Please cite as:

Zych, I., Ttofi, M. M., Llorent, V. J., Farrington, D. P., Ribeaud, D., & Eisner, M. P. (2018). A longitudinal study on stability and transitions among bullying roles. *Child Development*. Online First. https://doi.org/10.1111/cdev.13195

A longitudinal study on stability and transitions among bullying roles

Izabela Zych[a], Maria M. Ttofi[b], Vicente J. Llorent[a], David P. Farrington[b], Denis Ribeaud[c] and Manuel P. Eisner[b]

[a]Universidad de Córdoba (Spain), [b]Cambridge University (UK), [c]University of Zurich (Switzerland)

Abstract: Trajectories of stability and change in bullying roles were examined through a longitudinal prospective study 916 school students followed up biannually from age 11 to 17. Perpetrators and victims had relatively stable trajectories with most of the children remaining in the same role over time or becoming uninvolved. Bully/victims was the most unstable role with frequent transitions to perpetrators or victims. Developmental change in bullying roles was found with a decrease in physical forms over time in bullies and victims but with persistently high perpetration and victimization in bully/victims. These findings open new horizons in research and practice related to bullying and can be useful for its early detection or design of targeted interventions.

Acknowledgements: We thank the Swiss National Science Foundation, the Jacobs Foundation, and the Swiss Federal Office of Public Health for financial support for the z-proso study during the period 2009-2015. We are also grateful to the youths, parents and teachers who provided data for the z-proso study. We thank the Spanish Ministry of Education for providing a Jose Castillejo mobility grant to the first and third authors.

School bullying is a type of aggressive behavior in which some students frequently, continuously and intentionally inflict harm on other students who are not able to defend themselves (Smith & Brain, 2000). This behavior is displayed long-term, and there is an imbalance of power between perpetrators and victims. Bullying is not only a dyadic interaction between the victim and the bully but it is rather a complex psychosocial phenomenon with the interplay between different bullying roles. In this field of research, children are usually classified into roles that include perpetrators, victims, bully /victims and bystanders who might ignore the situation, reinforce or support the bully, or help the victim (Salmivalli, 2010).

Evidence suggests that a notable number of children are involved in bullying. For example, a meta-analytic synthesis of eighty different studies conducted around the world (Modecki, Minchin, Harbaugh, Guerra, & Runions, 2014) found that, on average, 35% of adolescents bully their peers while 36% of adolescents are being victimized. This was the overall prevalence without specifying a time period or severity of bullying. Although boys and girls seem to be involved in different types of bullying behavior, gender differences are usually small (Zych, Ortega-Ruiz, & Del Rey, 2015b).

School bullying has received a lot of attention since the 1970s and the number of projects on the topic has increased exponentially (Zych, Ortega-Ruiz, & Del Rey, 2015a). This expansion in research contributed to a better understanding of the detrimental effects of school bullying on the psychosocial development of children both concurrently (Gini & Pozzoli, 2009; Valdebenito, Ttofi, Eisner, & Gaffney, 2017) and longitudinally (Ttofi, Farrington, & Losel, 2012; Ttofi, Farrington, Lösel, & Loeber, 2011). There is also now a better understanding of factors that predict children's involvement in bullying as perpetrators, victims or bully/victims (Cook, Williams, Guerra, Kim, & Sadek, 2010; Zych, Farrington, & Ttofi, 2019).

Despite the vast amount of research in the area of school bullying, there are pressing gaps in the literature that need to be addressed (Zych, Farrington, Llorent, & Ttofi, 2017), especially with regards to longitudinal research on stability and change of bullying behavior. Although most of the studies in the field describe different bullying roles, very little is known about the developmental stability and change in these roles.

New studies should endorse more dynamic experiences of victimization, as young people may enter and escape different bullying roles throughout their school years (Ryoo, Wang, & Swearer, 2015). This is the concern of the current paper. Using prospective longitudinal data across four different waves, spanning from ages 11 to 17, we aim to investigate stability and transitions in bullying roles in just under 1000 students.

Stability and transitions in bullying roles: Existing theoretical and empirical perspectives

Continuity of childhood, adolescent and adult problem behavior is "one of the few 'knowns' in criminology" (Juon, Doherty, & Ensminger, 2006, p. 194) and the same could be said for aggression (Olweus, 1979). This stability could be addressed by various theoretical models, such as the Integrated Cognitive Antisocial Potential (ICAP) theory, which suggests that there is continuity in externalizing problem behavior because the relative ordering of people on the long-term antisocial potential stays fairly consistent over time (Farrington, 2003, p. 235). Research on the stability of aggression shows that

patterns of continuity are common (Piquero, Carriaga, Diamond, Kazemian, & Farrington, 2012).

Nevertheless, while aggression during the school years is strongly related to aggression and violence later in life (Ttofi et al., 2012), the prediction is "far from perfect, both in terms of false-positive errors … and false-negative errors" (Loeber & Hay, 1997, p. 385). It is possible that there might be a stable propensity to commit aggression and/or that this propensity could be changed by life events (Nagin & Paternoser, 1991). Various theories, such as the theoretical model of Sampson and Laub (1995) suggest that there are circumstances that can act as turning points that interrupt the development of violent behavior.

Overall, there is a pressing need to assess continuity and change in aggression between- and within-individuals, across transitioning stages of the life course, as well as over the full life course (Piquero et al., 2012). Previous studies revealed that aggression decreases throughout normative child development and although only some variation in aggression can be predicted by previous aggression, between-individual differences are relatively stable over time (Eisner & Malti, 2015). Within the bullying literature, however, most work is based on cross-sectional data (Zych et al., 2015b), with very few examples of longitudinal research that focused on stability and change in bullying roles.

Stability and change in bullying behavior was studied in the past by describing the relation between bullying and age in cross-sectional studies. In their narrative review, Farrington and Baldry (2010) concluded that victimization seems to decrease with age and that the relation between age and perpetration is not clear. A meta-analysis conducted by Cook, Williams, Guerra, Kim, and Sadek (2010) included 39 studies that described the relation between different bullying roles and age, from early childhood up to age 18. They found that as children got older, there was a higher chance that they would become bullies. No relation was found between victimization and age or between being a bully/victim and age. Although not reported in the article, the vast majority of the included studies were cross-sectional, thus making it impossible to draw any conclusions about the prevalence of children who remain stable in the same bullying role across different years versus the prevalence of children who 'escape' one bullying role and 'enter' a different one.

Many other studies discussed developmental changes in school bullying by looking at between-individuals analyses of cross-sectional data. For example, based on a study of 2,000 Canadian students, Pepler and colleagues (2006) discussed developmental changes in school bullying during school transition. They argued in favor of a higher prevalence of bullying during school transition and then a decrease in school bullying towards the end of high school. However, as in many earlier studies, these 'developmental changes' were discussed as trending upwards or downwards based on comparisons of different age participants in cross-sectional data.

Longitudinal research on stability and change in bullying

Firm conclusions about stability and change in different bullying roles can only be achieved by looking at designs that are based on longitudinal data which follow the same individuals across transitioning stages of the life course. To the best of our knowledge, the number of studies that analyzed stability and change in different bullying roles based on longitudinal data is few and none of them analyzed transitions among bullying roles with several waves of data. Previous studies are summarized in Table 1.

Table 1. Studies that addressed stability and change in bullying

Studies and countries	*Waves and participants*	*Main findings regarding bullying trajectories*
Barker, Arseneault, Brendgen, Fontaine, and Maughan (2008) UK	3,932 adolescents at age 12 followed up annually during five years.	• low/decreasing bullying and low victimization (75%) • low/decreasing bullying and high/decreasing victimization (7%) • low/decreasing bullying and high/increasing victimization (3%) • high/increasing bullying and low victimization (11%) • high/increasing bullying and high/decreasing victimization (3%) • high/increasing bullying and high/increasing victimization (2%)
Crapanzano, Frick, Childs, and Terranova (2001) USA	284 children and adolescents between 9 and 14 years (M_{age} = 11.3, SD=1.82, 54.2% girls), followed up 7 months later (n = 185).	• Time 1 perpetration was related to Time 2 perpetration (r = .53 for the whole sample, r = .61 in boys and r =.44 in girls) • Victimization and bully/victim roles not measured
Cross, Lester, and Barnes, (2015) Australia	1,504 students in year 8, 1,347 at time 2 (about two years later), 1,292 at time 3 (about 1 year later), 53% girls.	• Rates of victimization (higher in males) decreased (more in males) from Time 1 to Time 2 and from Time 2 to Time 3. • Perpetration and bully/victim roles were not measured.
Espelage, Van Ryzin, and Holt (2018) USA	1,565 children, 11 years old (52% boys), followed up during 5 years.	Trajectories of bullying perpetration only: • low (37.8%) • moderate flat (51.3%) • high declining (3.4%) • middle school peak (4.2%) • moderate escalating (3.4%)
Espelage, Bosworth, and Simon (2001) USA	558 students in grades 6, 7 and 8 (46% boys), followed up after 4 months.	• Strong correlation (r =0.65) between Time 1 and Time 2 perpetration • No other bullying roles were analyzed.
Goldbaum, Craig, Pepler, and Connolly (2003) Canada	1,241 children (51% boys) in Grades 5 to 7 followed up six months and one year later	Trajectories of victimization only: • Non-victims (87.8%) • Desisters (6.1%) • Late onset victims (4.5%) • Stable victims (1.6%)
Haltigan and Vaillancourt (2014) Canada	695 students (53% girls) at age 10 followed up annually over 4 years	• low/stable bullying and low declining victimization (73%) • low/stable victimization and moderate/ increasing bullying (11%) • moderate declining victimization and low/stable bullying (10%) • moderate/declining victimization and moderate/increasing bullying (6%)
Kim, Boyce, Koh, and Leventhal (2009) South Korea	1666 students (55.1% boys) in grades seven and eight, followed up 10 months later	• Among children uninvolved at baseline, percentages of involvement 10 months later were: 80.9% still uninvolved, 5.8% victims, 10.4% bullies, 2.8% bully/victims • Among victims at baseline, percentages of involvement 10 months later were: 42.4% uninvolved, 39.9% victims, 7.1% bullies and 10.5% bully/victims • Among perpetrators at baseline, percentages of involvement 10 months later were: 47.7% uninvolved, 3.2% victims, 40.2% perpetrators and 8.9% bully/victims • Among bully/victims at baseline, percentages of involvement at Time 2 were: 25.9% uninvolved, 15% victims, 32.7% bullies and 26.5% bully/victims

