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Author(s): Saarinen, Milla; Bertram, Raymond; Aunola, Kaisa; Pankkonen, Julia; Ryba, Tatiana V.

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6 **Student-Athletes' Causal Attributions for Sport and School Achievement in Relation**
7 **to Sport Dropout and Grade Point Average**

8

9 Milla Saارينen¹, Raymond Bertram², Kaisa Aunola¹, Julia Pankkonen², and Tatiana V.
10 Ryba^{1,3}

11 ¹ Department of Psychology, University of Jyväskylä, Kärki, Mattilanniemi 6, P.O. Box
12 35, FI-40014 University of Jyväskylä, Jyväskylä, Finland.

13 ² Department of Psychology and Speech-Language Pathology, University of Turku,
14 Assistentinkatu 7, Publicum. 20014 University of Turku, Turku, Finland.

15 ² Methodology Center for Human Sciences, University of Jyväskylä, Ruusu puisto, RUU-
16 building Alvar Aallon katu 9, P.O. Box 35, FI-40014 University of Jyväskylä, Jyväskylä,
17 Finland.

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20 **Author Note**

21 Correspondence concerning this article should be addressed to Milla Saارينen, Department
22 of Psychology, University of Jyväskylä. E-mail: milla.s.a.saارينen@jyu.fi.

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1 **Abstract**

2 The present study longitudinally examined stability and change in the attributional profiles
3 of Finnish student-athletes ($n = 391$) in upper secondary sport school. Moreover, it
4 examined the extent to which these profiles, and changes in them, were associated with
5 athletes' level of sport competition and school achievements and dropouts at the end of
6 upper secondary sport school. Using latent profile analysis, five different and highly stable
7 attributional profiles were identified for student-athletes: (1) depressive (6.9 %), (2)
8 athletic self-serving (23.0 %), (3) average (16.4 %), (4) learned helplessness (30.9 %), and
9 (5) responsible (22.8 %). The results further showed that over the three-year study period
10 the responsible attributional style where individuals take responsibility for successes and
11 failures predicted student-athletes' subsequent high grade point average and low sport
12 dropout rates even after controlling for the impacts of their earlier grade point average,
13 gender, and type of sport.

14 *Keywords:* attributional style, senior high school, upper secondary school, ability,
15 effort, responsible

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1 **Student-Athletes' Causal Attributions for Sport and School Achievement in Relation**
2 **to Sport Dropout and Grade Point Average**

3 Adolescent athletes face the challenge of performing successfully in sports while at
4 the same time achieving academic success. However, previous sport and education
5 research has shown that succeeding in both is not guaranteed due to, for example,
6 conflicting goals, time constraints, and overlapping schedules (Stambulova & Wylleman,
7 2019). These challenges mean that athletes are often at risk of motivational problems in
8 both the sport and school domains, leading to the early termination of athletic and/or
9 academic careers (Aunola et al., 2018). Therefore, it is important to understand why some
10 student-athletes experience such problems, while others manage to maintain high levels of
11 motivation, and to assist student-athletes in maintaining their motivation in both domains.
12 *Causal attributions* are the causes individuals assign to justify their performance outcomes.
13 Attributions are typically considered *adaptive* and crucial for maintaining motivation in
14 any field (Weiner, 1985; 2018) when successes are attributed to internal and stable factors
15 (e.g., ability) and the causes of failures to unstable factors (e.g., luck). Yet, little is known
16 about the attributional profiles of student-athletes, how stable these profiles are across the
17 first year of upper secondary sport school, and how these profiles relate to their subsequent
18 level of sport competition, school achievements, and dropouts. The current study sets out
19 to explore these issues with student-athletes aged 15-19, admitted to prestigious upper
20 secondary sport high schools in Finland.

21 **Causal Attributions**

22 Attribution theory is a motivational theory that has received considerable attention
23 in recent decades. It holds that causal attributions for success or failure guide future efforts
24 (Weiner, 1985, 2018). Performance outcomes may be related to many factors (e.g., ability,
25 effort, luck, or task difficulty), but typically, individuals attribute succeeding or failing in
26 competitive situations mostly to ability and effort (Weiner, 1985, 2018). According to

1 attribution theory, factors that may account for performance outcomes can be classified
2 across three dimensions: locus of causality (internal/external), controllability
3 (controllable/uncontrollable), and stability (stable/unstable). Ability is typically considered
4 as internal, stable, and uncontrollable; effort is considered as internal, unstable, and
5 controllable; task difficulty is considered as external, stable, and uncontrollable; and luck
6 is considered to be external, unstable, and uncontrollable (Weiner, 1985, 2018). Since
7 effort and ability are the typical attributions individuals assign to their achievements, the
8 present study focuses particularly on these attributions.

9 **Attributional Styles**

10 The term *attributional style* refers to the ways individuals habitually explain the
11 causes of positive and negative performance outcomes (Abramson et al., 1978). In general,
12 an attributional style is referred to as *adaptive* when the causes of successes are attributed
13 to internal and stable factors, such as ability, and the causes of failures are attributed to
14 external and unstable causes, such as luck (Allen et al., 2020; Weiner, 2018). These types
15 of attributions are also coined *self-serving* (Mezulis et al., 2004) and may positively impact
16 athletes' perceptions of own ability, leading to higher hopes for and expectations of future
17 success and increasing efforts to succeed in the future. *Learned helplessness* is an example
18 of an assumably *maladaptive* attributional style, meaning that individuals fail to see
19 connections between their own efforts and achievements (Abramson et al., 1978; Yee et
20 al., 2003). Another well-recognized maladaptive attributional style is the *depressive*
21 attributional style, which involves a chronic style of attributing failures to internal, stable,
22 and uncontrollable factors like lack of ability without attributing successful outcomes to
23 one's own ability and/or efforts (Seligman et al., 1979).

24 Earlier athletics studies have shown that athletes often have a self-serving
25 attributional bias, attributing personal success in sport competitions to stable (ability) and
26 controllable (effort) factors and personal failure to unstable and uncontrollable (e.g., bad

1 luck) factors (for a review, see Allen et al., 2020; Mezulis et al., 2004). In the academic
2 context, studies have shown that students often ascribe both their achievements and
3 failures to internal factors, such as ability and effort (Graham, 2004; Weiner, 1985).
4 Interestingly, a recent variable-oriented study conducted among student-athletes in upper
5 secondary sport school found that the student-athletes attributed their positive outcomes in
6 sports more often to own efforts than positive outcomes in school (Van Yperen et al.,
7 2021). This may be because student-athletes tend to prioritize sports and thus have a
8 stronger desire for a positive athletic self-image than an academic one (Mezulis et al.,
9 2004). Earlier sport studies also indicate that the self-serving bias in athletic contexts is not
10 necessarily adaptive (Rees et al., 2005). In fact, Rees et al. (2005) argued that attributing
11 failures to external factors can be maladaptive, since external factors are not under an
12 individual's control. For instance, if an athlete is not in a position to change an ineffective
13 coach, ascribing failure to this coach will not increase faith in a more successful future.
14 Earlier attributional studies in sport psychology have often been cross-sectional and have
15 focused on examining state attributions, that is, attributions that individuals make about a
16 specific situation and/or at a specific point in time (Coffee & Rees, 2011; Rascle et al.,
17 2015). However, the novel approach taken in this study is to explore attributional styles,
18 that is, the general tendencies of individuals to account for failure and success (cf.
19 Abramson et al., 1978; Enlund et al., 2015) to better understand how attributions can
20 predict achievement outcomes over a longer period of time. While attributional styles are
21 assumed to be relatively stable over time, the few earlier studies that have longitudinally
22 examined the stability of causal attributions have focused only on the academic domain
23 and were carried out among primary school children and lower secondary adolescents
24 (Clem et al., 2018) or their parents (Enlund et al., 2015). Therefore, the development and
25 the consistency of attributional profiles during the later adolescence years is not well
26 understood. Understanding to what extent attributions are state-like or trait-like

1 characteristics and getting insight into the developmental trajectories of attributional styles
2 is important because it can indicate whether and when interventions are needed to preserve
3 adolescents' achievement motivation both in sport and school (Clem et al., 2018; Gordon,
4 2008; Weiner, 2018). Maintaining high levels of achievement motivation in both domains
5 is crucial in terms of successful participation and attaining desired outcomes, such as
6 progression of sport and completion of upper secondary school.

