



What triggers changes in adolescents' physical activity? Analysis of critical incidents during childhood and youth in student writings

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ABSTRACT

Objectives: To better understand life course transitions in physical activity (PA), we should identify crucial events that may play a key role as triggers for change. The aim of this study was to understand dynamic PA change by identifying triggers that adolescents themselves relate to their PA changes.

Design: A qualitative, inductive approach was used to analyse writings.

Methods: Critical Incident Technique (CIT) was used to analyse 115 specimens of 15–24-year-old students' writings.

Results: We identified seven critical incident categories: promoting one's own well-being, becoming aware of body-image ideals, finding an inspiring sport or losing sport motivation, encountering health problems, experiencing transitions in life circumstances, receiving support or lacking support from significant others, and becoming an adult. The adolescents' stories depicted the first three associated with agentic PA increase.

Conclusions: CIT holds promise as a useful analytical method for understanding impactful events leading to changes in lifestyle PA during the life course from the participants' own perspective.

1. Introduction

High levels of physical activity (PA) are associated with several beneficial outcomes, such as improvements in musculoskeletal health, self-concept, and academic performance; as well as decreases in anxiety and depressive symptoms (Strong et al., 2005). Yet, PA tends to decline during adolescence (Dumith, Gigante, Domingues, & Kohl, 2011). In understanding this, extensive research literature on adolescents' motives and barriers for adolescents' PA participation points to several well-documented motives, e. g., enjoyment, health benefits, body image, having fun, and being with friends (e.g. Allender, Cowburn, & Foster, 2006). However, motives and correlates of PA participation may not be determinants or triggers for changes in PA. Previous research has identified several triggers or reasons in adolescents' own accounts for giving up PA. No longer experiencing fun is a reason many adolescents give up a sport (e.g., Skille & Østerås, 2011). Pleasure was a key theme also in physically active older adults' interviews (Phoenix & Orr, 2014), indicating that pleasure and fun contributes to maintaining PA from adolescence to adulthood. Furthermore, adolescent girls have explained their withdrawal from PA with, for example, family influence, poor relationships with peers, fatigue, and time constraints due to studying or other tasks, in focus group interviews (Slater & Tiggemann, 2010).

PA changes have been associated with different transitions throughout the life span, such as employment, pregnancy or change of school (Coleman, Cox, & Roker, 2008; Hirvensalo & Lintunen, 2011). Life-course transitions seem to be perceived solely as barriers (Martins, Marques, Sarmiento, & da Costa, 2015); life changes during adolescence may be especially conducive to PA decline. During transitional periods, social support seems to be a buffer against PA decline (Allender et al., 2006). Previous research has also identified some triggers or reasons for PA increase in people's own accounts. Stewart and Smith (2014) demonstrated that a personal crisis, such as serious illness, family trauma, and ongoing physical deterioration may drive adults to increase PA, however, less research exists in adolescents. Further, even if the processes are alike, adolescents and adults may relate different meanings to the same events. The critical incident technique (CIT) is a promising approach in exploring dynamic PA. A critical incident, in the context of PA change, can be defined as an event or a sequence of events identified as decisive in a storyline describing PA adoption or dropout (Niska, Hynynen, & Vesala, 2011). Critical incidents are occurrences that people identify and acknowledge as crucial, and of special significance in their PA. The CIT allows for disentangling the dynamics of PA increase, investigating change as a process that consists of (a) the background, (b) the experienced event(s), and (c) the achieved end

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state. In this study, we utilise the critical incident approach and qualitatively explore older adolescents' PA change narratives, focusing especially on the critical incidents that the participants themselves relate to their own changes in their PA, particularly increases.

2. Theoretical and methodological considerations

The purpose of this study was to gain a deeper understanding of the dynamics of PA change in childhood and youth by identifying the events that older adolescents themselves relate to their PA change. Contrary to previous researchers, who frequently approach adolescents as belonging to groups of PA decliners or maintainers, or only investigate PA behaviour, we consider taking up and giving up PA as changes in adolescents' physical activity relationship (PAR) (Koski, 2008). According to Koski (2008, p.151), PAR is 'a concept and an approach for analysing and understanding an individual's relationship to physical culture'. In addition to PA behaviour, PAR consists of meanings: artefacts, norms, values, and beliefs. PAR can be analysed from four perspectives: personal PA, following others' activities (e.g., spectator sport), producing PA (e.g., voluntary work in sports clubs), and consumption of the meanings of PA. In this study, we use PAR as a conceptual tool to gain a better understanding of a person's relationship with sport and PA. Specifically, we aimed to answer the following research questions: How do adolescents interpret changes in their PAR in their life course? What critical incident categories are identified with processes of PA decline and increase, in particular with PA adoption? How do students who have experienced a change in their PAR describe their present PAR? This choice of approach is elaborated below.

2.1. Changes in physical activity relationship as changes in behaviour and meaning-making

PA has been defined as, for instance, 'any bodily movement produced by skeletal muscles that results in energy expenditure' (Caspersen, Powell, & Christenson, 1985, p. 126). This concept is broader than sports and exercise, and includes, for example, climbing stairs and playing drums. However, to capture the perceptions and meanings in adolescents' descriptions we need more comprehensive concepts, not only those related to physical movement. It seems we should conceptualise PA behaviour more broadly than mere increased accelerometer readings or the adoption of certain regular exercise behaviours.

PAR can be used as a metatheoretical tool for qualitative PA research (Koski, 2008). It 'is a concept by which sport and physical activities are approached as a cultural part of life to which all of us have a relationship' (Koski, 2008, p. 151). Hence, PA needs to be explored in relation to adolescents' attitudes, values, and meaning-making. PA increase might affect changes in language use, thoughts, and self-image, as well as the development of a new personal and social identity (Koski, 2008). We identify becoming physically active and becoming physically less active not only as more or less intense or frequent PA but as gradually shifting towards less or more encompassing PAR.