Nocentini, Menesini, and Salmivalli (2013) Italy	515 adolescents (46% girls), M_{age} = 14.5 years (SD = .54) at time 1, followed-up one and two years later.	• Significant correlation of Time 1 bullying perpetration with Time 2 (r = .28) and Time 3 (r = .27) bullying perpetration. • Significant correlation between Time 2 and Time 3 bullying perpetration (r = .35) • No other bullying roles were analyzed
Pellegrini and Long (2002) USA	154 early adolescents (M_{age} = 11.9 years, 44% girls), followed up one (n = 138) and two years later (n = 129).	• Perpetration was more frequent in boys than in girls, decreased with time in boys • Victimization was more frequent in boys, decreased from time 1 to time 2, slightly increased at the two year follow-up
Pepler, Jiang, Craig, and Connolly (2008) Canada	871 children (53.5% girls) 10 – 12 years old, followed-up eight times over seven years	• Trajectories of bullying perpetration only: Consistently high perpetration over time (9.9%) Moderate perpetration in adolescence, desisted before finishing high school (13.4%) Consistently moderate perpetration over time (35.1%) Non-perpetrators (41.6%)
Reijntjes et al. (2013) Holland	342 children (M_{age} = 10.4 years, 53% girls) followed up one and two years later	• Constantly low perpetration (82%) • Constantly moderate declining perpetration (11%) • Constantly high declining perpetration (8%). • No other roles were studied
Salmivalli, Lappalainen, and Lagerspetz (1998) Finland	189 adolescents between 14 and 15 years old (50.8% boys), followed-up two years later.	• Correlations between Time 1 and Time 2 peer-reported perpetration: r = 0.52 in boys; r = 0.28 in girls • Correlations between Time 1 and Time 2 self-reported perpetration: r = 0.34 in boys; r = -0.09 (ns) in girls • Correlations between Time 1 and Time 2 peer-reported victimization: r = 0.52 in boys; r = 0.48 in girls
Schäfer, Korn, Brodbeck, Wolke, and Schulz (2005) Germany	283 children in grades 2 and 3 of primary schools (51% boys) followed-up 6 years later.	• Percentages of children in stable or different bullying roles from primary to secondary schools: • Uninvolved in primary schools: 59% uninvolved in secondary, 13% victims in secondary, 20% bullies in secondary, 7% bully/victims in secondary school • Victims in primary schools: 61% uninvolved in secondary, 20% victims in secondary, 13% bullies, 7% bully/victims in secondary school • Bullies in primary schools: 50% uninvolved in secondary, 12% victims in secondary, 32% bullies in secondary, 6% bully/victims in secondary • Bully/victims in primary schools: 63% uninvolved in secondary, 10% victims in secondary, 15% bullies in secondary, 12% bully/victims in secondary schools
Sentse, Kretschmer, and Salmivalli (2015) Finland	A younger cohort of 2018 (all waves) students (M_{age} = 11.2, SD = .91, 50.3% boys) followed-up 6 months later (time 2) and one year later (time 3). An older cohort of 2403 (all waves) students (M_{age} = 14.4, SD = .90, 48.8% boys) followed-up 6 months later (time 2) and one year later (time 3).	Younger cohort: • T (time) 1 perpetration and T2 perpetration: β = .27 for girls, β = .22 for boys; T2 perpetration and T3 perpetration: β = .11 for girls, β = .07 for boys, T1 perpetration and T3 perpetration: β = .45 for girls, β = .29 for boys • T1 victimization and T2 victimization: β = .28 for girls, β = .29 for boys, T2 victimization and T3 victimization: β = .18 for girls, β = .13 for boys, T1 victimization and T3 victimization: β = .43 for girls, β = .34 for boys Older Cohort: • T1 perpetration and T2 perpetration: β = .36 for both genders, T2 perpetration and T3 perpetration: β =.32 for girls, β = .39 for boys, T1 perpetration and T3 perpetration: β = .19 for girls, β = .12 for boys • T1 victimization and T2 victimization: β = .47 for girls, β = .42 for boys; T2 victimization and

		T3 victimization: β = .31 for girls, β = .30 for boys; T1 victimization and T3 victimization: β = .20 for girls, β = .13 for boys
Sourander, Helstelä, Helenius, and Piha (2000) Finland	580 children followed-up from age 8 to age 16 (44.1% girls).	• Perpetrators only at Age 8: 29% of boys and 17% of girls • Victims only at Age 8: 41% of boys and 30% of girls • Perpetrators only at Age 16: 13% of boys and 5% of girls • Victims only at Age 16: 1% of boys and 6% of girls • Perpetration at both follow-ups: 8% of boys and 2% of girls • Victimization at both follow-ups: 12% of boys and 6% of girls. • No perpetration status across both follow-ups: 54% of boys and 76% of girls • No victimization status across both follow-ups: 46% of boys and 58% of girls
Williford et al. (2011) USA	458 children (53% girls) aged M = 10.5 years followed up one and two years later	• Uninvolved students mostly remained uninvolved (65% one year and 53% to years later) • Victims mostly transitioned to victims (48% one year later and 28% two years later) and uninvolved (41% one year later and 47% two years later) • Bullies transitioned mostly to uninvolved and bully/victims one year later. This role existed at age 10.5 but did not exist at ages 11.5 and 12.5. • Bully/victims transitioned almost equally to uninvolved, victim and bully victim one year later and mostly to uninvolved two years later)

Many studies focused on trajectories of bullying within one bullying role. Crapanazo et al. (2001) found that perpetration at one time point was highly related to perpetration seven months later. Espelage et al. (2018) showed that the most common trajectory of perpetration from age 11 to age 16 was low and moderate, relatively stable across time. Espelage et al. (2001) reported a strong correlation between perpetration in grades 6, 7 and 8 and perpetration four months later. Nocentini et al. (2013) found moderate correlations between previous and later perpetration in adolescence with a two year follow up. Pellegrini and Long (2002) reported that perpetration in early adolescence decreased one and two years later whereas victimization decreased one year later and slightly increased afterwards. Pepler et al (2008) described trajectories of perpetration, finding that non-perpetration was the most common trajectory, followed by consistently moderate, and then desistance before finishing high school. Reijntjes et al. (2013) reported that consistently low perpetration was the most common trajectory in early adolescents followed up for two years.

Regarding victimization, Cross et al. (2015) found that victimization rates decreased from age 13 to age 15. Goldbaum et al. (2003) showed that the most common trajectories of victimization in students in grades 5 to 7 followed up during one year were non-victims and desisters. Stense et al. (2015) reported moderate to weak correlations between previous and later victimization and previous and later perpetration (studied separately) for early and late adolescents followed up for one year. Also, Salmivalli et al. (1998) showed that previous perpetration in adolescents was related to perpetration two years later and that previous victimization was also related to victimization two years later. Sourander et al. (2000) followed up students from age 8 to 16, finding that most of them were uninvolved at both follow ups, and that perpetration or victimization (studied as two separate trajectories) only at one point were more common than perpetration or

victimization at both follow ups. The current study adds to this literature by studying stability and change in different bullying roles (i.e., victims, perpetrators, bully/victims and uninvolved) in the same analysis. This makes it possible to study bullying from a complex and dynamic perspective and to discover what happens to students who do not remain in the same bullying role.

Some studies focused on increasing and decreasing intensity of different bullying behaviors but without describing transitions among bullying roles. Barker et al. (2008) found that the most common trajectory was low decreasing perpetration and low victimization followed by high increasing bullying and low victimization, and low decreasing bullying and high decreasing victimization. Similarly, Haltigan and Villancourt (2014) reported that the most common trajectory was low stable perpetration and low declining victimization, followed by low stable victimization and moderate increasing bullying, and moderate declining victimization and low stable bullying. The current study adds to this literature by defining the roles, transitions among these roles across time, and prevalence rates from age 11 to age 17.

Kim et al. (2009) studied transitions among bullying roles for students in grades 7 and 8 followed up 10 months later. Uninvolved students mostly remained uninvolved, victims transitioned to uninvolved or remained victims, perpetrators transitioned mostly to uninvolved or remained perpetrators, and bully/victims transitioned to different roles. Williford et al. (2011) studied transitions in bullying roles from age 10.5 to age 12.5. They found that uninvolved students mostly remained uninvolved, victims mostly remained victims or transitioned to uninvolved, pure bullies existed only at age 10.5 and then transitioned to other roles at age 11.5 and 12.5, and bully/victims transitioned to different bullying roles at age 11.5 and mostly to uninvolved at age 12.5. Schafer et al. (2005) studied transitions among bullying roles from primary school (grades 2 and 3) to secondary school (6 years later), finding that uninvolved students mostly remained uninvolved, victims mostly transitioned to uninvolved, perpetrators mostly transitioned to uninvolved or remained perpetrators, and bully/victims mostly transitioned to uninvolved. These studies shed light on stability and change in bullying roles but they only include a one-year (Kim et al., 2009), or a two-year follow up (Williford et al., 2011), or a six-year follow up but only with two measurement points (Schafer et al., 2005). The current study adds to this literature by studying stability and change in bullying roles from a developmental perspective with four measurement points and a six-year follow up. To our knowledge, this is the first study that focuses on stability and change in bullying throughout adolescence, from very early adolescence (age 11) to late adolescence (age 17).