7 **The Role of Gender and Type of Sport**

8 Earlier studies provide conflicting evidence for the association between
9 attributional styles and gender. For example, Seligman et al. (1990) found that female
10 swimmers more often attributed failure in sport competition to lack of ability, whereas for
11 males it was more typical to attribute failure in competition to lack of effort. More recent
12 studies either did not find gender differences in attributions for athletic performance
13 (Hanrahan & Cerin, 2009) or found that female athletes emphasize effort attributions more
14 compared to males (Butler & Hasenfratz, 2017). In academic context, in turn, it has been
15 found that it is more typical for girls than for boys to attribute failure to lack of ability,
16 most often in activities that are stereotypically male dominant, such as math and science
17 (for a meta-analysis, see Meece et al., 2006). A better understanding of whether girls and
18 boys develop different attributional styles can help to design more specified attributional
19 interventions to alter maladaptive attributional styles for each gender. Therefore, it is
20 important to further investigate gender differences in attributional styles, and especially the
21 extent to which such differences occur across the domains of sport and school.

22 Additionally, the type of sport influences athletes' causal attributions. More
23 specifically, Hanrahan and Cerin (2009) found that individual sport athletes make more
24 internal, stable, and global, and less externally controllable attributions for sports
25 successes, and more internal attributions for negative sports events compared to team sport
26 athletes. It seems logical for individual sport athletes to make more internal attributions

1 and perceive themselves as having a greater control and responsibility for their
2 performance compared to team athletes as they do not have teammates to whom credit or
3 blame can be attributed (Hanrahan & Biddle, 2002). Because team sport athletes may be at
4 higher risk of developing a maladaptive attributional style than individual sport
5 athletes, by better understanding the role of type of sport in causal attributions may provide
6 means to effectively support team sport athletes' motivation and successful performance
7 outcomes. As only few studies thus far have investigated the role of type of sports in causal
8 attributions, and none of these have investigated whether athletes' attributions extend to
9 the academic domain, the role of type of sport in causal attributions, and their implications
10 for schooling, warrants further research.

11 **Outcomes of Attributional Styles**

12 Liu et al. (2009) found that high school students' attributions of academic success to
13 effort predicted an increase in their school achievements across five school years, whereas
14 attributions of success to ability did not. In contrast, Chen and Wu (2021) found that
15 attributing academic success to ability was positively associated with academic
16 achievement. Whereas attributions to academic success thus yield conflicting results, with
17 regard to academic failures research has consistently shown that college students who
18 attribute academic failures to controllable factors (e.g., effort or strategy) perform better
19 and are likelier to persist in their programs than those who attribute failures to
20 uncontrollable factors (Hamm et al., 2020; Parker et al., 2016).

21 In athletic contexts, studies examining the relationship between attributional styles
22 and sport achievements have typically been cross-sectional and have supported the self-
23 serving attributional style: athletes who perform well are likelier than low-performing
24 athletes to attribute success to internal and stable factors (Gordon, 2008; Seligman et al.,
25 1990). More recent experimental studies focusing on attributional retraining have shown
26 that encouraging athletes to attribute failures to controllable and unstable factors positively

1 influence their sport performance (Coffee & Rees, 2011; Rasclé et al., 2015). Similarly,
2 Parker et al.'s (2016) study focusing on first-year university students from Canada found
3 that encouraging athletes to make controllable and unstable attributions for negative
4 experiences in academic contexts significantly improved their academic performance and
5 decreased their likelihood of course withdrawal over two semesters. Overall, although
6 earlier research suggests that attributional styles can predict athletes' achievement levels
7 and dropout rates in both sport and school, most of these findings are from short-term
8 experimental studies focusing on attributional retraining in tightly controlled settings.
9 Therefore, there is a need to examine student-athletes' attributional styles over longer
10 periods of time and how these are related to real life outcomes, such as their sport
11 competition level, school achievement and sport dropouts at the end of upper secondary
12 school.

13 **Aims of the Study**

14 The present study had multiple aims. First, to identify student-athletes' attributional
15 profiles at the beginning and end of the first year of upper secondary school, a person-
16 centered approach was used (see Mäkikangas et al., 2018). This approach not only
17 identifies different profiles, it also provides proportions of the sample belonging to
18 identified subgroups at different measurement points. The second aim was to establish
19 whether gender and type of sports were related to attributional profiles. The third aim was
20 to assess how stable the attributional profiles were across the first year of upper secondary
21 school. To establish long-term implications of attributional profiles, the final aim was to
22 establish how attributional profiles were related to student-athletes' level of sport
23 competition, school achievements and sport dropouts at the end of the third year of upper
24 secondary school. Because previous studies suggest that talented elite athletes are likely to
25 be highly motivated to perform well in both sports and education (Aunola et al., 2018), we
26 expected (Hypothesis 1 [H1]) a large group of student-athletes to attribute success to

1 ability and effort across domains. However, we also expected (Hypothesis 2 [H2]) that in
2 the sport domain student-athletes' attributions to effort would be stronger compared to
3 school domain, but only for successful outcomes (Mezulis et al., 2004; Van Yperen et al.,
4 2021). In line with earlier studies on the relation between gender and type of sport with
5 athletes' attributional styles, we expected (Hypothesis 3 [H3]) girls to make more
6 attributions to effort than boys (Arens & Watermann, 2021) and individual sport athletes to
7 make more attributions to ability and effort for successes and failures compared to team
8 sport athletes (Hanrahan & Cerin, 2009). As past studies have shown that students'
9 attributions on school domain are relatively stable across primary and lower secondary
10 school years (e.g., Aunola et al., 2018; Clem et al., 2018; Enlund et al., 2015), we
11 hypothesized (Hypothesis 4 [H4]) that student-athletes' attributional profiles would also be
12 relatively stable in upper secondary school years. Because no previous studies have
13 longitudinally investigated the long-term outcomes of attributional styles in sports, it was
14 hard to formulate any hypotheses regarding such outcomes. However, some previous
15 studies indicate that students with adaptive attributional styles (i.e., those who attributed
16 success to internal and stable factors, and the causes of failures to unstable factors) would
17 have higher GPAs at the end of the third year of upper secondary school (Hypothesis 5
18 [H5]) (Hamm et al., 2020; Liu et al., 2009). Because gender and type of sport might be
19 assumed to be related to the student-athletes' attributional profiles, school achievement and
20 sport and school dropouts (Ryba et al., 2021; Hanrahan & Cerin, 2009) we accounted for
21 the possible impact of these variables when predicting student-athletes' achievements and
22 dropouts in relation to their attributional profiles.