The PAR concept has been used in earlier studies, demonstrating PA connections to lifestyles and identities. Liimakka, Jallinoja, and Hankonen (2013) identified three different PAR categories in adolescents' interviews. Whereas young athletes perceived PA as their lifestyle, less active adolescents valued the opportunity to make their own choices concerning PA. For some, spending time with their friends was the priority, and PA participation was dependent on their friends. The findings demonstrate how PA behaviour and PA meanings are intertwined with each other (Liimakka et al., 2013.). Our internalised meanings control our timely choices and our PA participation (Koski, 2008, p. 156).

3. Critical incident analysis as a tool for narrative and constructionist inquiry

The present study was focused on the processes and incidents that adolescents relate to their PAR change. We analysed written narratives about PA change and focused particularly on the critical incidents associated with the changes in these narratives.

As in the narrative approach generally, we were interested in how people construct themselves and their world in and through storytelling. As Tamminen and Bennett (2017) point out, individuals construct stories to give meaning to their emotional lived experiences. Hence, a narrative approach may be especially useful in understanding different transitions and their contributions to meaning-making (Knowles, Niven, & Fawkner, 2014). Smith and Sparkes (2009) stress that narratives are interpretive by nature: they draw from socially and societally shared narrative resources, and therefore cannot be expected to directly reflect the storytellers' actual experiences or inner worlds. Instead of asking whether the stories correspond to actual real-life events as such, the analytical focus is on the narrated reality, and how it displays versions of temporal coherence in the flow of events and individual lives (Bruner, 1987; Niska et al., 2011; Polkinghorne, 1996). In general, narrative approaches may explore both *what* people say and *how* they say it (Tamminen & Bennett, 2017). In this study, our focus was on the *what* questions: What critical incidents do the adolescents highlight in constructing stories of their PAR change?

CIT was originally created by John C. Flanagan (1954) for selecting and classifying aircrews for the US Air Force. Thereafter, the method has been applied in different fields (Butterfield, Borgen, Amundsen, & Maglio, 2005), and within post-positivist (e.g., Sundling, 2015) as well as interpretive and constructionist paradigms (e.g., Cope & Watts, 2000; Niska et al., 2011). We use the critical incident concept as an analytical tool for scrutinising accounts of PA change in written narratives. We apply CIT in a similar way to Stewart and Smith (2014), who considered informants' interviews as narrative case histories about PA. Often, accounts of critical incidents are elicited by directly asking respondents to name and depict incidents that they remember and regard as important (Butterfield, Borgen, Amundson, & Maglio, 2005; Chell & Pittaway, 1998). In our case, we used adolescents' written narratives of their PA as research material. While storytelling in itself affords a good opportunity for bringing forth critical incidents and key events, it was the authorship of the students as writers of their own narratives that finally determined whether and how the critical incidents were included.

Our research question concerns changes in PA behaviour and PA-related meanings, and one of the writing topics offered prompted writers to pay attention to such changes in particular. Thus, an obvious perspective for viewing critical incidents in these narratives is to interpret them as turning points or triggers of change (see Stewart & Smith, 2014), tying together the antecedents and the outcomes of change. Critical incidents may offer entirely new choices or deny some previously obvious opportunities, resulting in a different life course to that expected (Stewart & Smith, 2014). In this study, we follow Stewart and Smith by applying the CIT method to investigating PA change. Furthermore, our definition of a critical incident is in line with theirs; marking the beginning of a new trajectory.

Some authors maintain that critical incidents can be viewed as important contexts and situations for learning (Cope & Watts, 2000; Niska et al., 2011). As critical incidents are events and episodes that are memorized and given a key position in narratives, they bear a special significance as carriers of knowledge. As Cope and Watts (2000) suggest, critical incidents may be viewed as situations from which actors learn, for example, about themselves, their actions, values, and relations to other actors and environments. In our study, we aimed to interpret what insights the narrator had gained, i.e. what they had learned about their PAR.

4. Methods

4.1. Data collection

Our study was related to a larger research project which developed a theory- and evidence-based intervention to promote PA and reduce sedentary behaviours among vocational school students, later evaluating its effectiveness (Hankonen et al., 2016). For this sub-study in the formative research phase, we chose a qualitative approach and organised a writing contest for students in Finnish vocational and high schools (for details, see Appendix A). The contest was developed by the third author together with the national association of Finnish language teachers in Finland, so that essay topics of the contest could be used as part of normal teaching as a writing assessment in the course. We invited participants by contacting Finnish language teachers. First, the association sent the contest call to all its members by e-mail, inviting them to present the writing competition task to their students as part of their Finnish language courses. Secondly, the first author searched for e-mail addresses of Finnish language teachers on websites of high and vocational schools. Then, she sent the invitation to the first 87 teachers found. The authors had no other relationships with the teachers, their association or the schools.

To give all the students the opportunity to write about their perceptions and experiences irrespective of their PA history, the contest call offered them three alternative topics: 1) 'My relationship with physical activity has changed', 2) 'Being physically active is not a part of my life', and 3) 'This is how I maintain physical activity'. The topics aimed to focus the participants' attention on such situations and events that, when interpreted by the participants, would produce relevant material for this research and intervention design. Voluntary participation and the use of the narratives as research material were mentioned in the call and the instructions, informing that participant writings would be used as research material. The ethics committee of the Hospital District of Helsinki and Uusimaa and the Ethics Committee for Gynaecology and Obstetrics, Pediatrics and Psychiatry reviewed the research procedures (decision number 249/13/03/03/2011).