To sum up, there were some studies that addressed stability and change in bullying roles, but they all come with various limitations. With the exception of five studies (Barker et al., 2008; Haltigan & Vaillancourt, 2014; Kim et al., 2008; Williford et al., 2011; Schäfer et al., 2005), they focused on stability within the same bullying role (e.g., stability in victimization), without describing change across different roles (e.g., from victims to bullies). Follow-ups over more than one to two years were present only in seven studies (Barker et al., 2008; Cross et al., 2015; Espelage et al., 2018; Haltigan & Vaillancourt, 2014; Pepler et al., 2008; Schäfer et al., 2005; Sourander et al., 2000). Although different studies point out that bully/victims could be the most affected group of children among the bullying roles (Zych et al., 2015b), they were only analyzed by Barker et al. (2008), Kim et al. (2008), Haltigan and Vaillancourt (2014), Williford et al. (2011) and Schäfer et al. (2005) and not included in the rest of the studies shown in Table

1. Thus, although previous studies shed some light on the topic, to the best of our knowledge, stability and transitions among different bullying roles have not yet been studied longitudinally with several waves and across adolescence. In the current study, using four waves of data and participants followed-up from age 11 to age 17, we aim to address limitations arising from earlier research.

The current study also aims to overcome some difficulties related to the way in which students were assigned to bullying roles in previous research. The percentages of children in different bullying roles vary greatly among different studies, and this is usually attributed to the difficulties in measuring bullying (Vivolo-Kantor, Martell, Holland, & Westby, 2014). If bullying is measured with a single item, the reliability of the measure is low. A rating scale can increase the reliability if scores of the individual items are summed up or averaged, decreasing possible errors (Spector, 2013). Nevertheless, this is not usually done in the case of bullying where roles are usually established based on only one item (e.g., if a participant answers "once a month" to any item about victimization and "never" to all the items on perpetration, he or she is considered a pure victim). This classification might increase error and decrease reliability even further than single item measures (an error on any item would lead to an erroneous classification; see Zych, Ortega-Ruiz, & Marín-López, 2016, for further discussion of this topic). Thus, instead of the traditionally used theory-based classifications of participants into bullying roles, this study used a latent transition analysis that allows the classification of participants based on their actual response patterns that arise from all the items on a scale.

Based on previous studies, it is hypothesized that bullying roles such as victims, perpetrators and uninvolved are relatively stable, whereas bully/victims are relatively unstable, and that all these roles exist across the adolescent years. It is possible that the role of pure bullies is not fully defined in early adolescence. Even though some bullying roles are expected to be relatively stable, transitions among these roles are also expected to be found. Regarding prevalence, most children are expected to be uninvolved, whereas victims and perpetrators are expected to be more prevalent than bully/victims. Involvement in bullying is expected to be more prevalent in boys than in girls, and physical bullying is expected to decrease throughout adolescence.

Method

Participants

Participants were selected through a cluster stratified randomized sampling from primary schools in Zurich. A sample of 56 schools was randomly selected from 90 public schools in the city. Stratification was performed taking into account school sizes and socioeconomic background. Data on bullying perpetration and victimization were collected in normative urban sample of 1,144 children in Switzerland at Time 1 and on three later occasions. Participants´ ages were: Time 1 M = 11.33, SD = .37; Time 2 M = 13.67, SD = .36; Time 3 M = 15.44, SD = .36 and Time 4 M = 17.44, SD = .37. After eliminating participants with missing data (see data analysis section for details), 916 participants were analyzed (50.0% boys).

The 916 analyzed participants came from culturally and ethnically diverse backgrounds. The participants' parents were born in over 80 different countries; the most common were Switzerland (41.2%), former Yugoslavia (13.4%), Sri Lanka (5.7%), Germany (5.3%), Portugal (4.7%) and Turkey (4.3%); 27.4% of the participants had both parents born in Switzerland, 44.1% had both parents born abroad, and 28.5% had one

parent born in Switzerland, and the other born abroad. As to the birth country of the participants, 89.5% were born in Switzerland. Religious denominations were also diverse, with 25.2% Roman Catholics, 24.2% of Protestants, 16.6% of Muslims, 7.3% Christian Orthodox, 4.9% Hindi, 1.4% of other denominations. 20.4% of the participant had no religious denomination. There was also diversity regarding parental educational level, expressed as the highest level attained by either parent; 24.0% achieved basic vocational training (max. 2 years) at best, 26.6% achieved a comprehensive vocational training (3-4 years), 24.7% had a baccalaureate degree or advanced vocational diploma, and 24.8% had a university degree.

Instruments

- Bullying victimization:. There were written instructions that stated that young people can be purposely cruel or mean against each other in different contexts and places, and participants were asked if they had been bullied by other adolescents (for example, at school, on the way to school, when being out, at home, or on the internet). The German word "plagen" used in the definition implies an imbalance of power. In all waves, participants answered to four items (1. purposely ignored you or excluded you from something?; 2. laughed at you, mocked you, or insulted you?; 3. hit you, bitten you, kicked you, or pulled your hair?; 4. purposely stolen, broken, or hidden your things?). The 6-point Likert scale ranged from 1 (never) to 6 (almost every day) and the time period referred to the last year. The instrument was based on two German language scales aimed at measuring bullying victimization and perpetration in childhood (Alsaker, 2012) and in adolescence (Eisner, Manzoni, & Ribeaud, 2000). Both are conceptually based the Olweus Bully/Victim questionnaire (Olweus, 1996). This scale showed good reliability according to Cronbach´s alpha (wave 1 $\alpha = .72$; wave 2 $\alpha = .77$; wave 3 $\alpha = .70$; wave 4 $\alpha = .69$).
- Bullying perpetration: Written instructions were provided as described above and students were asked if they had bullied other adolescents (for example, at school, on the way to school, when being out, at home, or on the internet) answering to four items: 1. purposely ignored or excluded another youth; 2. laughed at, mocked, or insulted another youth; 3 hit, bitten or kicked another youth, or pulled their hair; 4. purposely stolen, broken or hidden another youth's things?. The response 6-point Likert scale ranged from 1 (never) to 6 (almost every day). The time period referred to the last year. This scale showed adequate reliability with good Cronbach´s alpha (wave 1 $\alpha = .75$; wave 2 $\alpha = .78$; wave 3 $\alpha = .75$; wave 4 $\alpha = .68$).

Procedure

This study is a part of the z-proso study. z-proso is a prospective longitudinal cohort study in which data were collected at several different time points. Data on bullying were first collected in 2009 when the participants were 11 years old and follow-ups were conducted every two years up to age 17 in 2015. Details on the project can be found at www.z-proso.uzh.chand (Ribeaud & Eisner, 2010). The study language is German.

Written informed consent at age 11 was obtained from the parents. From age 13 onwards written informed consent was obtained also from the youths and the parents were given the opportunity to opt out. At age 11 the surveys were carried out during regular

school lessons. From age 13 on the surveys were carried out during the participants' leisure time. Participants were supervised by one to three study collaborators.

The surveys were carried out in groups of 5-25 individuals in classrooms or university lecture rooms through a paper-and-pencil questionnaire and its duration was approximately 90 minutes. The study was conducted according to national and international ethical standards and was approved by the regional ethics committee.

Data analysis

Items were dichotomized and answers such as "never" and "1-2 times a year" were considered as non-bullying (as suggested also by Solberg & Olweus, 2003) whereas "3-10 times a year", "monthly", "weekly" and "daily" were considered as bullying. Cases known at all 4 waves with data on at least 3 of the 4 items were analyzed. Missing data were imputed when only one item had missing data – if a participant answered "yes" to two or three (out of three) completed items, "yes" was imputed in the fourth item (and vice versa for "no"). Participants with missing data on 2 or more of the 4 items at any wave were eliminated. Out of 1,144 participants, 916 were kept and 28 of these had data imputed.

Stability and change in bullying roles were studied through Latent Transition Analysis with SAS 9.4 software Proc LCA and LTA macros. This analysis is particularly useful to describe complex behaviors such as bullying, making it possible to identify qualitatively different groups of people based on their response patterns to different items that describe behaviors. Thus, instead of classifying participants to different bullying roles based on a theoretical basis (e.g., classifying a participant who responded at least "once a month" to any item that describes aggression and "never" to all the items that describe victimization as a bully), bullying roles were established based on the actual response patterns of the participants.

In the first step, LTA shows the number of groups (called latent statuses) present in a given dataset. This is done by testing different models with different numbers of possible groups and checking which model shows the best fit to the data. Following suggestions by Collins and Lanza (2010), a model with two groups was initially tested and then the number of groups (statuses) was increased in the consecutive models until the models were no longer identified or would not converge. The MAD $\leq$ .000001 convergence criterion was used (Collins & Lanza, 2010). To check if each model was identified, 100 random starting values were used and the percentage of seeds (numbers used to start a generator of pseudorandom numbers) that would converge to the same solution was calculated. Only models that converged and were identified (at least 50% of the seeds converged to the same solution) were further analyzed.

A combination of different statistics was used to check how many statuses (bullying roles) were found in the data. As recommended by Lanza, Bray, and Collins (2013), when degrees of freedom are high (> 99), the best model (i.e., with the most adequate number of groups) was assessed with a combination of indices and criteria such as G^2, AIC, BIC, log-likelihood, the theoretical basis and the lowest number of classes with adequate fit. The distribution of G^2 is similar to the chi-square distribution and its significance can be checked in a chi-square table considering also its degrees of freedom. A non-significant G^2 indicates the best model but when the number of parameters estimated is high (df > 99) this would often be biased. In those cases, the best model is usually chosen based on the lowest AIC, BIC and log-likelihood.