23

Methods

24 Participants and Procedure

25

26

The present study is part of the ongoing Finnish Longitudinal Dual Career Study
(Ryba et al., 2016) following talented adolescent student-athletes from the beginning to the

1 end of upper secondary school. Upper secondary education in Finland is equivalent to
2 senior high school in the US as student-athletes are typically 15-16 years old when they
3 enroll to these schools and 18-20 when they graduate. Upper secondary school lasts for 3-4
4 years and consists of grades 1-3 which are equivalent to the grades 10-12 in the US
5 schooling system. Currently, 15 upper secondary schools in Finland are designated as sport
6 schools according to the Ministry of Education and Culture. The Human Sciences Ethics
7 Committee of the relevant university, Finland, approved this study in June 2015. The study
8 began in fall 2015, and the sample consisted of 391 (51 % female, 49 % male) student-
9 athletes from six different upper secondary sport schools across Finland. At the time the
10 data was collected, there were a total of 13 upper secondary sports schools in Finland (i.e.,
11 schools providing structural support for talented athletes to combine upper secondary
12 school education with an athletic career). The six sport schools were selected from across
13 Finland, making up about 50% of all sport schools, indicating representative subset.
14 Moreover, the sample size of the current study ($n > 300$) was - according to studies on
15 statistical power - large enough to apply structural equation modelling and latent profile
16 analyses (Boomsma & Hoogland, 2001; Nylund-Gibson & Choi, 2018). Prior to data
17 collection, all participants were informed about their rights and provided written consent
18 for their voluntary participation in the study. In Finland, informed consent from the
19 parents/guardians of young people over 15 years old is not required. The data for the
20 present study were collected during the first and third years of upper secondary school: at
21 the beginning of Grade 1 (September, Time 1; $n = 391$), at the end of Grade 1 (March,
22 Time 2; $n = 370$), and at the end of Grade 3 (March, Time 3; $n = 390$). At each
23 measurement point (T1, T2, and T3), participants completed a self-report questionnaire.
24 Ethical guidelines for human subjects were followed throughout the data collection
25 process. Of the 391 participating student-athletes, 26 were excluded from the analyses due
26 to missing values for one or more variables. Of the remaining 365 participants, 185 (50.7

1 %) were female and 180 (49.3 %) were male. At the beginning of upper secondary school,
2 50 % of the student-athletes played individual sports and 50 % played team sports at
3 various levels (i.e., regional, national, and/or international).

4 **Measurements**

5 *Causal Attributions*

6 Students' causal attributions were assessed at T1 and T2 separately for athletic and
7 academic performance. To measure athletic attributions, we used the scale of Aunola et al.
8 (2015). First, the section measuring attributions for athletic performance included
9 questions concerning both failures and successes. A distinction was made between the
10 practice and competition contexts, so attributions were measured separately for
11 competition and practice performance. Second, the questionnaire assessing attributions for
12 academic performance covered both mathematical and language skills. The questionnaire
13 was a modified version of Rytönen et al.'s (2007) scale. The questions were specifically
14 related to language and mathematics as school subjects rather than overall school
15 performance. Attributions to successes and failures were assessed separately for these two
16 academic domains. The students were asked to answer questions across domains (athletic:
17 "If I fail/succeed in practice/competition, it is mainly because . . ."; academic: "If I
18 fail/succeed in language/mathematics, it is mainly because . . .") by rating four items on a
19 five-point Likert scale (1 = strongly disagree, 5 = strongly agree). The alternatives covered
20 ability ("I am/am not skillful"), effort ("I have/have not practiced a lot"), task difficulty
21 ("It was too easy/difficult"), and teaching ("The level of teaching/coaching is good/poor").
22 For failure in the sport domain, an additional fifth option of injury ("I am sick/injured")
23 was included.

24 To understand the students' general attributional styles for athletic and academic
25 performance, four mean score variables (success ability, success effort, failure ability, and
26 failure effort) were calculated separately for two time points, and for athletic and academic

1 domains, by combining the scores for practice and competition situations in an athletic
2 context and scores for language and mathematics in an academic context. In the athletic
3 domain, the Cronbach's alphas for success-ability, success-effort, failure-ability, and
4 failure-effort were .81, .84, and .80, and .83 at T1, and .87, .82, .85, and .89 at T2. In the
5 academic domain, the alphas for success-ability, success-effort, failure-ability, and failure-
6 effort were .56, .75, .60, .83 at T1, and .59, .73, .60, and .80 at T2, respectively.

7 *Type of Sport*

8 The students were asked to report their types of sports on the questionnaire at T1. In
9 the analyses, the types of sports were divided into individual sports (50 %) and team sports
10 (50 %).

11 *Level of Sport Competition*

12 We assessed participants' level of sport competition by asking them whether they
13 had participated in different kinds of competitions (ranging from regional to international).
14 Based on the answers, we created a new variable with five categories: 0 = no competition
15 experience, 1 = competing on a regional level, 2 = competing on a national level (Finnish
16 national championships), 3 = competing on a European level (e.g., European
17 tournaments/championships), and 4 = competing on a worldwide level (e.g., world
18 championships).

19 *Levels of School Achievements*

20 We assessed participants' school achievement levels using their Grade Point Average
21 (GPA)s, which were measured by asking them to report their latest GPAs at T1 and T3.

22 *Dropouts*

23 Sport dropouts were measured at T3 by asking the participants: "Are you still
24 participating in competitive sports?", to which 75.5% answered "yes" (value 1) or "no"
25 (value 0). Similarly, school dropouts were measured at T3 by asking the participants: "Are
26 you continuing your upper secondary education?", to which they answered "yes" (1) or

1 “no” (0). However, because only five of the participants dropped out of school (two of the
2 athletes quit school due to a lack of interest; one wanted to pursue a professional athletic
3 career; one was spending a year as an exchange student abroad, and one changed to a
4 vocational education), this variable did not provide useful information for this study.

5 **Data Analysis**

6 The statistical analyses were carried out as follows: First, we examined the causal
7 attribution profiles of student-athletes'. A latent profile analysis (LPA) was conducted
8 using ability and effort attributions for success and failure in both sports and school as the
9 criterion variables. Since the data were gathered at two different time points, I-states-as-
10 objects analysis (ISOA; Bergman & El-Khoury, 1999) was employed for the LPA
11 (Lazarides et al., 2016). In this procedure, the latent profiles were created independently of
12 the time points by reorganizing the data so that each student-athlete was coded at each
13 measurement point as a separate case (I-states). These reorganized data were then used in
14 the LPA. The criterion variables for the recoded data were standardized, and outliers ($n =$
15 25) exceeding the absolute values of standardized scores of -3 or 3 were identified and
16 forced into the -3–3 range. The following four criteria were used to select the number of
17 latent profiles: (1) model fit, (2) distinguishability of the latent groups, (3) latent class
18 sizes, and (4) theoretical justification. The following methods were used to evaluate the
19 model fit: (a) the Bayesian information criterion (BIC), (b) the adjusted Bayesian
20 information criterion (aBIC), (c) Akaike's information criterion (AIC), (d) a Vuong–Lo–
21 Mendell–Rubin likelihood ratio test (VLMR), and (e) a Lo–Mendell–Rubin adjusted
22 likelihood test (LRM).