Our data, collected at the end of 2013, consisted of 115 narratives. The writings were sent from two high schools and three vocational schools situated in different parts of the country, from students of seven teachers. All the writings were included in the analysis. Seven high school and 67 vocational school participants reported being male, whereas 12 high school and 27 vocational school participants reported being female. One story was sent without information about the school, two without gender information and nine without the age of the writer. The remaining 96 students were 15–24-year-olds, only nine were over 18 years old. In total, one third ($n = 34$) of the narratives described change in PAR: 25 stories illustrated PA increase and nine PA decline.

Descriptions of PA increase or decline were not limited to stories under Topic 1 but were found in the narratives produced for all three topics. Hence, all 115 narratives were included in the analysis, although the focus was on the narratives that described change. The texts varied greatly in length and content: the longest contained one and a half pages and the shortest only a few lines. In general, texts written on change in PAR (Topic 1) were longer than those on low PA (Topic 2) or PA maintenance (Topic 3) narratives. Some writers highlighted only

their present sport and exercise activities, others illuminated their PA history through transitions from one sport to another, and some described their PA more broadly – climbing stairs instead of using the elevator, cycling to school, and working at the family farm, for example. A few reflected on their PA experiences throughout their life courses; that is, from childhood to the present.

4.2. Data analysis

A typical feature of CIT analyses is flexibility; CIT does not include specific analytical rules but allows its principles to be modified for practical reasons. Critical incidents are identified inductively. Traditionally, a critical incident is expected to contain information about its antecedent(s), the event itself, and its outcome(s) (Butterfield et al., 2005). The focus of the analysis was directed toward incidents that were perceived as important according to the texts. A critical incident was defined as an event that the writer presented as related to change in their PAR.

We chose not to read students' narratives as valid reports of their real-life PA participation, but as subjective constructions of changes in their PAR. We used 'PA increase stories' and 'PA decline stories' as analysis tools, that is, classifications to help us understand the relationship with sport and physical activity and how it may change during the life course. Furthermore, change in PA behaviour is simultaneously a change in PAR and changes in meaning-making are a change in PAR, whereas a change in PAR does not necessarily mean a change in both PA and meaning-making.

PA levels were evaluated according to the writers' descriptions of its quantity, regularity and intensity. As the students did not explicitly report their PA behaviour, classifications of PA increase, PA decline and PAR change had to be concluded by the impression given in the stories. For example, one of the processes interpreted as PA increase was described as equally regular but more purposeful exercise, triggered by gradually growing interest in one's body image. Moreover, due to a decrease in intensity, giving up competitive sports was classified as PA decline even if the writer continued their sport participation by playing regularly with friends.

The first author coded the narratives, reading each story several times, first identifying the change processes, then identifying and classifying the critical incidents. She also kept a research diary, in which she wrote down preliminary leads and ideas, regularly reflecting on the development of her thinking with the co-authors and discussing the analysis with them as it proceeded. All three authors discussed the preliminary categories and agreed on the final category names. We formed the categories through inductive reasoning and named them according to which issues were repeatedly highlighted in the change process descriptions. Some narratives described events from more than one category, whereas others presented only one. Table 1 shows the analysis process in more detail.

4.3. Credible qualitative research

Some researchers (e.g., Butterfield et al., 2005) have suggested credibility criteria for studies applying the CIT method. However, these procedures stem from a positivist tradition whereas we used CIT from a

Table 1
Analysis of critical incidents.

Steps	Description	Topic
1. Getting acquainted with data	Reading the stories without any particular theoretical perspective	All stories
2. Identifying critical incidents	Highlighting verbs and writing down citations from narratives about Topic 1 (change in relationship to PA)	Topic 1 stories
3. Classification according to PA change	Classifying critical incidents according to whether the end state was PA increase or decline	Topic 1 stories
4. Identification of change processes	Writing short process descriptions based on the citations	Topic 1 stories
5. Checking preliminary results	Repeating Steps 2–4 with PA change descriptions in the writings about Topics 2 and 3	Topic 2 and 3 stories
6. Classification of critical incidents	Classifying identified critical incidents according to their nature	

constructionist perspective. Instead of exploring the participants' narratives as realistic descriptions, we approached the writings as presentations of *possible* events, being more interested in their interpretations than their authenticity. Thus, we applied the 'specimen perspective', focusing on 'what classifications and distinctions a text contains' (Alasuutari, 1995, p. 63). We have striven to enhance trustworthiness by detailed description of the analysis process and illustrating the results with several data excerpts. Moreover, we believe that our close collaboration during the analysis process was beneficial in that we were able to challenge and develop the interpretations of the material, reflecting the use of critical friends as recommended by Smith and McGannon (2017). For example, our first aim was to analyse only Topic 1 texts. However, as we noticed that PAR changes were also described in some texts written with Topics 2 and 3, we decided to check whether these presentations were in line with our preliminary results.

5. Results

First, we summarise the key findings, and then, present the results in detail. We identified seven critical incident categories: promoting one's own well-being, becoming aware of body-image ideals, finding an inspiring sport or losing sport motivation, encountering health problems, experiencing transitions in life circumstances, receiving support or lacking support from significant others, and becoming an adult. In the adolescents' stories, the first three were described as agentic triggers of PA increase, whereas the last four were presented as something that just happened or was promoted by other people.

Most writers described changes in their PAR as a process consisting of two phases. The first phase emerged as a change in PA behaviour prompted by some internal or external trigger. Secondly, this PA change appeared to produce consequences that contributed to a change in one's attitude towards PA: value judgments and meaning-making. Construed in this way, the participants' narratives present a clear view of the change in their PAR.