Once the LTA analysis showed the number of groups present in the current dataset, these groups were examined to give them an appropriate label. The results of the LTA analysis showed behavioral patterns in each identified group (i.e., bullying role) based on a probability of giving an affirmative answer to each item and each time point. Labels were given based on these probabilities. Thus, a group in which participants had high probabilities of displaying aggressive behaviors and low probabilities of suffering different types of victimization were labeled "bullies" (and vice versa for victims). A group with a high probability of both aggressive behaviors and victimization were labeled "bully/victims". A group with a low probability of both aggressive behaviors and victimization were labeled "uninvolved". This was done in each time point. LTA analysis also showed the prevalence in each bullying role and time point.

It should be noted that these groups are slightly different from the traditionally used artificial groups formed in earlier research. Artificial groups are pure in a way that, for example, researchers usually consider that victims are children who are never aggressive, bullies are never victimized and uninvolved children are never victimized or aggressive. LTA classifies participants to roles based on their actual response patterns according to which victims are mostly victimized and have a low probability of aggression, bullies are mostly aggressive and have a low probability of victimization and children who are not involved in bullying are sometimes have a low probability of being victimized or being aggressive.

LTA also makes it possible to examine the percentages of participants who stay in the same bullying role or transition to a different bullying role between time points (from time 1 to time 2, from time 2 to time 3 and from time 3 to time 4). Thus, LTA is particularly useful to analyze longitudinal data. Nevertheless, one limitation of this analysis is that percentages are calculated between two time points and it does not show participants´ trajectories throughout all the time points (e.g., how many children who are victims at time 1 are victims, bullies or bully/victims throughout times 2, 3 and 4; how many children who are uninvolved at time 1 remain uninvolved at times 2, 3 and 4, etc.).

To overcome this limitation and to describe the most common bullying trajectories, further analyses were conducted. After grouping subjects in bullying roles at each time point through LTA, all the combinations of roles were recoded in a way that a unique code was given to every possible trajectory throughout all the waves (e.g., 1 = uninvolved at time 1, time 2, time 3 and time 4; 2 = uninvolved at time 1, time 2 and 3 but victimized at time 4; 3 = uninvolved at time 1, time 2, time 3 but bully at time 4, etc.). Taking into account that there were four bullying roles and four time points, there were 256 possible trajectories (4*4*4*4). Only trajectories with a prevalence ≥ 5% were reported. Also the percentages of children in each bullying role at the age 11 who were not involved in any bullying role afterwards, who were involved in any bullying role once more (e.g., at age 13), two more times (e.g., at age 13 and 15) or three more times (at age 13, 15, and 17) were calculated.

Measurement invariance was tested across times and gender. Measurement invariance across times was tested by comparing LTA models with and without restricting the item-response probabilities across times (Difference $G^2 = G^2_{\text{(constrained time)}} - G^2_{\text{(free time)}}$; difference $df = df_{\text{(constrained time)}} - df_{\text{(free time)}}$). Probability (*p*) was calculated with G^2 (equivalent to chi-square) and degrees of freedom (chi-square tables). A significant *p* according to the chi-square tables indicates that measurement invariance should not be assumed (although when the number of df is > 99, G^2 is not considered to be the most adequate statistic to select the best model and other indices such as BIC or AIC are preferred, see Collins & Lanza, 2010).

Measurement invariance across gender was also tested using difference G^2, difference *df*, AIC and BIC (with the same criteria as those described above). If there is measurement invariance across gender, items contribute equally to a group membership in both genders (although prevalence might be different across genders). That is, behaviors are (or are not) valid indicators of a bullying role in both genders. If measurement invariance is not assumed across times or gender, indicators of the bullying roles change throughout time or across gender (e.g., bullies might have high probability of displaying physical aggression at age 11 and low probability to display physical aggression at age 17).

Results

Number of different bullying roles

To discover the number of groups present in the dataset, models with 2, 3, 4 and 5 latent statuses (bullying roles) were tested with 100 sets of random starting values each. Table 2 shows that the ML solution for 5 statuses could not be identified (less than 5% of seeds converged to the same solution) and, therefore, only identified models with 2, 3 and 4 statuses were compared. Given that models with 5 or more statuses were not identified, no more models with higher numbers of statuses were tested.

Table 2. Model fit statistics used to select the number of latent statuses (bullying roles) in the Latent Transition Analysis model (4 time points, N = 916).

N statuses	% seeds	LL	G^2	AIC	BIC	Df
2	99	-9926.38	9602.04	9744.04	10086.26	4294967224
3	30	-9664.38	9078.04	9310.04	9869.16	4294967179
4	50	-9447.54	8644.35	8978.35	9783.29	4294967128
5	Less than 5% - model unidentified					

Note: % of seeds calculated with 100 random starting values. All the parameters were freely estimated.

Table 2 shows different indices that are useful to compare models with 2, 3 and 4 different bullying roles. The model with 4 statuses was identified (50% of the starting values converged to the same solution) and had the lowest values in all the fit indices (log-likelihood, G^2/df, AIC and BIC). Thus, the model with four bullying roles showed the best fit.

Next, it was tested whether different bullying roles were defined with the same indicators across time (e.g., if the high probability of being physically aggressive characterizes bullies at age 11 equally well as at age 17). The G^2 difference test between free and time constrained models was significant (Difference G^2 = 9009.54 - 8644.35 = 365.19; difference *df* = 4294967224 - 4294967128 = 96, $p < .01$). Thus, invariance across time was not assumed, meaning that there was a significant developmental change not only in the prevalence but also in the behaviors that characterize each bullying role.

Finally, we tested whether different bullying roles could be described in the same way for males and females. Invariance across gender was tested with the G^2 difference

between free and group (gender) constrained models. It was found that this difference was significant (Difference $G^2 = 9346.14 – 9044.30 = 301.84$; difference $df = 8589934385 - 8589934257 = 128$, $p < .01$). When the number of df is > 99, G^2 is not considered to be the most adequate statistic to select the best model. Thus, AIC and BIC were also examined. It was found that AIC showed a better fit of the free (AIC = 9712.30) versus gender constrained model (AIC = 9758.14). On the other hand, BIC showed a worse fit of the free (BIC = 11322.18) versus gender constrained model (BIC = 10751.06). Given that the AIC difference is rather small and BIC indicates that the model with measurement invariance across gender is more parsimonious, invariance across gender was assumed. According to Collins and Lanza (2010) it is strongly recommended to assume gender invariance whenever it is defensible based on the fit indices. If bullying roles are assumed to be defined in the same way across genders, it is possible to compare boys and girls regarding the prevalence in these roles.

Bullying roles at age 11, 13, 15 and 17

After a careful examination of the probabilities of dichotomized "yes" answers to all the items regarding perpetration and victimization (see Table 3), labels were assigned to the bullying roles identified according to the response patterns in the data. These labels were: uninvolved, victims, bullies, and bully/victims. At age 11, the group of perpetrators was labeled "incipient bullies" given that their response pattern at this age did not show a clear tendency to have a high probability of displaying aggressive behaviors (detailed description and analyses are provided later).

Prevalence rates of involvement in different bullying roles for the whole sample and separately for males and females are shown in Figure 1. The percentage of children involved in bullying decreased from ages 13 to 17. For the whole sample, a clear drop was observed in the case of bully/victims with more than 10% at age 11 and 1.5% at age 17. Perpetration decreased from age 11 to 13 but increased again at age 15. Victimization, on the other hand, increased from age 11 to 13 and then was relatively stable.

Regarding differences between girls and boys, figure 1 shows that perpetration rates were higher in boys and increased with age (from around 20% to around 30%), whereas perpetration rates in girls were lower and decreased with age (from around 14% to around 7%). Being a bully/victim was more prevalent in boys than in girls and decreased with age in both genders (from around 20% to around 3% in boys and from around 3% to around 0.5% in girls). Victimization rates were relatively stable across age, and were higher in girls (around 20%) than boys (around 15%).