23 Second, log linear models were used to examine the stability of and change in the
24 latent attributional profiles across the two time points. At this stage, the data were
25 reorganized successively (at the first and second measurement points, each student-athlete
26 was once again handled as two consecutive measurements of the same participant). A

1 Pearson's chi-squared test was used to indicate significant associations between categorical
2 variables across two time points, and adjusted standardized residuals were used to indicate
3 significant differences between the observed and expected counts. Third, cross-tabulation
4 was used to examine the associations between attributional profiles and gender at Time 1
5 and the associations between attributional profiles and type of sport at Time 1. Fourth, the
6 outcomes associated with different attributional profiles were examined using ANCOVA
7 to predict the outcome variables, that is, level of sport competition and GPA at Time 3 (a
8 separate analysis for both) with cluster membership at Time 2, after controlling for the
9 impacts of earlier level of sport competition or school achievement at Time 2, respectively,
10 and gender and type of sport. Finally, the relation between attributional profiles and sport
11 dropouts at Time 3 was investigated by cross-tabulating the attributional profile
12 membership at Time 2 with sport dropouts at Time 3. Logistic regression analyses were
13 further used to examine how cluster membership at Time 2 predicted sport dropouts at
14 Time 3, after controlling for gender and type of sport. The LPA was carried out using
15 MPlus statistical software (version 8; Muthén & Muthén, 1998, 2017). Assuming
16 missingness at random (MAR), the parameters of the models were estimated using full-
17 information maximum likelihood estimation with standard errors that were robust for non-
18 normal distributions (MLR estimator; Muthén & Muthén, 1998, 2017). Log linear models,
19 logistic regressions, cross-tabulations, and ANCOVAs were performed using IBM® SPSS®
20 Statistics 20 software.

21 **Results**

22 **Attributional Profiles**

23 The goodness-of-fit indices for the LPAs of student-athletes' attributions for sports
24 and school across the two time points suggested that a five-class solution was appropriate
25 (see Table 1). The five-class solution had smaller BIC and AIC values than the other class
26 solutions, and the entropy value was also better than for two-, three-, or four-class

1 solutions. However, the VLMR and LMR tests indicated that a six-class solution was no
2 better than a five-class solution; therefore, the five-class solution was selected as the final
3 solution.

4 **Insert Table 1 about here**

5 The first and smallest (5 % of I-states) attributional profile (see Table 2 for raw
6 scores and Figure 1 for standardized scores) was characterized by weak effort attributions
7 for sport and school success and weak ability attributions for school success. This profile
8 of attributions was labeled “Depressive.” The second profile (22 % of I-states) was
9 characterized by strong effort and ability attributions for sport success and weak effort and
10 ability attributions for sport failures. This profile was labeled “Athletic self-serving.” The
11 third profile (18 % of I-states) was characterized by neither particularly strong nor weak
12 attributions to ability and effort for success or failure across domains and was thus labeled
13 “Average.” The fourth profile (31 % of I-states) was characterized by weak effort
14 attributions for sport and school success and was labeled as “Learned helplessness” to
15 describe an attributional style where individuals fail to see the connection between their
16 own effort and achievement. Finally, the fifth profile (23 % of I-states) was characterized
17 by strong effort attributions for sport success and strong effort attributions for sport and
18 school failures. This profile was labeled “Responsible” to describe the individual taking
19 personal responsibility for both successes and failures.

20 **Insert Table 2 about here**

21 **Insert Figure 1 about here**

22 An examination of the gender distribution in the five groups showed no statistically
23 significant association between group membership and gender at Time 1 ($\chi^2 [4] = 7.347, p$
24 $= .115$). However, inspection of adjusted residuals revealed that girls were overrepresented
25 (adj. res. = 2.3, $p < .05$) in the “Responsible” group, whereas boys were underrepresented
26 (adj. res. = -2.3, $p < .05$). Examination of the association between the type of sport and

1 group membership at Time 1 showed a statistically marginally significant association (χ^2
2 [4] = 8.965, $p = .062$). Team sport athletes were overrepresented (adj. res. = 2.6, $p < .05$) in
3 the “Learned helplessness” group, whereas individual-level athletes were underrepresented
4 in this group (adj. res. = -2.6, $p < .05$).

5 **Stability and Change in Attributional Profiles Over Time**

6 The statistically significant stability of, and change in, the attributional profiles from
7 Time 1 to Time 2, analyzed using log linear models, are shown in Figure 2 (frequencies;
8 straight line for changes that were likelier than by chance; dotted lines for changes that
9 were less likely than by chance; $p < .05$). The results showed statistically significant
10 associations between group membership at Time 1 and Time 2. All five attributional
11 profiles exhibited considerable stability across the two measurement points. This meant
12 that student-athletes with a particular attributional profile at Time 1 more likely had the
13 same attributional profile at Time 2 rather than some other profile. The only exception was
14 for student-athletes in the “Depressive” group, who were statistically likely to either stay in
15 the same group or move to the “Learned helplessness” group between Time 1 and Time 2.
16 The percentages of student-athletes in the “Depressive” but also the “Athletic self-serving”
17 groups actually decreased across the two time points, whereas the percentages of student-
18 athletes in the “Average,” “Learned helplessness,” and “Responsible” groups increased
19 over time.

20 **Insert Figure 2 about here**

21 **Outcomes Associated with the Attributional Profiles**

22 Next, to examine how the attributional profiles were associated with athletes’
23 subsequent level of sport competition and GPA at Time 3, we conducted ANCOVAs to
24 determine statistically significant group differences in level of sport competition and GPA
25 at Time 3, after controlling for the dependent variable at Time 1 (level of sport competition
26 and GPA, respectively). From a possible range of 4 (insufficient) to 10 (excellent), the

1 participants' GPAs were, on average, 8.85 ($SD = 0.62$; $Range = 7.25-10$) at Time 1, and
2 8.05 ($SD = 0.87$; $Range = 5-9.90$) at Time 3. The results showed no statistically significant
3 associations between attributional profile membership at Time 2 and level of sport
4 competition at Time 3 after controlling for level of sport competition at Time 1, gender,
5 and type of sport ($F[4, 229] = 0.057$, $p = .994$). However, the attributional profile group
6 membership at Time 2 predicted athletes' GPA at Time 3 after controlling for the GPA,
7 gender, and type of sport at Time 1 ($F[4, 298] = 2.949$, $p = .021$). The pairwise
8 comparisons revealed that athletes in the "Responsible" group at Time 2 had higher GPAs
9 at Time 3 than athletes in the "Learned helplessness" group at Time 2.

10 Next, to examine how the attributional profiles at Time 2 predicted athletes' sport
11 dropouts at Time 3, cross-tabulation between the group membership at Time 2 and sport
12 dropout at Time 3 was analyzed. At T3, 75.5 % of participants reported that they still
13 participated in competitive sports, whereas 24.5 % had dropped out of sports.
14 The results showed that there was an underrepresentation of student-athletes who had
15 dropped out of sports in the "Responsible" group ($n = 9$; adj. res. = -3.4, $p < .01$), whereas
16 there was an overrepresentation of student-athletes who continued sports ($n = 72$; adj. res.
17 = 3.4, $p < .01$) in this group. In contrast, there was an overrepresentation of student-athletes
18 who had dropped out of sports in both the "Average" ($n = 22$; adj. res. = 2.4, $p < .05$) and
19 the "Depressive" group ($n = 6$; $\chi^2(4) = 16.579$, $p < .01$).

20 Finally, logistic regression analysis was used to examine how group membership at
21 Time 2 predicted sport dropouts at Time 3 after controlling for gender and type of sport.
22 The results showed that gender statistically significantly predicted dropouts with dropout
23 from sport being more typical for females than for males ($B = -.915$; Wald (df) = 10.028; $p =$
24 = .002; Exp (B) = 0.400), whereas type of sport did not ($B = .333$; Wald (df) = 1.497; $p =$
25 = .221; Exp (B) = 1.395). In line with the cross-tabulation analyses, attributional profile
26 significantly predicted sport dropouts, even after controlling for gender and type of sport

1 (Wald = 14.856, df = 4, $p = .005$). More specifically, athletes belonging to the
2 “Responsible” group were less likely to drop out of sports than athletes in any other group.