5.1. Physical activity change described as a two-phase process

Topic 1 (change in one's PAR) attracted narratives from altogether 34 adolescents, more specifically, 20 vocational students (11 males, 9 females), and 13 high school students (3 males, 10 females). The majority of the writers described their PAR changes as a process triggered by one or more critical incidents. Only two students did not relate the change to any particular incident ('for some reason or other I started going to the gym last winter'), and two did not reflect on actual PA quantity, regularity or intensity change. In addition to the described behaviour change, both its antecedents and consequences were illustrated in most texts. As one female student wrote:

Before beginning to exercise, I had trouble with my back. I visited a doctor and the doctor recommended that I exercise. [...] I used to be lazy and didn't like exercise at all. I thought that exercise was unnecessary. [...] My relationship with physical activity changed after that visit. I decided to exercise regularly. [...] now I feel much healthier. I can walk more and long days don't make me tired. [...] I have noticed that exercise is good for my body.

Typically, PA increase stories described change from low or occasional activity to regular activity, resulting in a new lifestyle and a more positive attitude. In this sense, they can be regarded as transitions towards deeper physical activity relationships. Change in one's PAR was also present in stories describing PA decline. Even if most of the writers of PA decline stories still participated in exercise regularly or occasionally, their storytelling revealed a change in their PA perceptions. One male student illustrated his giving up PA as follows:

I used to exercise a lot when I was kid. I played [...] football for six

years in a team and [...] volleyball for at least five years in a team. [...] I stopped playing football and volleyball after primary school. I lost interest in volleyball as we couldn't find a good coach. I had to quit football because there weren't enough players of my age and I would have been playing with older or younger children. Some of my friends continued to play with older children but I didn't want to continue. Now I don't do any sport regularly. Sometimes I go jogging with the dog. [...] I only follow sport on TV and by watching my nine-year-old cousin play ice hockey – I'm not that interested in exercise anymore.

The excerpts show how the critical incidents included descriptions about PAR as both behaviour and meaning-making. In the narratives, they are inevitably intertwined: in the first excerpt, PA increase is linked to understanding PA benefits, while in the second excerpt PA decline is associated with loss of interest in PA participation.

5.2. Critical incident categories triggering physical activity change

The narratives contained several incidents that were important triggers of PA change. We identified seven critical incident categories: 1) promoting one's own well-being, 2) becoming aware of body-image ideals, 3) finding an inspiring sport or losing sport motivation, 4) encountering health problems, 5) experiencing transitions in life circumstances, 6) receiving support or lacking support from significant others, and 7) becoming an adult. The first three categories were described as agentic triggers of behaviour change from physical inactivity to physical activity. In agentic stories, adolescents used expressions such as *I noticed, I felt, I hated, I wanted, I decided* and [*presently*] *I can, I know, I like, I understand*, illustrating their own role and agency in the process (see Hilppö, Lipponen, Kumpulainen, & Virlander, 2016). In contrast, many other writers presented social and contextual issues as prompting them to change, as reflected in expressions such as *I had to* or [*someone*] *recommended, told, urged, organised*.

Health problems, lack of support, different transitions and growing up were illustrated as triggers of PA decline. All but one of the writers of Topic 1 construed PA decrease as being triggered by some critical incident. Nevertheless, PA decrease as part of becoming an adult was identifiable in several writings that described both PA maintenance (Topic 3) and low PA (Topic 2).

5.2.1. Category 1: promoting one's own well-being

One salient theme that emerged in the narratives and highlighted participants' own agency was understanding of the associations between one's own well-being and PA. This insight was gained during the change process when giving up a sport had resulted in various negative experiences, such as tiredness and weight gain. The following statements demonstrate this process.

My relationship to physical activity was that I do not need to exercise, I will stay fit without doing anything for it. [...] I assumed that walking to school and back would be enough. My basic fitness had been quite good after playing ice hockey and floorball for a couple of years when I was younger. After giving up hobbies I was still feeling good and I did not bother to find a new sporty hobby as I already had other ways to waste time. [...] Then I noticed I had gained weight and was not satisfied with what I saw in the mirror. Also, the daily walk to school was too much for me, as I was tired after walking only a short distance. If I had to do physical work, I became tired quickly and my muscles were sore afterwards. This made bells ring in my head: perhaps a short walk is not enough exercise. (male student)

Last winter my relationship with physical activity was very good. [...] After the summer it came to a halt, the microcar. [...] Because of the microcar I didn't move any more, I drove everywhere, gave up jogging [...] In the moment when I was climbing up the stairs and

got out of breath, I realised that this does not work. [...] I decided to buy a membership to the gym. It felt like a slow start, I simply did not have any strength, but I had to keep trying anyway. Every time when I was able to do more, it felt good. Going to the gym felt the best. [...] Physical activity has become a big part of my life again. I feel much better when I have exercised and eaten healthily. (female student)

Here, the lesson that the writers have learned is that experiences of being fit cannot be maintained without adequate exercise.

5.2.2. Category 2: becoming aware of body image ideal

Some students associated their PA increase with the possibility to obtain a desirable body image. Two female students stated that for them, the turning point was becoming aware of their own body.

In the third and fourth grade [...] I noticed that my body was a bit rounder than those of the others. [...] During PE lessons my own body and its abilities didn't please me, as 'everyone else' was so beautiful and thin. [...] At the same time, I wanted to exercise a lot and started to play floorball and often went jogging with our dog. I knew that through exercise I could achieve the kind of a self-image I could accept and enjoy. Fifth and sixth grade at school were a turning point: I started to really exercise a lot and going jogging with the dog made my day. Also, my slowly changing body [...] began to please me and I liked the changes I saw. Then my relationship with physical activity changed and I diligently started working out at home. Exercise had become my new inspiration and I enjoyed group exercise at school, wanting to progress in it.