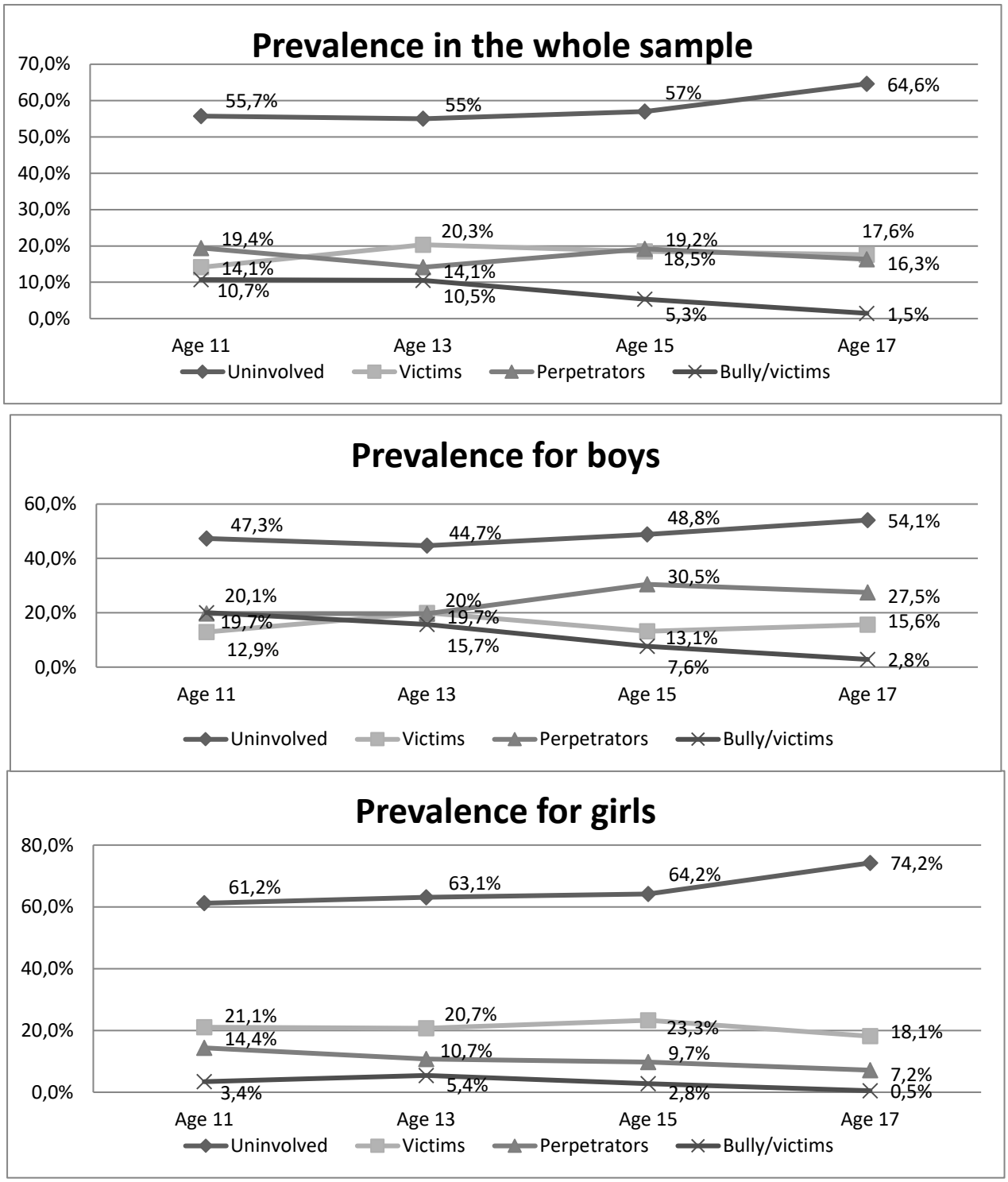

Figure 1. Percentages of children (whole sample, girls and boys) involved in different bullying roles at ages 11, 13, 15 and 17

Lack of invariance across time showed that there was a developmental change in the nature of bullying. That is, there was a developmental change in bullying and some

indicators defined certain bullying roles in certain time points but not across all the time points. Table 3 shows probabilities of affirmative answers to each item in each time point and bullying role.

Table 3. Probabilities of affirmative answers to different bullying behaviors at age 11, 13, 15 and 17 in uninvolved, victims, bullies and bully/victims

	Uninvolved (%)				*Victims (%)*				*Perpetrators (%)*				*Bully/Victims (%)*			
Age	11	13	15	17	11	13	15	17	11	13	15	17	11	13	15	17
Was ignored	1.4	3.1	2.4	2.3	55.3	36.6	53.3	57.4	10.1	3.3	9.4	0	64.4	40.5	52.9	26.1
Was insulted	3.2	1.7	4.3	2.4	79.5	70.6	70.3	71	25.4	8.1	22.7	17.4	72	83.8	100	100
Was physically attacked	0	0.8	2.1	0	20.1	12.5	4.4	1.4	33.6	9.6	7.3	5.4	58.2	68	50.8	65.1
Had destroyed things	2.7	1.7	4.2	1.4	24.3	27.7	22.8	13.6	16.2	5.7	14.9	3.1	43.5	65	75	84.1
Ignored others	10	4.3	5.7	2.1	13.9	19.9	35.3	38.3	7.8	55.2	63.1	42.2	60.3	51	56.3	41.2
Insulted others	0	2.9	6.4	0	25.3	30.5	41.8	45	23.6	77.5	86.4	74.3	76.5	85.5	93.9	100
Physically attacked others	0.6	2.5	2.9	0.8	0.6	1.4	0.8	0	26.7	34.5	23.7	13.9	57.6	62.7	44.3	65.4
Destroyed others´ belongings	0	1.3	1.1	0	0	0	1	5	9.5	30	26.8	15.6	33.7	43.4	57.2	66.5

Table 3 shows roles that refer to groups but without showing within-individuals trajectories that are analyzed later. The group of children who had a low probability (≤ 10%) of suffering from or perpetrating any of the bullying behaviors across time was labeled uninvolved. Victims were frequently insulted or ignored across all the time points. In victims, being physically attacked decreased a lot across time (from 20% at age 11 to 1.4% at age 17). With time, victims had a higher probability of ignoring and insulting others (but they were always labeled as victims because their probabilities of experiencing bullying were always much higher than their probability of displaying aggressive behaviors).

At age 11, none of the groups showed a clear pattern of aggressive behavior that could be labeled bullying perpetration. Nevertheless, there was a group who experienced and perpetrated most of the bullying behaviors with probabilities between 7.8% and 33.6%. They had a relatively low probability (compared to other groups labeled as victims and bully/victims) of being ignored or insulted (behaviors suffered by victims with high probability across all the time points) but their probability of being physically attacked was higher than for the group labeled as victims at age 11. Their probability of physically attacking others and destroying belongings of others at age 11 was also much higher than for the groups labeled as victims and uninvolved at age 11. Thus, this group was labeled as incipient perpetrators. A group that could clearly be labeled as perpetrators appeared at age 13. Their probability of insulting others was high (> 70%) across time, and ignoring others slightly increased from age 13 to 15 and then decreased at age 17. There was a steady decrease in physically attacking others (34.5% at age 13 to 13.9% at age 17). Destroying other´s belongings also decreased at age 17 (26.8% at age 15 to 15.6% at age 17).

Bully/victims had high probabilities of receiving and perpetrating most of the bullying behaviors. The probabilities of most of these behaviors increased (or were relatively stable) across time. One exception was being ignored, which decreased over

time (65.4% at age 11 to 26.1% at age 17). Fluctuations were also present in ignoring others (60.3% at age 11, 51% at age 13, 56.3% at age 15 and 41.2% at age 17).

Transitions among different bullying roles

Figure 2 shows transitions among different bullying roles across time. The vast majority (> 70%) of the uninvolved children remained in the uninvolved group across all transitions. Some of them transitioned to bullies (< 10% per transition) or victims (15% from 11 to 13 years and less than 6% thereafter) and very rarely to bully/victims (< 3.5% per transition).

The majority of victims remained victims (between 55% and 63% per transition), and a high percentage also transitioned to uninvolved (between 28% and 37% per transition). Victims rarely transitioned to bully/victims (less than 10% per transition) and almost never to bullies (0% from 11 to 13 years, 3.9% from 13 to 15 years and 0% from 13 to 15 years).

The group labeled as incipient bullies (at age 11) mostly transitioned to uninvolved (44.4%) or bullies (40.8%). Bullies at age 13 remained bullies (70.7%) or transitioned to uninvolved (27.1%) at age 15, and bullies at age 15 remained bullies (54.2%) or transitioned to uninvolved (40.6%) at age 17. Bullies very rarely transitioned to bully/victims (incipient bullies from 11 to 13 years – 10.2%, bullies from 13 to 15 – 0 % and from 15 to 17 – 1.8%), and almost never transitioned to victims (less than 5% at either transition).

Bully/victims were the group that transitioned the most frequently, but mostly remained involved in bullying. The prevalence rates of being a bully/victim decreased a lot across time after age 13. From 11 to 13, about half continued to be bully/victims and less than 20% transitioned to uninvolved. From age 13 to 15, only 10% of bully/victims transitioned to uninvolved and the rest were distributed almost equally among other bullying roles. From age 15 to 17, most of the bully/victims transitioned to victims (60.7%) and to uninvolved (26%).

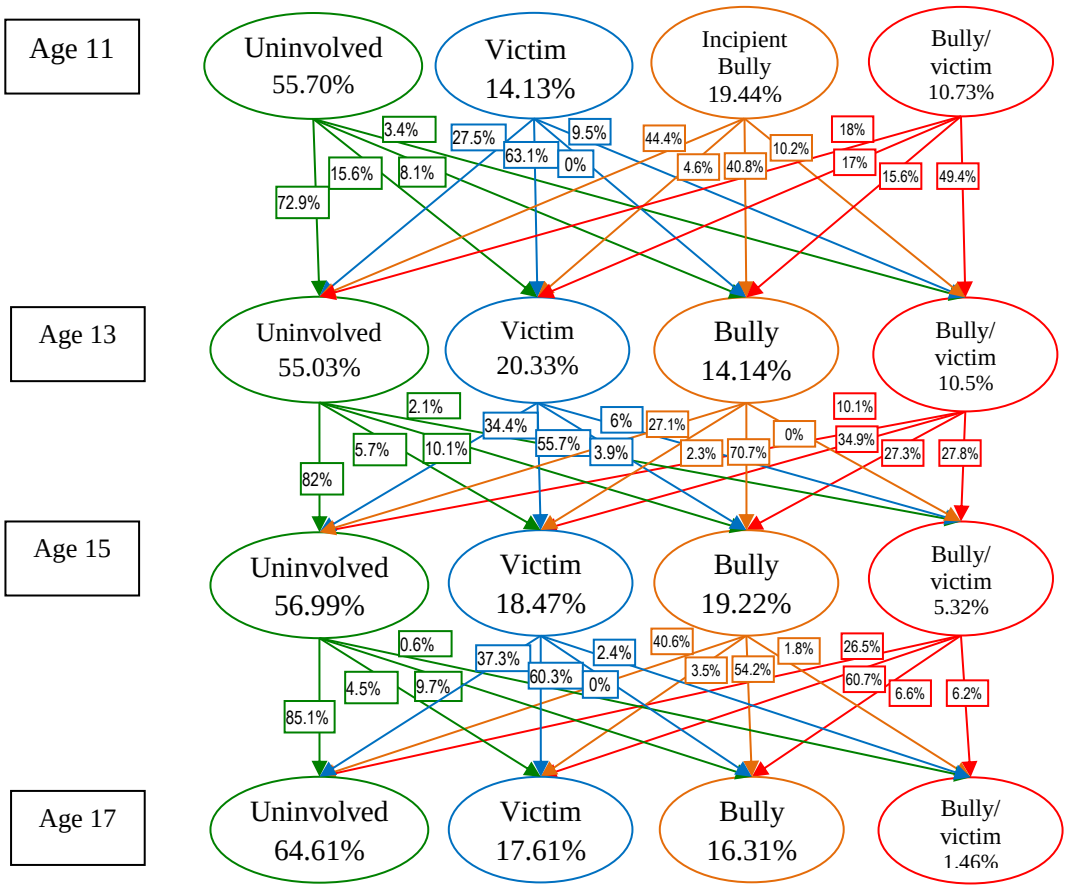

Figure 2. Transitions among different bullying roles from age 11 to 13, 13 to 15 and 15 to 17.