3 **Discussion**

4 The present study applied a person-oriented approach to identify diverse subgroups
5 of student-athletes with different attributional profiles for success and failure situations in
6 the sport and school domains. Five different and highly stable attributional profiles were
7 identified in the sample: “Learned helplessness” (30.9 %), “Athletic self-serving (23.0 %),
8 “Responsible” (22.8 %), “Average” (16.4 %), and “Depressive” (6.9 %). The most
9 common profile was “Learned helplessness,” mostly characterized by weak effort
10 attributions for sport success and relatively weak effort attributions for school success. At
11 the beginning of upper secondary school, this profile was typical for about 30 % of the
12 student-athletes. Since the admission process for upper secondary sport schools in Finland
13 is competitive, and athletic and academic demands increase when athletes enter secondary
14 education, requiring more effort for students to succeed, it is somewhat concerning that a
15 third of the student-athletes did not believe that their own efforts contributed to their
16 school and sport achievement. A possible explanation is that when entering upper
17 secondary sport school, many talented athletes may start to realize that effort alone is not
18 enough to succeed, as they enter an environment in which all student-athletes devote a lot
19 of time and effort to sports.

20 Moreover, at the beginning of upper secondary school, almost 25 % of the student-
21 athletes demonstrated an “Athletic Self-serving” attributional style, characterized by strong
22 effort and ability attributions for sport success but weak effort and ability attributions for
23 sport failures. This finding aligns well with previous literature showing that athletes, most
24 typically those who prioritize sports over school - often have a domain-specific self-
25 serving bias (Allen et al., 2020; Mezulis et al., 2004). This implies that they ascribe their
26 positive outcomes in sports more often and/or more strongly to their own ability and effort

1 than in the school domain and attribute failures in sports more often to external factors
2 (Van Yperen et al., 2021). The results showed that nearly 25 % of the student-athletes had
3 a “Responsible” profile characterized by attributing successes and failures in sports and
4 failures in school strongly to their ability and effort. The existence of a high personal
5 responsibility group in which students take credit for their successes and hold themselves
6 responsible for failures has also been reported previously (Houston, 2016). Finally, almost
7 7 % of the student-athletes demonstrated a “Depressive” attributional style characterized
8 by low effort attributions for sport success and relatively low effort attributions for school
9 success, combined with low-ability attributions for school success at the beginning of
10 upper secondary school.

11 Generally, while the attributions student-athletes made were consistent across the
12 sport and school domain, they made stronger ability and effort attributions for sport
13 success compared to school success especially in the “Athletic self-serving” group. This
14 can be explained by the highly competitive selection procedure adopted by sport schools
15 which require athletes to perform at a very high level, leading to more conscious
16 evaluations of one’s own sport performances.

17 We also examined the role of gender and type of sport in student-athletes’
18 attributional profiles. The results indicated a nonsignificant trend in the predicted direction
19 for both variables; it was more typical for girls than boys to demonstrate a “Responsible”
20 attributional style (Arens & Watermann, 2021). The “Learned helplessness” attributional
21 style proved to be more typical for team sport athletes than for individual sport athletes
22 (Hanrahan & Cerin, 2009). This is in line with the notion that individual athletes are more
23 likely to hold themselves responsible for performance outcomes (Hanrahan & Cerin,
24 2009). Since the results were marginal, future studies should clarify the roles of gender and
25 type of sport in the ways athletes explain their successes and failures. Adding knowledge

1 on these issues would be important when aiming to efficiently support the development of
2 an adaptive attributional profile, especially among boys and team sport athletes.

3 The results also showed that student-athletes' attributional profiles were stable across
4 the first year of upper secondary school: the profile typical for a student-athlete at the
5 beginning of the first year was likely to be the same at its end (see also, Aunola et al.,
6 2018; Clem et al., 2018; Enlund et al., 2015). This finding, as well as the fact that
7 attributions were found to be relatively consistent across domains, both support the idea
8 that for many adolescents the attributional style may be a trait-like characteristic that has
9 stabilized before the first grade of upper secondary school and does not alter under
10 intensified academic and athletic circumstances. This means that it is especially important
11 for different actors (i.e., coaches, teachers) who work with young athletes to focus on
12 preventing the development of a maladaptive attributional style. However, because
13 attributional profiles were not set in stone for all student-athletes, and a substantial amount
14 of them developed a different attributional profile during the first year of upper secondary
15 school it is important that an adoption of an adaptive attributional style is also promoted in
16 upper secondary school.

17 The final research question asked how causal attribution profiles relate to student-
18 athletes' level of sport competition and school achievement and sport dropout at the end of
19 the third year of upper secondary sport school when gender and type of sport were
20 controlled for. The results showed that athletes' attributional styles were found to predict
21 sport dropouts: student-athletes with a "Responsible" attributional style were less likely to
22 drop out of sports than athletes in other groups. This may be because athletes with this
23 profile are typically achievement oriented and willing to learn despite failures, leading to
24 clear improvements, which, in turn, increase enjoyment of an activity and may prevent
25 dropout (Duda & White, 1992). Second, student-athletes' attributional profiles were not
26 associated with upper secondary third year level of sport competition after controlling for

1 the earlier levels of sport competition, gender, and type of sport. While this result is
2 somewhat surprising, bearing in mind the positive results of earlier attributional retraining
3 studies (Coffee & Rees, 2011; Rascle et al., 2015), it may be explained by unequally
4 distributed dropout rates across profiles. That is, it is possible that the dropout cases were
5 athletes who did not achieve much, increasing the overall achievement levels of all but the
6 responsible group, which had almost no dropout cases.

7 Finally, the results showed that student-athletes' attributional profiles predicted their
8 school achievement: athletes with a "Responsible" attributional style during the first year
9 had higher GPAs than the other groups at the end of the third year of upper secondary
10 school (Houston, 2016). This was true even after controlling for earlier school
11 achievement, gender, and type of sport. This suggests that the attributions individuals make
12 to account for their successes and failures play important roles in guiding future
13 motivation, effort, and achievements.

14 Overall, while the self-serving attributional style is generally considered as the
15 most adaptive one (attributing successes to internal and stable factors, such as ability, and
16 failures to external and unstable factors, such as luck) (e.g., Allen et al., 2020; Mezulis et
17 al., 2004), the current study shows that from a longitudinal perspective it may be the most
18 beneficial to attribute both successes and failures to one's own effort, that is, to adopt a
19 responsible attributional style. While previous research has often suggested that attributing
20 success both to ability and effort can be considered adaptive, according to the present study
21 individuals may especially benefit from attributing successful events to effort (Weiner,
22 2018). This may be especially important in a failure situation because it has been found
23 that too much focus on ability may be counterproductive and lead to anxiety over future
24 performance or depressive symptoms (Gordon, 2008). In fact, when adopting a responsible
25 attributional style individuals take credit for successful performance outcomes and are
26 motivated to maintain behavior but also can learn and effectively change behavior after a

1 negative experience and use that as a starting point for improvement (Hamm et al., 2020).
2 Practically, the results of the present study suggest that it is important to develop
3 interventions especially among younger athletes to internalize responsible attributional
4 style. This means that the role of effort should be promoted above ability when accounting
5 for successful and less successful performance outcomes in different sport and educational
6 settings and interactions among teachers and coaches (Hamm et al., 2020). Because
7 attributional styles tend to stabilize prior to upper secondary school, interventions should
8 target youngsters and/or their coaches and/or teachers at an earlier stage to efficiently
9 enable the change of maladaptive profiles (Clem et al., 2018).

