase, two of the girls pursued two sports, something the respective coaches were not encouraging: 'If I missed a few practices, my 'punishment' was reduced playing time. That kind of ruined the love of the game for me'. The girls were not afraid to say that they hoped to make it to the national team one day, which is their ultimate dream. What they are doing now is a stepping stone on this journey, they have to make the sacrifices. Following that decision, they also experience several stressors that we have divided into physiological issues, logistical issues, and team issues (see Table 2).

The mean increase in training volume was 5.8 hours per week, mean reduction of sleeping time was about one hour per night and the mean length growth was 6 cm, ranging from 1 cm to 8 cm during the first year at the sport school. Two of the players had an Osgood–Schlatters diagnosis at baseline. Three of the players developed long lasting injuries (>3 months without ordinary training) including stress fractures, ACL and ligaments injuries during the first year at the sport school and one girl reported repeated shorter periods (≤2 weeks without ordinary training) with knee and ankle problems. Individually differences were observed in body composition (fat mass)

and VO_{2max} at baseline and after one year. All girls that experienced injuries reached menarche during the first year at the sport school and grew 6-8 cm.

DISCUSSION

The aim of this investigation was to elaborate on the psychologically and physically experienced transition from primary school into a secondary sport school for six young female handball players. From the above it is obvious that the lives of these young athletes appear to revolve around training/playing, eating, and resting/sleeping. Their social network tends to consist of the team, as they are together at school and training. Not only do the athletes have to make sacrifices in order to become elite athletes, parents have to make some too, as sport for young athletes is time consuming and expensive.[4] Fatigue was related to the overwhelming number of stressors they were exposed to—we found evidence of all the three major categories of stressors [23]: competitive stressors related to the tough game schedules and constant comparison; organizational stressors from commitments to several sports and from the school sport balance; and personal stressors when they sacrifice social life for sport and when they struggle with injuries. In addition to turning to parents as support persons in times of stress, the sport school offers advice on lifestyle management [48] and teaches them about nutrition, recovery, and life balance. Teachers were also perceived as supportive. Interestingly however, the parents seem not to push them as hard as the coaches and advised them to rest more if they were tired/injured. This reveals that the network around the athletes may make it more complicated for athletes to make decisions,[14] as their support persons are not always on the same page. Research has previously revealed that older adolescents have a greater range of coping strategies than younger ones,[49] which include more use of problem-focused coping strategies in addition to social support (from parents and coaches). Skinner and Zimmer-Gembeck argue that when young

people mature, they increasingly draw upon both behavioural and cognitive strategies, and by the age of 19-21 years they are able to regulate and monitor their own emotional states.[50] Teaching young female athlete's ways to cope with stressors other than sleep (and watching movies on NETFLIX) is vital.

All girls reported time management and enough sleep as significant and most challenging in relation to recovery in the interviews (enclosed as supplements). Research conducted on sleep for this age group unanimously shows that both physical performance and mental skills improve when athletes sleep well [16] and that < 8 hours sleep per night is associated with increased risk for injuries.[15] While optimal duration of sleep per night for adolescence is individual, lack of sleep was a main theme in all the interviews. Adding the changes in physical and physiological variables as well as the changes in training volume the first year of the sport school, table 3 shows that the increase in training volume together with length growth of 6-8 cm were distinctive of all four girls who had experienced injuries the last year. Three of the players had experienced long lasting injuries (>3 months) including stress fractures and knee and ankle problems, and one reported repeated shorter periods of injuries (≤ 2 weeks). This is in line with earlier studies reporting associations between early specialization and increased training volume and overuse injuries.[13,14] For example, it is likely that the growth spurt in addition to six hours increase in training volume and lack of sleep may be the main reason for the development of a stress fracture in subject two. She reported in the interview that she was not physically prepared to cope with the increased training volume and after the first stress fracture she resumed training too soon and developed a new and long lasting stress fracture (see supplement). Furthermore,

two of the three girls with long lasting injuries competed in two sports. In addition, they did not take part in strength and injury prevention training as they prioritized football or rest.

Body composition (fat mass) and VO_{2max} results showed individually differences but they were not different between the injured and non-injured handball players (table 3). There were also some common denominators of the physical and physiological characteristics of the two non-injured players that differed from the other four; they had a small increase in growth and their time of menarche differed (one at the age of 11.5 years, before starting at the sport school and the other had not reached menarche at the time of the interview). In addition, they took injury prevention training, which was emphasized by the school and club trainers, more seriously. Subject one appeared already as the '24 hours athlete.' She was serious about nutrition and recovery, and she knew how to avoid diseases and injuries. She reported that physical activity in different outdoor environments (e.g., skiing, mountain expeditions, cycling) was mandatory during her childhood and the versatile motoric base may be help injury prevention in addition to supporting parents. However, she still reported lack of sleep as one of the major challenges during the first year at the sport school (see supplement).