The most common bullying trajectories

The previous section reported transitions among different bullying roles between two adjacent time points (i.e., from age 11 to 13, from age 13 to 15, and from age 15 to 17). This section reports trajectories of children classified to different bullying roles at age 11 across all the time points (e.g., it reports what happened with children who were victims at age 11, taking into account all their statuses at ages 13, 15, and 17).

Among all the participants of this study, 34.5% were never involved in any bullying role (at any time point), 19.2% were involved in a bullying role (i.e., victim, perpetrator or bully/victim) at one time point, 16.1% were involved in a bullying role (i.e., victim, perpetrator or bully/victim) at two time points, 15.7% were involved in a bullying role (i.e., victim, perpetrator or bully/victim) at three time points and 14.5% were involved in a bullying role (i.e., victim, perpetrator or bully/victim) at four time points. Figure 3 shows the percentages of participants in each bullying role at age 11 according to whether thereafter they were never, once, twice, or three times involved in a bullying role.

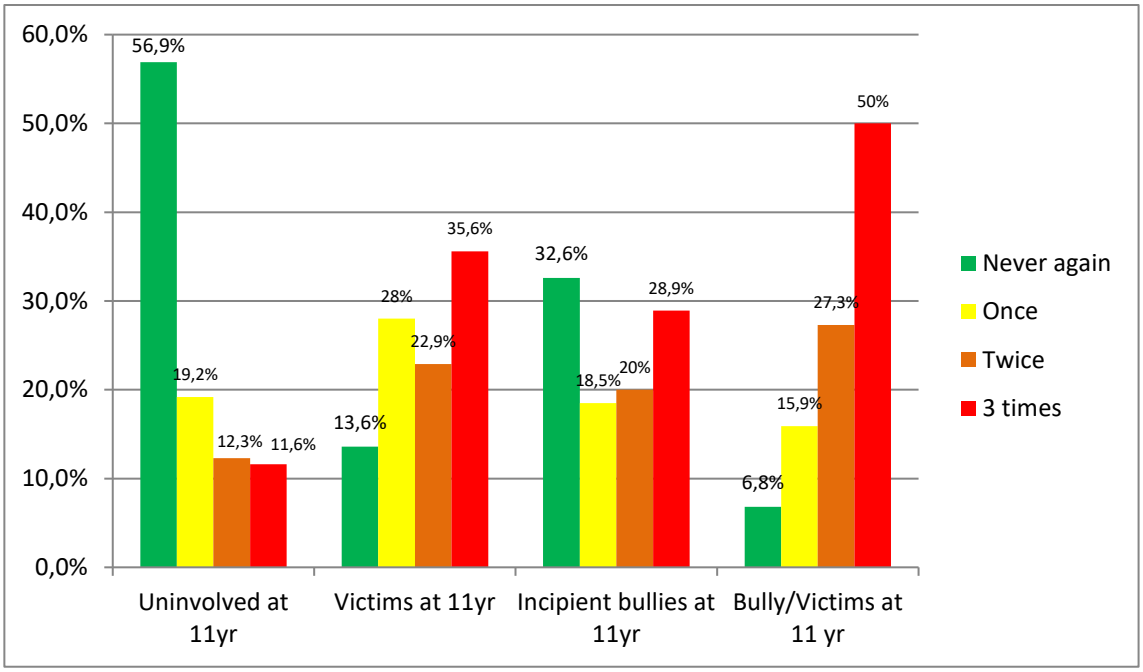

Figure 3. Percentages of participants in each bullying role at the age 11 who were not involved in bullying later, who were involved once, twice and three more times.

Figure 3 shows that most of the children who were not involved in bullying at age 11 remained uninvolved across all the time points (56.9%) and only 11.6% were involved three times. Among victims at age 11, many were persistently involved (35.6% across all time points) and only 13.6% were never involved again. Among incipient bullies at age 11, about one third became entirely uninvolved and about one third became chronically involved across all time points. Bully/victims at age 11 were the most chronically involved group, with only 6.8% of children who were not involved again and 50% who were involved across all the time points.

Analyses of the most prevalent trajectories (> 5%) taking into account all the time points in the same analysis, showed that, among the children who were uninvolved at age 11, 56.9% were never involved, 5.3% become victims from age 13 to age 17 and 5% were uninvolved up to age 15 and become bullies at age 17. Among victims at age 11, almost one third were always victims (27.1%), 13.6% changed to uninvolved from age 13 to age 17, 18.6% were victims up to age 13 and then become uninvolved and 11.9% were victims up to age 15 and were uninvolved at age 17. Similar trajectories were found in incipient bullies at age 11, of whom 18.5% were always bullies, 32.6% were uninvolved from age 13 to age 17, 7.4% were bullies at age 13 and then became uninvolved, and 12.6% were bullies up to age 15 and became uninvolved at age 17. Transitions between bullies and victims were very rare (less than 5%). Bully/victims were the most unstable role and their most common trajectories (from age 11 to 17) were: 6.8% uninvolved from age 13 to 17, 6.8% bullies from age 13 to 17, 12.5% bully/victims also at age 13 and victims at age 15 and 17, 11.4% bully/victims up to age 15 and victims at age 17 and 6.8% bully/victims up to age 13 and bullies at age 15 and 17. It was uncommon for children classified as bully/victim at age 11 to end up as a bully/victim at age 17 (less than 5%).

Discussion

The current study described bullying roles and developmental trajectories based on repeated long term measurement from age 11 to age 17. Bullying roles and transitions among these roles were discovered and analyzed with a novel methodology using latent transition analysis. Therefore, children were classified into bullying roles according to the actual response patterns of the participants instead of traditionally used theoretical criteria, overcoming some of the methodological problems related to these theoretically based bullying roles (see Zych et al., 2016). Our results showed that the actual bullying roles are not as pure as the roles established theoretically. That is, students can be classified to roles such as victims, bullies, bully/victims and uninvolved, as is usually done on theoretical basis (see Salmivalli, 2010). However, based on the actual response patterns, this study found that children who tend to be victimized sometimes show some aggressive behaviors, that children who tend to bully others are sometimes victimized, and that children who are not involved in bullying can sometimes display or suffer some forms of aggressive behaviors. These findings suggest that researchers and practitioners should consider behavioral patterns rather than separate behaviors when approaching bullying.

Developmental change in bullying

This study showed that there was a developmental change not only in the rates but also in the nature of bullying. There was a group of victims across all ages. On the one hand, victims reported relatively stable rates of being excluded or ignored, and being insulted or called names or being laughed at. On the other hand, physical victimization decreased with age. With age, victims started to show higher probabilities of insulting and excluding others. Previous research showed that aggressive behavior decreases throughout development (Eisner & Malti, 2015). It is possible that the findings of this study regarding victimization can be attributed to the fact that physical aggression becomes less acceptable with age, but subtle aggression persists in adolescence. It is also possible that, with time, victims start to respond to aggressive behaviors by excluding and sometimes even insulting the perpetrators.

In the current study, there was no clearly defined group of bullies at age 11, although there was a group who showed some aggressive behaviors, that we labeled incipient bullies. This is consistent with the findings reported by Smith, Cowie, Olafsson, and Liefooghe (2002), who compared children at age 8 and 14 and concluded that the younger group had no clear notion of bullying whereas the older group understood and was able to describe bullying. This is also consistent with Williford et al. (2011) who found that no pure bully role was present when children were around 12 years old. In perpetrators, high rates of ignoring or insulting others appeared at age 13 and then stayed high. Physical aggression decreased at age 17. This pattern of a decrease in physical bullying found in the current study in both bullies and victims is consistent with previous findings (e.g., Rivers & Smith, 1994). In bully/victims, almost all bullying behaviors and types of victimization increased (or remained high) with age, except being ignored that decreased. Understanding these developmental changes can be crucial for detection of bullying throughout adolescence given that physical forms of perpetration and victimization can be easier to perceive whilst subtle forms can be more difficult to notice and might require special attention.

Prevalence of bullying throughout adolescence

In this study, uninvolved children accounted from around 56% (at age 11) to around 65% (at age 17) of the sample whereas the rest were involved in different bullying

roles. Compared to previous studies such as Modecki et al. (2014), who meta-analyzed bullying rates based on 80 studies and found that mean victimization rates were around 36% and mean perpetration rates were around 35% the results of this study show relatively low rates of involvement in bullying. The prevalence of bullying depends greatly on the way in which it is measured and the cut-off that is used to classify participants to different bullying roles. It is therefore very difficult to compare prevalence among studies.

Only around 35% of the participants of this study were never involved in bullying, whereas around 15% were involved in a bullying role (i.e., victim, perpetrator or bully/victim) at all four time points. Thus, the current study showed that episodic/sporadic involvement in bullying was very common whereas persistent involvement was much rarer. Previous research suggested that the emotional impact of bullying on frequent victims was stronger than the impact on occasional victims (Ortega et al., 2012) but stability and change was rarely studied. By discovering the existence of these different patterns of involvement, findings of this study open new research horizons where predictors and consequences of persistent versus episodic involvement in bullying should be described. By definition, bullying is a long-term and frequent aggressive behavior (Smith et al., 2002) but the length of its persistence is rarely studied. The findings of this study show that some students remain involved in different bullying roles from early to late adolescence. Given that anti-bullying programs can be effective (Gaffney, Ttofi, & Farrington, 2018), it is important to implement them and stop bullying before it becomes persistent.