10 **Limitations**

11 The present study has a number of limitations. First, only three years of upper
12 secondary school were covered. Future studies should therefore examine stability and
13 change in attributions, as well as their relation with level of sport competition, school
14 achievement and sport/school dropout over a longer period of time, extending study to
15 tertiary education (vocational high school, university) and/or working life. Second, the
16 Cronbach alpha reliabilities for the success-ability (T1: 0.56; T2: 0.59) and failure-ability
17 (T1: 0.60; T2: 0.60) scores in academic domain were low. This may be related to the fact
18 that in the academic domain attributions were calculated across two school subjects
19 (mathematics and language), whereas in the sport domain questions concerned sports only.
20 Earlier studies showed that students sometimes make different attributions for mathematics
21 and language, related to differences in self-concept of ability (Clem et al., 2018; Meece et
22 al., 2006). We leave it to future studies to assess attributions related to mathematics and
23 literature separately. Third, the sample consisted of academically high-performing student-
24 athletes from upper secondary sport schools, which is a rather elite subpopulation not
25 representative for this age category. Yet, most attributional profiles are quite common
26 among other populations as well, so it can be assumed that the findings are at least to some

1 extent generalizable. Finally, the present study was conducted in a particular sociocultural
2 context — Finland. Because the results may not fully apply to other educational and
3 cultural settings, future cross-cultural studies are needed to establish to what extent there
4 are similarities and differences in causal attributions, sport and school achievement, and
5 sport dropout across countries.

6 **Conclusions**

7 The present study provides an important theoretical and empirical contribution to the
8 existing attributional literature by longitudinally examining student-athletes' attributional
9 profiles and the outcomes associated with these profiles during upper secondary school in
10 two domains, sport and school. We identified five different and highly stable attributional
11 profiles among the sample at the first year of upper secondary school and the profiles were
12 predictive of student-athletes' school achievement and sports dropout at the end of the
13 third year of upper secondary school. While earlier studies have often considered the self-
14 serving bias as the most adaptive attributional style (e.g., Mezulis et al., 2004), the current
15 study supports the view that from a longitudinal perspective it is most adaptive to adopt a
16 responsible attributional style, that is, to explain both successes and failures in terms of
17 one's own effort. This can help to maintain behavior after a successful outcome but also
18 implies that taking personal responsibility after failures helps to learn and effectively
19 change behavior (Houston, 2016). In order to support talented and elite athletes' successful
20 combination of sports and school and to prevent their sports dropout at the level of elite
21 sport or higher education, it is important to develop interventions targeted to help student-
22 athletes to internalize responsible attributional styles in response to both successes and
23 failures in both sport and education at an early age.

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References

- 1
2 Abramson, L. Y., Seligman, M. E., & Teasdale, J. D. (1978). Learned helplessness in
3 humans: critique and reformulation. *Journal of Abnormal Psychology, 87*(1), 49.
4 <https://psycnet.apa.org/doi/10.1037/0021-843X.87.1.49>
- 5 Allen, M. S., Robson, D. A., Martin, L. J., & Laborde, S. (2020). Systematic review and
6 meta-analysis of self-serving attribution biases in the competitive context of
7 organized sport. *Personality and Social Psychology Bulletin, 46*(7), 1027-1043.
8 <https://doi.org/10.1177%2F0146167219893995>
- 9 Arens, A. K., & Watermann, R. (2021). Students' achievement goals and beliefs of causes
10 of success: Temporal relations and gender differences. *Contemporary Educational*
11 *Psychology, 64*, 101941. <https://doi.org/10.1016/j.cedpsych.2020.101941>
- 12 Aunola, K., Ryba, T. V., & Selänne, H. (2015). Causal attribution questionnaire for
13 adolescent athletes. Unpublished test material. University of Jyväskylä.
- 14 Aunola, K., Selänne, A., Selänne, H., & Ryba, T. V. (2018). The role of adolescent
15 athletes' task value patterns in their educational and athletic career
16 aspirations. *Learning and Individual Differences, 63*, 34-43.
17 <https://doi.org/10.1016/j.lindif.2018.03.004>
- 18 Bergman, L. R., & El-Khoury, B. M. (1999). Studying individual patterns of development
19 using I-states as objects analysis (ISOA). *Biometrical Journal: Journal of*
20 *Mathematical Methods in Biosciences, 41*(6), 753-770.
21 [https://doi.org/10.1002/\(SICI\)1521-4036\(199910\)41:6%3C753::AID-](https://doi.org/10.1002/(SICI)1521-4036(199910)41:6%3C753::AID-)
22 [BIMJ753%3E3.0.CO;2-K](https://doi.org/10.1002/(SICI)1521-4036(199910)41:6%3C753::AID-BIMJ753%3E3.0.CO;2-K)
- 23 Boomsma, A., & Hoogland, J. J. (2001). The robustness of LISREL modeling
24 revisited. *Structural equation models: Present and future. A Festschrift in honor of*
25 *Karl Jöreskog, 2*(3), 139-168.
- 26 Butler, R., & Hasenfratz, L. (2017). Gender and competence motivation. In A. J. Elliot, C.

- 1 S. Dweck, & D. S. Yeager (Eds.), *Handbook of competence and motivation: Theory*
2 *and application* (pp. 489–511). The Guilford Press.
- 3 Chen, M., & Wu, X. (2021). Attributing academic success to giftedness and its impact on
4 academic achievement: The mediating role of self-regulated learning and negative
5 learning emotions. *School Psychology International*, 42(2), 170-186.
6 <https://doi.org/10.1177%2F0143034320985889>
- 7 Clem, A. L., Aunola, K., Hirvonen, R., Määttä, S., Nurmi, J. E., & Kiuru, N. (2018).
8 Adolescents' domain-specific self-concepts of ability predict their domain-specific
9 causal attributions: A longitudinal study. *Merrill-Palmer Quarterly*, 64(4), 539-569.
10 <https://doi.org/10.13110/merrpalmquar1982.64.4.0539>
- 11 Coffee, P., & Rees, T. (2011). When the chips are down: Effects of attributional feedback
12 on self-efficacy and task performance following initial and repeated failure. *Journal*
13 *of Sports Sciences*, 29(3), 235-245. <https://doi.org/10.1080/02640414.2010.531752>
- 14 Duda, J. L., & White, S. A. (1992). Goal orientations and beliefs about the causes of sport
15 success among elite skiers. *The Sport Psychologist*, 6(4), 334-343.
16 <https://doi.org/10.1123/tsp.6.4.334>
- 17 Enlund, E., Aunola, K., & Nurmi, J. E. (2015). Stability in parents' causal attributions for
18 their children's academic performance: A nine-year follow-up. *Merrill-Palmer*
19 *Quarterly (1982-)*, 61(4), 509-536.
20 <https://doi.org/10.13110/merrpalmquar1982.61.4.0509>
- 21 Gordon, R. A. (2008). Attributional style and athletic performance: Strategic optimism and
22 defensive pessimism. *Psychology of Sport and Exercise*, 9(3), 336-350.
23 <https://doi.org/10.1016/j.psychsport.2007.04.007>
- 24 Graham, S. J. (2004). Giving up on modern foreign languages? Students' perceptions of
25 learning French. *The Modern Language Journal*, 88(2), 171-191.
26 <https://doi.org/10.1111/j.0026-7902.2004.00224.x>