In their stories, understanding that exercise improves one's body image or looks was the trigger to PAR change.

Physical activity has always meant a lot to me and it has been a part of my daily life for a long time. [...] Since childhood, my hobbies have mainly been exercise-oriented. At a younger age the meaning of physical activity was more emphasized in creating friendships and having fun without thinking the benefits of activity that much. [...] While growing older, the interest in my own appearance increased, which motivated me to exercise even more purposefully, especially at the gym. The visual changes in my body due to exercise, like the increase of muscle mass and getting firmer, motivated me to practise even harder than before.

5.2.3. Category 3: finding an inspiring sport or losing motivation for sports

Having an inspiring and enjoyable sports hobby which also provides feelings of success, was equally related to PA changes. This was reflected frequently in the narratives. Many writers describing PA decline justified giving up sports by losing interest, combined with either a specific incident or no particular reason. As one male student describing his PA maintenance commented, enthusiasm for exercise may not arise until you discover 'your cup of tea'. As such, PAR change is not related to PA behaviour but to increased personal significance of PA, triggered by finding a more attractive form of PA.

My relationship with physical activity is difficult. [...] I choose this word because ever since childhood I have played several different sports and never found my cup of tea until some years later. [...] Luckily, I have now found my hobby and a real 'touch' for sports. [...] I found powerlifting on the internet and that was it. Almost daily exercises at the gym were fun but I didn't take them seriously. Now I am training to get results and still enjoying it.

Here, the writer discovered that all sports are not equally inspiring: a certain hobby can give much more pleasure than another. Similar findings are reflected in the following statement by a female student.

... I have always wanted to have a hobby of my own. [...] When I was a kid, I started ballet and I thought that it would become the

hobby of 'my life', but when the school began, I gave it up, too. I think I had no hobbies for four years. [...] I hated the thought of having to go exercise every week at the same time even if I did not feel like it. [...] [Later] I set a goal to go jogging every week. My brother bought me a heart rate monitor, so I got motivated. I also started going to the gym and bought a membership. You can go to the gym whenever you like, and going there doesn't create stress. At the gym, you can relax and think your own thoughts. I encourage everyone to start a hobby that they like.

5.2.4. Category 4: encountering health problems

Health-related problems such as allergies, musculoskeletal problems and stress injuries were presented as incidents triggering physical deactivation. Nevertheless, when exercise appeared to be crucial for personal health maintenance, these incidents were followed by PA increase.

My relationship with physical activity changed about a year ago, when my back became so sore, that even walking from a classroom to another was painful. All physical activity in my life ended. I could not move or have fun like others my age. [...] I have to live with back pain all my life, but I am able to keep the pain away by exercising. So nowadays I go to the gym every second day and walk the dogs in order not to have to feel that pain ever again. I love physical activity and it makes me happy and energetic! (female student)

My relationship with physical activity first changed about a year ago, when I broke both my wrists and could no longer do motocross or do any other sports very actively. A couple of months ago, I got permission to use my wrists again properly. First, I had to begin training my wrists and hands back to fitness and to the same level as my legs. Finally, I got so into gym exercise that nowadays I go to the gym twice a week and go jogging at least once a week. My relationship with physical activity has become more positive. Also before I used to move and be busy a lot, but now I have at least some sort of regular exercise habit. (male student)

Contrary to the first account, the learning experiences presented in the latter narrative are more implicit, allowing various interpretations. The reader might think that the inspiration for PA was only gained after positive experiences produced by PA increase. Nevertheless, as the writer illustrates his PAR change by highlighting the injury as the turning point, an alternative interpretation might be that he has learned, on the one hand, how vulnerable the human body is, and on the other hand, that recovery and staying fit require regular exercise.

5.2.5. Category 5: experiencing transitions in life circumstances

One salient theme related to PAR change were changes in circumstances such as school, residence, or means of transportation, resulting in either PA increase or decline. Incidents in this category were often combined with other categories. For example, a change of residence was associated with new friends and their encouragement to adopt a new hobby. The following statements demonstrate the interpretations of contexts and transitions.

I didn't exercise that much until summer 2011. That summer was a kind of turning point in my life because I got my first summer job: because of which I became far fitter and adopted a whole new attitude to exercise after cycling the eight-kilometer-long trip from work and back for two and half months daily. (female student)

When I started at vocational school exercise really decreased. I could claim that this was caused by the fact that there were no regular sport lessons in vocational school and you can choose sport lessons only once a year. (male student)

In the first story, the turning point for PA increase was 'having to

Table 2

Critical incident categories classified into agentic and non-agentic triggers for PA increase, and triggers for decline in PA.

Agentic triggers of PA increase	Non-agentic triggers of PA increase	Triggers of PA decline
Promoting one's well-being (1)	Health demands (4)	Health problems (4)
Becoming aware of body-image ideals (2)	Experiencing transitions in life circumstances (5)	Experiencing transitions in life circumstances (5)
Finding an inspiring sport (3)	Support from important others (6)	Losing the inspiration for sport (3)
		Lacking support from significant others (6)
		Becoming an adult (7)

cycle to work', followed by inspiration to do PA. In the second excerpt, the turning point for PA decline was a new school. The triggers for PA change are presented as separate from one's personal choices or actions.

5.2.6. Category 6: receiving support or lacking support from significant others

Social support from significant others, for example family, friends, teachers, and classmates was associated with PA increase. In contrast, bullying, new coach or teacher, and friends' giving up sport were presented as justifications for PA decline. In the following, a male student describes having learned a positive attitude towards PA because of his father's efforts.