Obviously, younger athletes need even more help to prepare for and cope with athletic and non-athletic transition.[3] Stambulova and Wylleman consider two perspectives as important – *preventive supportive* and *crisis/negative consequences*. The latter is a result of ineffective coping, which in this investigation was exemplified through sleeping, exhaustion, and depression. Some interventions can help athletes with the transition in order to avoid negative

consequences such as drop-out and overtraining—which we also found examples of. Furthermore, those who perceived that they got high quality social support during the transition [36,37] were more successful. The finding from this study further support this as the athletes with resourceful parents, in combination with physiological advantages, cope better with the increase of training and dual workload as this is a critical development phase where dedication and specialization may be perceived differently by the athletes.[34] The two non-injured girls had parents who encouraged them and injury prevention training was prioritized before handball training if they needed to choose. They also monitored the daily workload more closely than the parents of the other girls, and had a good relationship with the club coach. Emotional support is not enough—the support must also be informative feedback on the daily training and effective strategies for training and life situation.[6]

Limitations

The results of the present study must be interpreted in lights of its limitations and strengths. We have followed these girls weekly over one year in order to minimize the often cited limitation of asking about coping with stress in retrospect [51,52] which was hereby minimized as much as possible. Also, being present at the venues gave us opportunity to build trust in the group and observe their psychological and physiological challenges first hand. Generalization of results based on data from six individuals is not possible. This study aimed to explore possible consequences of the workload (both psychologically and physically) young elite athletes at specialized sport schools are exposed to.

CONCLUSIONS AND RECOMMENDATIONS

The young athletes transitioning into a specialized secondary sport school perceived several stressors (competition, organizational and personal) due to a significant increase in training volume, lack of sleep and development of severe and long lasting injuries. Parental support, support from teachers/trainers at school and rest were mentioned as main coping mechanisms that contributed to effective coping.[3]

The six young female handball players express a mature struggle as they combine dual careers and adapt to a high workload. In addition, high expectations and the huge demands of elite sport will create a constant 'need' to cope with new and different sources of strain, and this was also true for the young female athletes in this investigation. The importance of sleep, growth and stage of puberty needs to be taken into consideration for young female athletes (at age 12-13). Naturally, the complex network of people working with young athletes may make maintaining a balance between training and rest complicated. What is critical is the unclear support or almost lack of support from club coaches when the girls were injured and also the number of injuries among them—while the parents and school teachers appear more concerned about their welfare. Generalization is not possible with the small number of athletes included in the present study, and more knowledge is thus needed. Stambulova and Wylleman [3] underline the importance of helping athletes to cope with both normative and non-normative transitions; teaching coping strategies is helpful, but clinical interventions are also needed. These young athletes need help and support from trainers and parents. As shown in Table 3, young athletes are different and this needs to be taken into account when planning training and recovery because the combination of psychological stress, lack of sleep, and physiological factors including stage of puberty and growth may influence the development of injuries. In order to prevent injury, we recommend that

biological more than chronological age is taken into account and that for each individual, progressive training volume and intensity and deliberate recovery is planned. In addition, extensive collaboration between school trainers/teachers, club coaches, and parents is key for monitoring the total workload for athletes in a secondary sport school.

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SIX INDIVIDUAL STORIES

Subject 1

Subject 1 reached menarche at an early age (11 ½ years old), and she has so far never been seriously injured. She is well trained with a lot of extra injury preventive training. In addition, her growth spurt occurred before she entered the sport school due to early menarche and also before the training volume increased. She was therefore more physically prepared for the increased training volume. She expressed a relaxed attitude towards potential negative consequences of her sport such as injuries: 'I do not think about it, well, I do think about what if a ligament ruptures, but I am not afraid that it will happen. I do a lot of exercise in order to avoid injuries.' However, she is often reminded of the possibility of getting hurt due to the high rate of injuries among others, which also affects her: 'It is boring when people are injured at the team, you cannot play with them as usual, and it is negative for the interaction in the team.'

Another stressor that came up in the interview was the high workload (from school in addition to sport) that she experienced when she started at the sport school: 'I often fall asleep after school before training—if I have time for it—I am out, the daily routines are okay, but it requires a lot of planning to stay on top of everything. It is so much easier in the spring.' She admitted that she was willing 'to sacrifice a lot in order to' reach her goal and excel in sport and getting good grades for a future education. Subject 1 also showed a social side in this strive—doing it with her team-mates was preferable.

Subject 2

Subject 2 reached menarche at age 14 and the year before she experienced extreme growth. Late puberty combined with extensive training may have contributed to her injuries. She admitted that she was not 'strong enough in my stomach and back muscles to cope with

the development' and she developed a stress fracture in her back. After her first major injury and time away from sport, she started too quickly again with the training and another long-term injury followed. When interviewed she was back in training again, but she hesitated to talk about these issues—and said with a sigh that she hated to be taken for a 'wimp:'

I'm afraid to say that I have pain, sometimes I try to be tough and probably push myself more than I should if I aim at recovering from the injuries! You need to be tough in my position. The positive factor here is that the girls on the team have stopped me when they see that I am overdoing it when the coaches are too busy to pay enough attention.