In the current study, girls reported more victimization than boys, whereas boys reported more perpetration and higher rates of being a bully/victim than girls. It was also found that, for the whole sample, there was a decrease in being a bully/victim, whereas rates of only victimization and only perpetration were relatively stable. In boys, the prevalence of being a bully/victim decreased, victimization rates increased and then decreased again, whereas perpetration rates increased. These results are similar to the age trends reported by Cook et al. (2010), who found a positive relation between perpetration and age and no relation between victimization and age. Farrington and Baldry (2010) and Smith et al. (1999) also concluded that victimization decreases with age. Future studies could look at factors that would explain these gender and age differences.

Stability and change in bullying roles

This study described developmental trajectories of children involved in different bullying roles focusing on transitions among these roles throughout a 6-year follow-up. Bullying roles such as victims, perpetrators and uninvolved were relatively stable. Most of the uninvolved children remained uninvolved across all transitions. Most of the victims remained victims or transitioned to uninvolved and very rarely to perpetrators or bully/victims. Bullies transitioned to bullies or uninvolved, and very rarely to victims or bully/victims, but mostly remained involved in bullying. Bully/victims were the smallest and the most unstable group, who mostly transitioned to bullying roles different from being a bully/victim. Thus, different subgroups of children involved in bullying were identified from a dynamic longitudinal perspective. These findings open up new horizons in research about bullying where predictors and consequences could be described for each of these subgroups. It is also possible that different patterns of involvement could benefit from specific targeted interventions which could improve effectiveness of anti-bullying programs. Although far from perfect, our results show that prediction of future

involvement in bullying is possible if past involvement is detected. This is especially true for bully/victims.

Although more research is needed to lay foundations for a new generation of tailored anti-bullying interventions, this study provides some clues that could be taken into account. Given that perpetrators, victims and bully/victims seem to be well defined groups, specific risk and protective factors for each role could be evaluated and addressed. Similarly, the consequences for each group could be studied and possibly prevented. This could be done separately for early onset, late onset and persistent involvement. Some components of anti-bullying programs are more effective for certain bullying roles (see Gaffney et al., 2019) and less effective for other roles. Although a whole-school response against bullying is usually the most effective, it is possible that applying the most effective components to children and focusing on each bullying role would make the interventions even more effective.

Taking into account that the nature and design of this study is different from previous research, it is difficult to compare these results with other studies. Schäfer et al. (2005) found that most of the children who were involved in bullying at age 7 or 8 ended up being uninvolved 6 years later. Similarly, Sourander et al. (2000) found that bullying roles were not stable from age 8 to 16. However, Pepler et al. (2008) reported that perpetrators rarely desist to non-perpetrators from age 10-12 by the end of high school. Other studies described in Table 1 showed that perpetration at one time-point was usually related to perpetration at another time-point (and vice versa for victimization), but transitions were not reported. A longitudinal study conducted by Pouwels et al. (2018) showed developmental trajectories of social status and behavior and that these trajectories predicted involvement in different bullying roles in adolescents. However, bullying was analyzed as a distal outcome and bullying trajectories were not reported. Another longitudinal study reported that moral disengagement was a predictor of bullying perpetration after several months (Wang, Ryoo, Swearer, Turner, & Goldberg, 2017). Future studies should discover predictors according to transition patterns discovered in this study.

Current findings add to this literature by showing transitions among different bullying roles. This is particularly important given that research that focused on one bullying role discovered if children persisted or desisted from this role but without showing whether they got involved in a different bullying role. Our results showed that transitions between perpetrators and victims are rare, and that bully/victims frequently become victims or bullies. Similar findings were reported by Kim et al. (2009) who followed-up students in South Korea only for 10 months. Therefore, victimization and perpetration seem to be two separate trajectories. Future studies could describe whether there are persistent group dynamics in which some children bully the same victims over time. This could explain why changing from perpetrators to victims and vice versa is rare, confirming that bullying is a group phenomenon (Salmivalli, 2010) with the dominance-submission scheme suggested by some authors (Ortega, 2010).

Being aggressive and victimized at the same time could be a way to begin a bullying career that is later defined as a victim or a bully. Research suggests that being in the bully/victim role can have especially serious consequences (Zych et al., 2015a). Thus, future studies could explore specific characteristics of these two trajectories, from bully/victims to victims and from bully/victims to bullies. Given that bully/victims detected at age 11 remained mostly involved in bullying across all the waves, it is

reasonable to conclude that early detection could be useful for prediction and possibly prevention of bullying across adolescence.

This study has some important strengths and also some limitations. It was conducted with self-reports and it could also be useful to include other-reports (e.g., by peers or teachers) in future research. It would also be useful to conduct similar studies in different geographic areas. Among the strengths, it should be highlighted that this project included data on a broad sample of nearly 1000 adolescents, followed up throughout six years with four waves of data. It was conducted in Zurich, a city that is characterized by very high cultural diversity and heterogeneity. A longitudinal methodology and a specific novel way of analyzing data made it possible to overcome many methodological problems found in past research. To the best of our knowledge, this is the first large-scale study on stability and transitions in bullying roles.

The current findings have some important implications for educational policy and practice. Taking into account that bullying has very serious consequences (Ttofi, Farrington, & Losel, 2012; Ttofi, Farrington, Lösel, & Loeber, 2011), it is crucial to implement effective anti-bullying programs. Knowledge on specific trajectories and developmental change in bullying can be very useful for early detection, prediction, prevention and design of targeted interventions. It is possible that targeted interventions could help children to transition early from different bullying roles to being uninvolved.

References

Alsaker, F. D. (2012). *Mutig gegen Mobbing in Kindergarten und Schule [Bullying intervention in kindergarten and school]*. Bern: Huber Verlag.

Barker, E. D., Arseneault, L., Brendgen, M., Fontaine, N., & Maughan, B. (2008). Joint development of bullying and victimization in adolescence: Relations to delinquency and self-harm. *Journal of the American Academy of Child & Adolescent Psychiatry, 47*, 1030-1038. doi: 10.1097/CHI.ObO13e31817eec98

Collins, L. M., & Lanza, S. T. (2010). *Latent Class and Latent Transition Analysis*. New Jersey: Wiley.

Cook, C. R., Williams, K. R., Guerra, N. G., Kim, T. E., & Sadek, S. (2010). Predictors of bullying and victimization in childhood and adolescence: A meta-analytic investigation. *School Psychology Quarterly, 25*, 65-83. doi: 10.1037/a0020149

Crapanzano, A. M., Frick, P. J., Childs, K., & Terranova, A. M. (2001). Gender differences in the assessment, stability, and correlates to bullying roles in middle school children. *Behavioral Sciences and the Law, 29*, 677–694. doi: 10.1002/bsl.1000

Cross, D., Lester, L., & Barnes, A. (2015). A longitudinal study of the social and emotional predictors and consequences of cyber and traditional bullying victimisation. *International Journal of Public Health*, *60*, 207–217. doi: 10.1007/s00038-015-0655-1

Eisner, M. P., & Malti, T. (2015). Aggressive and violent behavior. In M. E. Lamb (Vol. Ed.) & R. M. Lerner (Series Ed.), *Handbook of Child Psychology and Developmental Science, Vol. 3: Social, emotional and personality development* (7th ed., pp. 795-884). New York, NY: Wiley.

Eisner, M., Manzoni, P., & Ribeaud, D. (2000) *Gewalterfahrungen von Jugendlichen: Opfererfahrungen und selbst berichtete Gewalt bei Schülerinnen und Schülern im Kanton Zürich.* Aarau: Sauerländer Verlag

Espelage, D. L., Bosworth, K., & Simon, T. R. (2001). Short-term stability and prospective correlates of bullying in middle-school students: An examination of potential demographic, psychosocial, and environmental influences. *Violence and Victims, 16*, 411-426.

Espelage, D. L., Van Ryzin, M. J., & Holt, M. K. (2018). Trajectories of bully perpetration across early adolescence: Static risk factors, dynamic covariates, and longitudinal outcomes. *Psychology of Violence, 8*, 141-150. doi: 10.1037/vio0000095

Farrington, D. P. (2003). Developmental and life-course criminology: Key theoretical and empirical issues-the 2002 Sutherland Award address. *Criminology*, *41*, 221-225. doi: 10.1111/j.1745-9125.2003.tb00987.x

Farrington, D. P., & Baldry, A. C. (2010). Individual risk factors for school bullying. *Journal of Aggression, Conflict and Peace Research, 2*, 4-16. doi: 10.5042/jacpr.2010.0001

Gaffney, H., Ttofi, M. M., & Farrington, D. P. (2018). Evaluating the effectiveness of school-bullying prevention programs: An updated meta-analytical review. *Aggression and Violent Behavior*, online first.

Gini, G., & Pozzolli, T. (2009). Association between bullying and psychosomatic problems: A meta-analysis. *Pediatrics*, *123*, 1059 – 1065. doi: 10.1542/peds.2008-1215

Goldbaum, S., Craig, W. M., Pepler, D., & Connolly, J. (2003). Developmental trajectories of victimization: Identifying risk and protective factors. *Journal of Applied School Psychology, 19*, 139-156. doi: 10.1300/J008v19n02_09

Haltigan, J. D., & Vaillancourt, T. (2014). Joint trajectories of bullying and peer victimization across elementary and middle school and associations with symptoms of psychopathology. *Developmental Psychology, 50*, 2426-2436. doi: 10.1037/a0038030

Juon, H. S., Doherty, E. E., & Ensminger, M. E. (2006). Childhood behavior and adult criminality: Cluster analysis in a prospective study of African Americans. *Journal of Quantitative Criminology*, *22*, 193-214. doi: 10.1007/s10940-006-9008-9

Kim, Y. S., Boyce, W. T., Koh, Y. J., & Leventhal, B. L. (2009). Time trends, trajectories, and demographic predictors of bullying: a prospective study in Korean adolescents. *Journal of Adolescent Health*, *45*, 360-367. doi: 10.1016/j.jadohealth.2009.02.005

Lanza, S. T., Dziak, J. J., Huang, L., Wagner, A., & Collins, L. M. (2015). *PROC LCA & PROC LTA users' guide (Version 1.3.2).* University Park: The Methodology Center, Penn State.