[...] Before my relationship with physical exercise changed, I was very dismissive of exercise. [...] My dad had clearly paid attention to my low physical fitness because he arranged me to go to a beginner course of junior judo. It is not surprising that a person, who tries to avoid physical activity by all means, was not very keen of this idea. Despite of this, I went there and it was tough. I couldn't match up with others even at the basics and I was always tired after the training. But the longer I had been there, the fitter I became. The trainings were not as hard any more, I was more awake and cheerful and learned to enjoy it; the physical activity. [...] I learned to appreciate physical exercise in a totally new way.

During one's life course, one's PA history may consist of several periods of PA adoptions and dropouts, as illustrated by a female student:

When I was a kid, I didn't like exercise at all and avoided all sports. [...] Somewhere along the line my mother took me to ballet lessons which I hated at first. I was not flexible and it was irritating to be the worst. [...] After that I found football. My brother had already been playing football for a couple of years so I decided to follow in his footsteps. [...] After six and half years I decided to quit football. The reason was a new coach and a new team, which I didn't like. [...] I had no hobby for a long time and that was okay for me but not for my mother. Now my hobby is going to the gym and I like it a lot, because it's voluntary.

This writer also presents the triggers for her PA changes as external to herself. In the PA increases, the encourager is her mother and the role model her brother, while the coach and the team act as reasons for giving up sport.

5.2.7. Category 7: becoming an adult

Some low-active writers presented growing up as the only reason for PA decline: 'since elementary school, exercise didn't interest me at all'. Yet, this theme was also present in the narratives of PA maintenance and change. These writers did not reflect change as being triggered by any critical incident but as a natural and continuous process, usually related to transition from elementary school to comprehensive school. Typically, change descriptions associated growing up with the end of playing and games during school breaks.

I cannot remember from my childhood that I would ever have strived to move in order to only be physically active [...] I was never keen on sports or exercise during free time yet got a great deal of

physical activity by naturally exploring the environment and playing. [...] Nowadays my relationship with physical activity is totally different as, after getting older, my exercise habits have changed, too. In secondary school these breaktime games ended because of a new school yard and simply because we had become older. (male student)

What makes 'becoming older' a critical incident instead of a transition is illustrated later in this narrative. What is noteworthy is, even if this storyteller chose PAR change as his topic, the process he presents here is not a behaviour change, as he does not describe PA increase or decline.

The biggest change has happened in my thoughts about exercise. Formerly, exercise used to come automatically, but now I have to think more about getting enough exercise and when I have enough time to do it. From time to time, I have been less interested in exercise but the joy that it brings has always brought me back to it.

In this story, becoming an adult is also a learning process: understanding that as an adult one needs to pay special attention to finding time for exercise as PA no longer comes 'by itself'. Other narratives that highlighted becoming an adult described PA decline and presented it as a natural process rather than a critical incident, for example: 'I used to exercise a lot more, but my enthusiasm dwindled during secondary school'.

In general, the sources or agents of critical incident categories differed according to the storytellers' narration (table 2). Narratives that illustrated one's own activity highlighted improving one's well-being, obtaining a positive body image, and finding an inspiring sport as triggers for PA increase. Other narratives presented significant others, circumstances, or health problems as turning points in PA increase. PA decline was associated with circumstances, health problems, losing the inspiration of sport, becoming an adult, and lacking support from significant others (see Table 2).

5.3. Adolescents' constructions of their physical activity relationships after PA change

5.3.1. PAR constructions after physical activity increase

The stories describing PAR change as PA increase highlighted pleasure and benefits as the motivating factors for PA maintenance. *Better coping with daily life, being fit, health promotion, and a more desirable body image* were presented as benefits whereas pleasure was perceived as *joy, well-being, experiences, succeeding, and autonomy*. Exercise was mostly described as independent: many of the writers mentioned gym exercise, jogging, cycling, or walking as their main form of PA. Whereas some adolescents reported exercising more regularly, for others PA was not an established part of their daily life. However, several noted that they had adopted PA as part of their lifestyles. New, sporty ways of life were illustrated as 'getting the spark' and 'a resource I don't want to give up'. Hence, behaviour change had contributed to the PAR change. Some students even summarised the PAR change as an end state of a learning process, which was reflected in statements such as 'I understand that PA is important', 'previously I have never felt being physically active so necessary', and 'I have noticed that physical activity really is beneficial'.

5.3.2. PAR constructions after physical activity decline

While none of the PAR change writers describing PA decline mentioned any regular sport as their present hobby, most still participated in PA regularly or occasionally. Nevertheless, their PA meaning-making varied. Unlike the PA increase stories, these narratives did not highlight meaningfulness of PA, but they did not understate it either. Happy memories and being content with the present indicate that these adolescents do not interpret PA decline as a failure or disappointment. Only the writer who had experienced bullying expressed her grief by accounting 'that the small and spunky girl is lost forever'.

6. Discussion

The purpose of this study was to examine how adolescents interpret changes in their PAR in terms of the critical incidents they connect to it, and how they describe their present PAR. Usually, the writers illustrated the change in their PAR as originating from some critical incident. Some PA decline descriptions, however, were presented as a natural process, related to a life course transition. The critical incidents that the narratives highlighted were classified in seven main categories: promoting one's own well-being, encountering health problems, becoming aware of body-image ideals, finding an inspiring sport or losing sport motivation, experiencing transitions in life circumstances, receiving support or lacking support from significant others, and becoming an adult.