- 1 Hamm, J. M., Perry, R. P., Chipperfield, J. G., Hladkyj, S., Parker, P. C., & Weiner, B.
2 (2020). Reframing achievement setbacks: A motivation intervention to improve 8-
3 year graduation rates for students in Science, Technology, Engineering, and
4 Mathematics (STEM) fields. *Psychological Science*, *31*(6), 623-633.
5 <https://doi.org/10.1177%2F0956797620904451>
- 6 Hanrahan, S., & Biddle, S. (2002). Measurement of achievement orientations:
7 Psychometric measures, gender, and sport differences. *European Journal of Sport*
8 *Science*, *2*(5), 1-12. <https://doi.org/10.1080/17461390200072502>
- 9 Hanrahan, S. J., & Cerin, E. (2009). Gender, level of participation, and type of sport:
10 Differences in achievement goal orientation and attributional style. *Journal of*
11 *Science and Medicine in Sport*, *12*(4), 508-512.
12 <https://doi.org/10.1016/j.jsams.2008.01.005>
- 13 Houston, D. M. (2016). Revisiting the relationship between attributional style and
14 academic performance. *Journal of Applied Social Psychology*, *46*(3), 192-200.
15 <https://doi.org/10.1111/jasp.12356>
- 16 Lazarides, R., Viljaranta, J., Aunola, K., Pesu, L., & Nurmi, J. E. (2016). The role of
17 parental expectations and students' motivational profiles for educational
18 aspirations. *Learning and Individual Differences*, *51*, 29-36.
19 <https://doi.org/10.1016/j.lindif.2016.08.024>
- 20 Liu, K. S., Cheng, Y. Y., Chen, Y. L., & Wu, Y. Y. (2009). Longitudinal effects of
21 educational expectations and achievement attributions on adolescents' academic
22 achievements. *Adolescence*, *44*(176), 911-924.
- 23 Meece, J. L., Anderman, E. M., & Anderman, L. H. (2006). Classroom goal structure,
24 student motivation, and academic achievement. *Annual Review of Psychology*, *57*,
25 487-503. <https://psycnet.apa.org/doi/10.1146/annurev.psych.56.091103.070258>
- 26 Mezulis, A.H., Abramson, L.Y., Hyde, J.S. & Hankin, B.L. (2004). Is there a universal

- 1 positivity bias in attributions? A meta-analytic review of individual, developmental
2 and cultural differences in the self-serving attributional bias. *Psychological*
3 *Bulletin, 130*, 711-747. <https://psycnet.apa.org/doi/10.1037/0033-2909.130.5.711>
- 4 Muthén, L. K. and Muthén, B. O. (1998–2017). *Mplus user's guide* (8th ed.). Los Angeles,
5 CA: Muthén & Muthén.
- 6 Mäkikangas, A., Tolvanen, A., Aunola, K., Feldt, T., Mauno, S., & Kinnunen, U. (2018).
7 Multilevel latent profile analysis with covariates: Identifying job characteristics
8 profiles in hierarchical data as an example. *Organizational Research*
9 *Methods, 21*(4), 931-954. <https://doi.org/10.1177%2F1094428118760690>
- 10 Nylund-Gibson, K., & Choi, A. Y. (2018). Ten frequently asked questions about latent
11 class analysis. *Translational Issues in Psychological Science, 4*(4), 440.
12 <https://psycnet.apa.org/doi/10.1037/tps0000176>
- 13 Parker, P.C., Perry, R.P., Hamm, J.M., Chipperfield, J.G. & Hladkyj, S. (2016). Enhancing
14 the academic success of competitive student athletes using a motivation treatment
15 intervention (Attributional Retraining). *Psychology of Sport and Exercise, 26*, 113-
16 122. <https://doi.org/10.1016/j.psychsport.2016.06.008>
- 17 Rasclé, O., Le Foll, D., Charrier, M., Higgins, N. C., Rees, T., & Coffee, P. (2015).
18 Durability and generalization of attribution-based feedback following failure: Effects
19 on expectations and behavioral persistence. *Psychology of Sport and Exercise, 18*,
20 68-74. <https://doi.org/10.1016/j.psychsport.2015.01.003>
- 21 Rees, T., Ingledew, D. K., & Hardy, L. (2005). Attribution in sport psychology: Seeking
22 congruence between theory, research and practice. *Psychology of Sport and*
23 *Exercise, 6*(2), 189-204. <https://doi.org/10.1016/j.psychsport.2003.10.008>
- 24 Ryba, T. V., Aunola, K., Kalaja, S., Selänne, H., Ronkainen, N. J., & Nurmi, J. E. (2016).
25 A new perspective on adolescent athletes' transition into upper secondary school: A
26 longitudinal mixed methods study protocol. *Cogent Psychology, 3*(1), 1142412.

- 1 <https://doi.org/10.1080/23311908.2016.1142412>
- 2 Ryba, T. V., Ronkainen, N. J., Douglas, K., & Aunola, K. (2021). Implications of the
3 identity position for dual career construction: Gendering the pathways to (Dis)
4 continuation. *Psychology of Sport and Exercise*, 53, 101844.
5 <https://doi.org/10.1016/j.psychsport.2020.101844>
- 6 Rytkönen, K., Aunola, K. & Nurmi, J-E. (2007). Do parents' causal attributions predict the
7 accuracy and bias in their children's self-concept of maths ability? A longitudinal
8 study. *Journal of Educational Psychology*, 27, 771-778.
9 <https://doi.org/10.1080/01443410701309316>
- 10 Seligman, M. E., Abramson, L. Y., Semmel, A., & Von Baeyer, C. (1979). Depressive
11 attributional style. *Journal of Abnormal Psychology*, 88(3), 242.
12 <https://psycnet.apa.org/doi/10.1037/0021-843X.88.3.242>
- 13 Seligman, M. E., Nolen-Hoeksema, S., Thornton, N., & Thornton, K. M. (1990).
14 Explanatory style as a mechanism of disappointing athletic performance.
15 *Psychological Science*, 1, 143–146. [https://doi.org/10.1111%2Fj.1467-](https://doi.org/10.1111%2Fj.1467-9280.1990.tb00084.x)
16 [9280.1990.tb00084.x](https://doi.org/10.1111%2Fj.1467-9280.1990.tb00084.x)
- 17 Stambulova, N. B., & Wylleman, P. (2019). Psychology of athletes' dual careers: A state-
18 of-the-art critical review of the European discourse. *Psychology of Sport and*
19 *Exercise*, 42, 74–88. <https://doi.org/10.1016/j.psychsport.2018.11.013>
- 20 Van Yperen, N. W., Den Hartigh, R. J., Visscher, C., & Elferink-Gemser, M. T. (2021).
21 Student-athletes' need for competence, effort, and attributions of success and failure:
22 Differences between sport and school. *Journal of Applied Sport Psychology*, 1-11.
23 <https://doi.org/10.1080/10413200.2019.1675198>
- 24 Weiner, B. (1985). An attributional theory of achievement motivation and emotion.
25 *Psychological Review*, 92, 548-573.
- 26 Weiner, B. (2018). The legacy of an attribution approach to motivation and emotion: A no-

1 crisis zone. *Motivation Science*, 4(1), 4.

2 <https://psycnet.apa.org/doi/10.1037/mot0000082>

3 Yee, P. L., Pierce, G. R., Ptacek, J. T., & Modzelesky, K. L. (2003). Learned helplessness

4 attributional style and examination performance: Enhancement effects are not

5 necessarily moderated by prior failure. *Anxiety, Stress, and Coping*, 16(4), 359-373.