When asked about her role as a student, athlete, subject 2 reported that she found the balance between school and training hard, which is no wonder considering she reported an average of seven hour sleep per night. At home she would spend most of her time in bed (watching Netflix) compensating for the limited sleep during the night, so overall when counting the hours she reckoned it was enough sleep. Consequently, a picture of an athlete who tries to accomplish a lot when her body is also changing appears.

Subject 3

Subject 3 is pursuing two sports:

It is hard to combine football and handball, I play football for a junior team, and they are 19 years old and very good and ambitious. And then I have handball and it is hard to come to all trainings for both sports. The coaches do not talk much together, I think the football coach tries to, but I am not sure what the handball coach thinks of all this... I think I should be able to do both sports if I want, but I understand of course that with an increased focus and level it will be hard to stay at top of both team sports.

As she plays both sports competitively, she has an exhausting program and tends to disappear from preventive and strength training. She is talented, but not mature enough to make the right decisions to stay injury free and when to recover. She has had several injuries in hips, back, and knees. She prioritizes each sport in their respective seasons (football from April-September and handball from September-April), but struggles 'to decide between the two sports.' When asked if this combination in addition to school was a lot to cope with, she became silent before responding: 'If I am really struggling, I may simply lie down and cry, just because I'm tired, and I easily lose my temper. I simply need rest.' When asked if she thought that pursuing only one sport would help, she hesitated and responded 'I do not know, maybe a little, yes, maybe a little.'

Subject 4

Subject 4 reached menarche at age 13 ½ She is a talented player with an average aerobic capacity and she is not very fond of strength training. She is one of the tallest of the participants. She has not suffered from major injuries, but did suffer from a minor knee and hip injury. She admitted that she should be more committed to strength training in order to avoid any more severe injuries.

She claims to be good at recovery, but emphasizes that she could sleep more. She sleeps an average of 7½ hours per night, something she underlines is not enough. The question is of course when to sleep as her schedule is quite full. Once a month she is part of a regional group, and on those days she does not get home before midnight. She dedicated weekends for sleep and relaxing with her family, but in the season this is only possible on Sundays. Her parents are relaxed when it comes to school-work and time spent on it; 'they say I should only do what I feel I can manage. They do not accept laziness, but they know that as an athlete I will not have the same energy as others.' With older siblings in elite sport,

her parents have not expected as much of her: 'It was more a surprise to them that I wanted to pursue sport.'

Subject 5

Subject 5, as does subject 3, also combines handball and football. She too has a lot to gain from conditioning and commitment to the injury preventive training, but she is a very talented handball and football player. She has had problems with her ankle and knees, but her talent is noticed by her coach (which is noticed by the other players).

Last year, I was injured for six months (ankle sprains and instability in ligaments), it was not easy, it was not easy at all to come back, I could do some exercise, but mentally, if I was not so strong mentally, I would have never made it, I had some days where I just stayed at home and not even get out of bed, and my parents would let me stay home, they realized that I could not make it and left me alone. Eventually, I started to observe practices, but I had completely lost the handball feeling, I had to start from scratch again. This was in the winter, so I did not attend football trainings.

Also for her, sleep was often mentioned in the interview, and she emphasized that she tried to 'sleep for 13 to 14 hours on weekends, my mom comes in and to make sure that I'm alive.' She had a hard time with the combined workload of school and two sports, for example she admitted that the bathroom had become her favourite room to relax in the past year: 'I like to relax on the floor in the bathroom [laughs] because it is hot'. She has started to consider to go all in for handball, and she has a goal to continue with football until summer of 2016. She realizes she is pushing herself hard, but claims that it is fun too, however: 'I used to love my sport more... this has changed'.

Subject 6

Subject 6 is one of the shortest, has not reached menarche yet and with few injuries or problems so far in her career (just knee pains due to Osgood-Schlatters disease). She is an excellent player, and has a heavy training load and committed to several training groups besides her club. She is devoted to 7 1/2 hours sleep every night, and underlines that this is a success factor. She spent the first year at the sport school learning good routines. While the parents closely follow up on her injuries and make sure she rests or trains alternatively when needed, to stay home from school (in order to sleep) is not an option! She admits that it is not always easy to be in a competitive environment:

Mom says I've become much stronger and have more stamina now, and I feel that myself as well. I have a bad habit of comparing myself with others, I know I should not do it and that personal development is important, but if I stand next to someone who manages something, I want to do it as well or better. To improve my own technique is great, but sometimes I get a little too competitive.

The competition was not underlined so much by the others, but again, having been smaller than her peers and having experienced later physical development than her peers may have left her feeling unsure of herself at times and it may have made it common for her to compare herself with the others.