This study revealed several interesting findings. The analysis identified several categories of critical incidents that may trigger increase in PA among youth. Previous literature has associated presence of agency with expressions that highlight own subjectivity and possibility of choice (e.g., Thomson et al., 2002). In the present study, in the narratives describing PA increase, some writers stressed their own agency, whereas some presented other people or circumstances as being more impactful. These agentic and non-agentic changes were related to different critical incident categories. Increases in PA were triggered by promoting one's own well-being, becoming aware of body-image ideals, and finding an inspiring sport, with each of these triggers being described in a way that illustrated one's own agency. Conversely, narratives in which PA change was triggered by encountering health problems, experiencing transitions in life circumstances, receiving support from significant others, and becoming an adult stressed the importance of social and contextual issues. Experienced fun during PA was represented more as a maintaining factor than as an inspiring trigger to increase PA. In the narratives, most PA increases were initiated by experientially learning that PA helps one to attain personally important or meaningful outcomes, such as maintaining wellbeing, gaining a positive body image, experiencing feelings of achievement, or treating a concrete health problem.

Previous researchers have also associated perception of immediate benefits with PA participation (e.g., Bélanger et al., 2011; Brooks & Magnusson, 2007) and with PA adoption and increase (Sallis, Calfas, Alcaraz, Gehrman, & Johnsons, 1999). Interestingly, our young writers perceived health reasons as triggers for PA only when health maintenance was impossible without exercise. This is in line with previous studies stressing that traditional health promotion messages, which may often focus on the risks to one's future health, do not motivate a person to increase PA, particularly among youth (Poobalan, Aucott, Clarke, & Smith, 2012; Renner, Spivak, Kwon, & Schwarzer, 2007).

While Stewart and Smith (2014) have suggested that illnesses and significant bodily deterioration (stroke, arthritis, spinal damage, and valve replacement) may be interpreted as critical incidents in adults' PA adoption and increase, our findings extend this evidence to adolescence. In our study, some adolescents illustrated personal experiences of physical vulnerability while encountering health problems (broken wrist, back ache, knee pain, and spinal disc herniation) as triggers to lifestyle changes. Moreover, some stories illustrated gaining insight into how PA may contribute to promoting one's own well-being as a turning

point. Adolescents who described how giving up a sport had resulted in tiredness and weight gain, for example, especially highlighted becoming aware of lost fitness. Even if coping with stress was also related to PA participation in the participants' narratives, our young writers did not describe family problems or emotional distress as triggers for PA increase, as did adult participants in the study of Stewart and Smith (2014).

Our results seem to form a more varied picture of critical incidents related to PA increase than the traumatic experiences category identified by Stewart and Smith (2014). This may, at least partly, be due to data collection. Our data set included 115 written narratives, as opposed to ten individual case studies. Eight interviewees' accounts revealed traumatic experiences as a trigger for gym training, while the remaining two were excluded from the analysis as they presented no critical incident (Stewart & Smith, 2014.).

The critical incident concept proved to be a fruitful tool for focusing attention onto storytelling about change, helping to identify turning points in PA behaviour and separating them from more stable motives or barriers, reported especially by the participants who wrote about low activity and PA maintenance. As many previous studies (e.g., Bélanger et al., 2011; Brooks & Magnusson, 2007), in our study many writers emphasised pleasure and fun. Personal experiences of relaxation, stress relief, improved fitness, and better well-being in general seem to be key elements in making adolescents gain a true insight into the benefits of exercise and thus may have a crucial role in adolescents' PA increase. Staying in shape and relieving stress have also previously been identified as determinants of promoting fun in youth sport (Visek et al., 2015).

Phoenix and Orr (2014), studying adults' interviews about physical activity, identified pleasure as sensual pleasure (experienced while exercising), documented pleasure (experienced after exercising), pleasure of habitual action (providing structure and meaning), and pleasure of immersion (resulting in better coping in daily life). Despite differences in the focus of our study, we might suggest that documented pleasure (*being fit, health promotion, a more desirable body image*) and the pleasure of immersion (*better coping with daily life*) can be identified in our results.

Examination of critical incidents revealed that, in change interpretations, fun was related to PA maintenance but was not a trigger for PA increase, whereas lack of fun was presented as a justification for PA decrease. Moreover, only after self-experienced positive consequences could PA become a permanent part of one's daily life. Experiencing fun was not identified as a critical incident in itself, but it was involved in several categories: losing sport motivation, experiencing transitions in life circumstances, receiving support or lacking support from significant others, and becoming an adult. For example, receiving encouragement from a new teacher after changing schools was related to fun; however, here the critical incident was the school change, resulting in more motivation to do PA. Interestingly, many PA decline stories critical presented incidents as something that took the fun out of PA. For example, change of residence was illustrated as a trigger for PA decline because after having to travel a longer distance to engage in sports hobbies, it was no longer fun. The results bear a resemblance to previous literature on adults' PA decline in situations in which the costs, such as time or inconvenience, seemed to outweigh the benefits (Larson, McFadden, McHugh, Berry, & Rodgers, 2018).

Curran, Jarvis, Blackburn, and Black (1993) have demonstrated how social relationships are embedded in critical incidents in also other domains in multiple ways. While previous researchers (e.g., Allender et al., 2006; Lee, MacDonald, & Wright, 2009) have stressed the importance of social support for adolescents' PA participation, significant others were less important in the narratives in this study. Even if, for example, emotional support (see Antonucci, 2001) was presented in some stories, the role of other actors was mostly illustrated as being a part of subjective learning rather than an essential trigger in the change process. We presume that the way in which we collected our data – that

is, through a writing contest – may have guided adolescents to project self-focused reflection onto the texts, especially those under the first topic ('My relationship with physical activity has changed').