6 <https://doi.org/10.1080/0003379031000140928>

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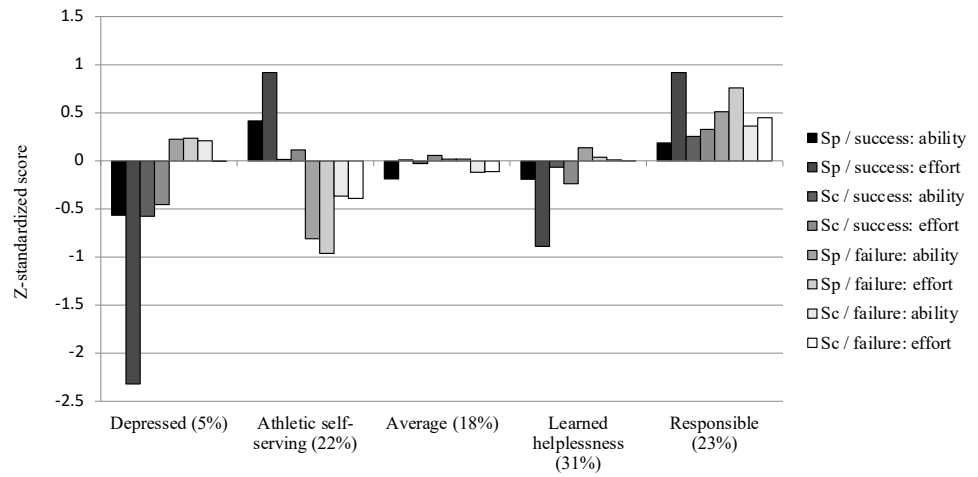
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1 **Figure 1**

2 *Standardized Scores of Criteria Variables in Different Attribution Profiles.*



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4 *Note 1.* N of I-states = 761.

5 *Note 2.* Sp = Sport; Sc = School.

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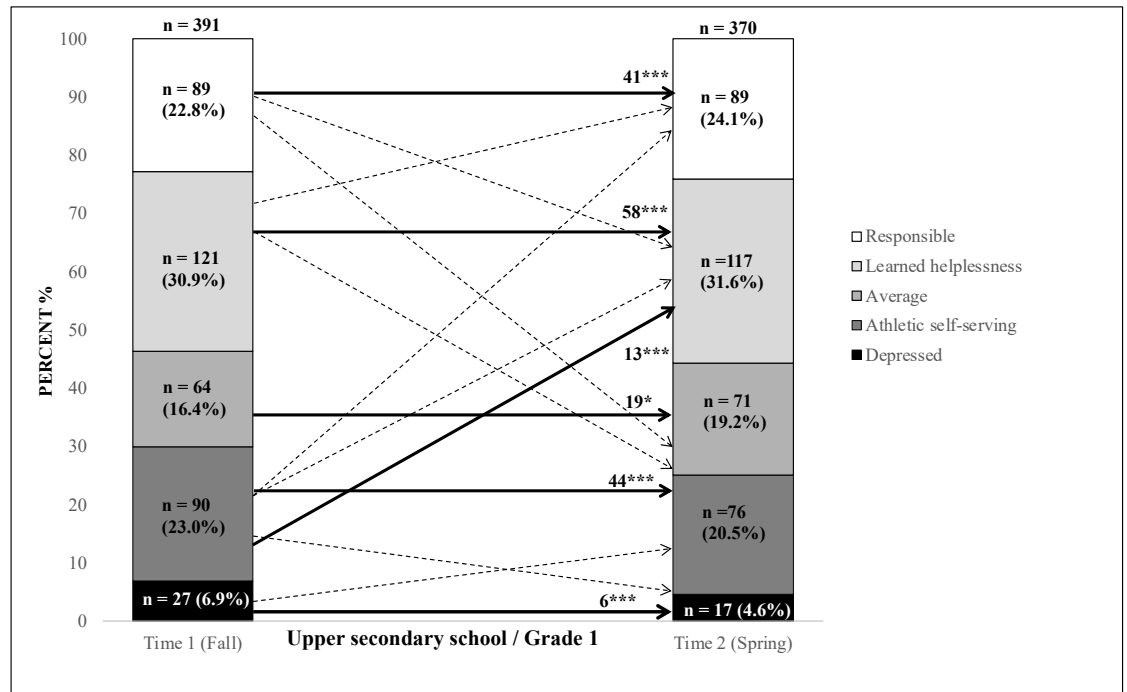
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1 **Figure 2**

2 *Statistically Significant Stabilities and Changes in Attributional Profiles Across Two*

3 *Measurement Points (Frequencies) when Tested with Log Linear Models.*



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5 *Note 1. Straight line for changes that are more likely than expected by chance; dotted lines*

6 *for changes that appear less likely than expected by chance ($p < .05$).*

7 *Note 2. * $p < .05$, *** $p < 0.001$.*

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Table 1

Model Fit Indices and Class Frequencies for Latent Profile Analyses (with different numbers of latent profiles for student-athletes' causal attributions in sport and school (N of I-states = 761).

Number of Groups	BIC	aBIC	AIC	Entropy	p-Value of VLMR	p-Value of LMR
2 (288/473)	16,838.074	16,758.688	16,722.208	0.696	$p < .05$	$p < .05$
3 (292/217/252)	16,679.970	16,572.005	16,522.392	0.801	$p < .05$	$p < .05$
4 (29/279/214/239)	16,484.261	16,347.717	16,284.972	0.851	$p < .05$	$p < .05$
5 (44/166/135/238/178)	15,607.897	15,442.775	15,366.896	0.929	$p < .05$	$p < .05$
6 (44/135/20/23/189/135)	15,600.197	15,406.495	15,317.484	0.930	$p > .05$	$p > .05$

Note. The selected solution is in bold.

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Table 2

Means of Standardized Variables, Standard Deviations (in Parentheses), and Differences between Attribution Profiles for Criterion Variables Tested with ANOVA (N of I-states = 761).

Criterion Variable	Profile 1 Depressive (n = 44)	Profile 2 Athletic self- serving (n = 166)	Profile 3 Average (n = 135)	Profile 4 Learned helplessness (n = 238)	Profile 5 Responsible (n = 178)
<i>Success/ability</i>					
Sport	-0.57 (1.18) ^a	0.41 (0.91) ^b	-0.19 (0.92) ^a	-0.19 (0.77) ^a	0.19 (1.09) ^b
School	-0.58 (0.90) ^a	0.01 (1.11) ^{bc}	0.03 (0.90) ^{bc}	0.07 (0.97) ^c	0.25 (0.93) ^b
<i>Success/effort</i>					
Sport	-2.32 (0.49) ^a	0.92 (0.00) ^b	0.01 (0.00) ^c	-0.89 (0.00) ^d	0.92 (0.00) ^e
School	-0.46 (0.71) ^a	0.11 (1.11) ^b	0.06 (0.89) ^b	-0.24 (0.86) ^a	0.33 (0.91) ^b
<i>Failure/ability</i>					
Sport	0.22(0.87) ^{acd}	-0.81 (0.75) ^b	0.02 (0.98) ^c	0.14 (0.87) ^{ac}	0.51 (0.96) ^d
School	0.21 (0.82) ^{ac}	-0.37 (1.11) ^b	-0.12 (0.94) ^{ab}	0.01 (0.93) ^a	0.36 (0.94) ^c
<i>Failure/effort</i>					
Sport	0.23 (0.60) ^a	-0.96 (0.73) ^b	0.02 (1.04) ^a	0.04 (0.83) ^a	0.76 (0.72) ^c
School	-0.00 (0.72) ^{ab}	-0.39 (1.17) ^a	-0.11 (0.96) ^{ab}	0.00 (0.85) ^b	0.45 (0.93) ^c

Note. Group means with different superscripts showed a statistically significant difference ($p < .05$). Post hoc tests were performed with Tamhane.

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