Lanza, S. T., Bray, B. C., & Collins, L. M. (2013). An introduction to latent class and latent transition analysis. In J. A. Schinka, W. F. Velicer, & I. B. Weiner (Eds.), *Handbook of Psychology: Research Methods in Psychology* (2nd Edition, Vol. 2, pp. 691-716). Hoboken, NJ: Wiley.

Loeber, R., & Hay, D. (1997). Key issues in the development of aggression and violence from childhood to early adulthood. *Annual Review of Psychology*, *48*, 371-410.

Modecki, K. L., Minchin, J., Harbaugh, A. G., Guerra, N. G., & Runions, K. C. (2014). Bullying prevalence across contexts: A meta-analysis measuring cyber and traditional bullying. *Journal of Adolescent Health, 55*, 602-611. doi: 10.1016/j.jadohealth.2014.06.007

Nagin, D. S., & Paternoster, R. (1991). On the relationship of past to future participation in delinquency. *Criminology*, *29*, 163-189.

Nocentini, A., Menesini, E., & Salmivalli, C. (2013). Level and change of bullying behavior during high school: A multilevel growth curve analysis. *Journal of Adolescence, 36*, 495–505. doi: 10.1016/j.adolescence.2013.02.004

Olweus, D. (1979). Stability of aggressive reaction patterns in males: A review. *Psychological Bulletin*, *86*, 852 – 875.

Olweus, D. (1996). The revised Olweus Bully/Victim Questionnaire. Bergen, Norway: University of Bergen.

Ortega, R. (2010). *Agresividad Injustificada, Bullying y Violencia Escolar.* Madrid: Alianza Editorial.

Ortega, R., Elipe, P., Mora-Merchan, J. A., Genta, M. L., Brighi, A., Guarini, A., . . . Tippett, N. (2012). The emotional impact of bullying and cyberbullying on victims: A European cross-national study. *Aggressive Behavior, 38*, 342-356. doi: 10.1002/ab.21440

Pellegrini, A. D., & Long, J. D. (2002). A longitudinal study of bullying, dominance, and victimization during the transition from primary to secondary school. *British Journal of Developmental Psychology, 20,* 259-280. doi: 10.1348/026151002166442

Pepler, D. J., Craig, W. M., Connolly, J. A., Yuile, A., McMaster, L., & Jiang, D. (2006). A developmental perspective on bullying. *Aggressive Behavior, 32*, 376-384. doi: 10.1002/ab.20136

Pepler, D., Jiang, D., Craig, W., & Connolly, J. (2008). Developmental trajectories of bullying and associated factors. *Child Development, 79,* 325-338. doi: 10.1111/j.1467-8624.2007.01128.x

Piquero, A. R., Carriaga, M. L., Diamond, B., Kazemian, L., & Farrington, D. P. (2012). Stability in aggression revisited. *Aggression and Violent Behavior, 17*, 365-372. doi: 10.1016/j.avb.2012.04.001

Pouwels, J. L., Salmivalli, C., Saarento, S., Berg, Y. H., Lansu, T. A., & Cillessen, A. H. (2017). Predicting adolescents' bullying participation from developmental trajectories of social status and behavior. *Child Development, Online First*. doi: 10.1111/cdev.12794

Reijntjes, A., Vermande, M., Goossens, F. A., Olthof, T., van de Schoot, R., Aleva, L., & van der Meulen, M. (2013). Developmental trajectories of bullying and social dominance in youth. *Child Abuse & Neglect, 37*, 224-234. doi: 10.1016/j.chiabu.2012.12.004

Ribeaud, D., & Eisner, M. (2010). Risk factors for aggression in pre-adolescence: Risk domains, cumulative risk and gender differences-Results from a prospective longitudinal study in a multi-ethnic urban sample. *European Journal of Criminology, 7*, 460-498. doi: 10.1177/1477370810378116

Rivers, I., & Smith, P. K. (1994). Types of bullying behaviour and their correlates. *Aggressive Behavior, 20,* 359-368.

Ryoo, J. H., Wang, C., & Swearer, S. M. (2015). Examination of the change in latent statuses in bullying behaviors across time. *School Psychology Quarterly, 30*, 105-122.

Salmivalli, C. (2010). Bullying and the peer group: A review. *Aggression and Violent Behavior, 15*, 112-120. doi: 10.1016/j.avb.2009.08.007

Salmivalli, C., Lappalainen, M., & Lagerspetz, K. M. (1998). Stability and change of behavior in connection with bullying in schools: A two-year follow-up. *Aggressive Behavior, 24*, 205-218. doi: 10.1002/(SICI)1098-2337

Sampson, R. J., & Laub, J. H. (1995). *Crime in the making: Pathways and turning points through life*. Cambridge, MA: Harvard University Press.

Schäfer, M., Korn, S., Brodbeck, F. C., Wolke, D., & Schulz, H. (2005). Bullying roles in changing contexts: The stability of victim and bully roles from primary to secondary school. *International Journal of Behavioral Development, 29*, 323-335. doi: 10.1080/01650250544000107

Sentse, M., Kretschmer, T., & Salmivalli, C. (2015). The longitudinal interplay between bullying, victimization, and social status: Age-related and gender differences. *Social Development, 24*, 659-677. doi: 10.1111/sode.12115

Smith, P. K., & Brain, P. (2000). Bullying in schools: Lessons from two decades of research. *Aggressive Behavior, 26*, 1-9. doi: 10.1002/(SICI)1098-2337

Smith, P. K., Cowie, H., Olafsson, R. F., & Liefooghe, A. P. D. (2002). Definitions of bullying: A comparison of terms used, and age and gender differences, in a fourteen-country international comparison. *Child Development, 73*, 1119-1133.

Smith, P. K., Madsen, K. C., & Moody, J. C. (1999). What causes the age decline in reports of being bullied at school? Towards a developmental analysis of risks of being bullied. *Educational Research, 41*, 267–285.

Solberg, M. E., & Olweus, D. (2003). Prevalence estimation of school bullying with the olweus bully/victim questionnaire. *Aggressive Behavior, 29*, 239–268. doi: 10.1002/ab.10047

Sourander, A., Helstelä, L., Helenius, H., & Piha, J. (2000). Persistence of bullying from childhood to adolescence—a longitudinal 8-year follow-up study. *Child Abuse and Neglect, 24*, 873-881.

Spector, P. E. (2013). Survey design and measure development. In T. D. Little (Ed.), *Oxford Handbook of Quantitative Methods* (pp. 170–188). New York: Oxford University Press.

Ttofi, M. M., Farrington, D. P., & Losel, F. (2012). School bullying as a predictor of violence later in life: A systematic review and meta-analysis of prospective longitudinal studies. *Aggression and Violent Behavior, 17*, 405-418. doi: 10.1016/j.avb.2012.05.002

Ttofi, M. M., Farrington, D. P., Lösel, F., & Loeber, R. (2011). Do the victims of school bullies tend to become depressed later in life? A systematic review and meta-analysis of longitudinal studies. *Journal of Aggression, Conflict and Peace Research, 3*, 63 – 73. doi: 10.1108/17596591111132873

Valdebenito, S., Ttofi, M. M., Eisner, M., & Gaffney, H. (2017). Weapon carrying in and out of school among pure bullies, pure victims and bully-victims: a systematic review and meta-analysis of cross-sectional and longitudinal studies. *Aggression and Violent Behavior, 33*, 62-77. doi: 10.1016/j.avb.2017.01.004

Vivolo-Kantor, A. M., Martell, B. N., Holland, K. M., & Westby, R. (2014). A systematic review and content analysis of bullying and cyber-bullying measurement strategies. *Aggression and Violent Behavior, 19*, 423-434. doi: 10.1016/j.avb.2014.06.008

Wang, C., Ryoo, J. H., Swearer, S. M., Turner, R., & Goldberg, T. S. (2017). Longitudinal relationships between bullying and moral disengagement among adolescents. *Journal of Youth and Adolescence, 46*, 1304–1317. 10.1007/s10964-016-0577-0

Williford, A. P., Brisson, D., Bender, K. A., Jenson, J. M., & Forrest-Bank, S. (2011). Patterns of aggressive behavior and peer victimization from childhood to early adolescence: A latent class analysis. *Journal of Youth and Adolescence, 40*, 644-655. doi: 10.1007/s10964-010-9583-9

Zych, I., Farrington, D. P., & Ttofi, M. M. (2019). Protective factors against bullying and cyberbullying: A systematic review of meta-analyses. *Aggression and Violent Behavior,* online first.

Zych, I., Farrington, D. P., Llorent, V. J., & Ttofi, M. M. (2017). *Protecting Children Against Bullying and Its Consequences*. New York: Springer. doi: 10.1007/978-3-319-53028-4

Zych, I., Ortega-Ruiz, R., & Del Rey, R. (2015a). Scientific research on bullying and cyberbullying: Where have we been and where are we going. *Aggression and Violent Behavior, 24*, 188-198. doi: 10.1016/j.avb.2015.05.015

Zych, I., Ortega-Ruiz, R., & Del Rey, R. (2015b). Systematic review of theoretical studies on bullying and cyberbullying: Facts, knowledge, prevention, and intervention. *Aggression and Violent Behavior, 23*, 1-21. doi: 10.1016/j.avb.2015.10.001

Zych, I., Ortega-Ruiz, R., & Marín-López, I. (2016). Cyberbullying: a systematic review of research, its prevalence and assessment issues in Spanish studies. *Psicología Educativa, 22*, 5-18. doi: 10.1016/j.pse.2016.03.002

Please cite as:

Zych, I., Ttofi, M. M., Llorent, V. J., Farrington, D. P., Ribeaud, D., & Eisner, M. P. (2018). A longitudinal study on stability and transitions among bullying roles. *Child Development*. Online First. https://doi.org/10.1111/cdev.13195