Moreover, the contest context may have produced particular types of storytelling. Whereas agentic PA increase narratives were presented as 'success stories', PA decline descriptions were written as 'consequence stories' in which the students' own decision to drop out was presented as a logical response to various events. Even if healthy behaviours such as PA might not be personally relevant to us, current cultural expectations framing health as a personal responsibility (e.g., Crawford, 2006) might contribute to a justified style of presenting our life course.

In line with previous research applying CIT to other behaviours (Cope & Watts, 2000; Niska et al., 2011), this study shows that the adoption of a physically active lifestyle can also be considered a dynamic learning process with the potential for life-long consequences. The critical incidents in the students' narratives appear to be developmental pathways leading to both PA and PAR change. The change process itself includes elements of learning: besides learning different PA habits, the storytellers had learned new attitudes and values. Moreover, they had learned something about their PAR, and were able to reflect on the PAR changes in their narratives. For example, PAR change might even end in learning that PA participation and increase can facilitate demonstrating and strengthening one's own agency. Teachable moments have been defined as opportunities, specific events or contexts, or particularly useful times to facilitate positive behaviour change. Moreover, they can be seen as being created during, for example, clinician-patient interaction (Lawson & Flocke, 2009.). In our results, we can identify such teachable moments in the health problem narratives, in which perceived health threats prompted responsiveness to change, with a recommendation from, for example, medical doctors.

Instead of distinct definitions and categorizations, adolescents' PARs appear to be a mosaic, consisting of various motives for PA participation. During the life course, participation in PA may vary among both different individuals and time, according to one's respective life conditions. In the adolescents' stories, the turning points towards PA increase were incidents related to learning: understanding that exercise produced better well-being, improved one's looks and created feelings of success. Various learning processes were also present in other critical incident categories. For example, becoming an adult did not only mean giving up games and playing, but learning that as an adult, one needs to pay special attention to finding or making time for exercise. In stories that described finding an inspiring sport, the lesson learned was that not all sports are equally inspiring: a certain hobby can give much more pleasure than others. It is noteworthy that the learning processes were not limited to PA increases. For example, experiences of bullying had become lessons of learning to hate physical education classes at school.

6.1. Limitations and strengths

Even if we have used descriptive terms to illustrate participants' PA (e.g., low, occasional, regular, and intensive), their narratives did not explicitly evaluate or report PA levels, nor can these terms be compared to the beginning or end states described by the students. For example, one student described her PA habits '[because of what happened] all PA in my life ended'. As we have considered adolescents' narratives as subjective interpretations of their experiences, our results should be regarded as interpretations of adolescents' constructions instead of valid reports of their real-life PA participation. As Smith and McGannon (2017) have demonstrated, qualitative research is interpretive by nature, as methods are not only theory-bound but also dependent on the people using the methods. In this study, the authors discussed the analytical decisions, and clear systematic and transparent logic underpinned the coding. Therefore, we believe that the extraction could be reproduced by following these procedures.

6.2. Implications for further research

While previous researchers have focused on PA motives, facilitators, and barriers, the current study also highlighted the role of adolescents' own agency in PA change. The critical incidents in adolescents' stories describing PAR increase were related to learning. Gaining an insight into the connection between PA and one's own well-being seemed to be a particular turning point that motivated adolescents to adopt PA as part of their lifestyles.

However, these aspects may not be experienced as motivating factors by adolescents who have always been low-active and thus, have not previously experienced any positive effects of PA. In the present study, many writers describing PA increase mentioned that they had participated in PA regularly at some phase of their life, and only two adolescents described change from low PA to occasional or regular PA. Even if our results have the potential for analytical generalization (see Smith, 2018), more evidence is required for theory generation. We recommend further researchers to assess which triggers are relevant to low-active adolescents who adopt PA. Also, investigating critical incidents within interventions is interesting (Kostamo et al., 2019), and we recommend integrating qualitative research in PA intervention studies to shed light on how participants understand change in behaviour and thoughts during and after the intervention process.

Declarations of interest

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Appendix A

Physical activity-related writing contest for all upper secondary school level students

Physical activity covers all sorts of activities. Walking your dog, playing with a freestyle foot bag, exercising during soap opera commercial breaks, playing table tennis, dancing and biking to school are all considered physical activities. The SOLE research project by the Faculty of Social Sciences at University of Helsinki is organizing a physical activity-related writing contest for all upper secondary school level students.

From the list below, choose a topic that speaks to you the most and write a short story about it. The story should reflect your own personal experience on physical activity. There is no word limitation, and you can write your story either by hand or on your computer. The options to choose from are:

1) My relationship to physical activity changed

Write a story about a phase, a time period or events that caused a change in your relationship with physical activity. For example, you can describe what the relationship was like before the change, what caused the change, how your behavior changed, what came out of the change, and what ways you have used to maintain the behavior after the change.

2) Being physically active is not a part of my life

Write a story about why physical activity is not a part of your life. For example, you can write about experiences that have caused physical activity not to be a part of your everyday life and describe your environment's reactions, or ponder on reasons why being physically active is not your thing.

3) This is how I maintain physical activity

Write a story about the ways you maintain your physical activity. For example, you can write about the ways you use to motivate yourself to be physically active, or about practical tools that you use to make sure that physical activity will continue to be a part of your everyday life.

The short stories should be submitted by **21.12.2013** either by mail (Katri Paajanen-Taube, Sosiaalitieiden laitos, PL 54, 00014 Helsingin yliopisto) or email (sole-tutkimus@helsinki.fi). Include your age, sex and topic number in your work.

The top three submissions will be rewarded with webstore gift cards (à 50 €). In addition, all participants will have a chance to win movie tickets and webstore gift cards. For the prize deliveries, the submissions must include the school's, student's and teacher's contact details.

All submissions will be handled anonymously. The organizers might use the stories or parts of them for physical activity promotion interventions.

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