



**Universität  
Zürich** <sup>UZH</sup>



**UNIVERSITY OF  
CAMBRIDGE**

Institute of  
Criminology



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**Programme 7<sup>th</sup> z-proso International Research Network (zIReN) Meeting**

**28<sup>th</sup> – 30<sup>th</sup> August 2025**

**Faculty of English – University of Cambridge, UK**

**Room GR06/GR07**

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**JACOBS  
CENTER**



**Time Schedule – 7<sup>th</sup> zIReN Research Meeting**  
**28<sup>th</sup> – 30<sup>th</sup> August 2025**

<b>Thursday, 28<sup>th</sup> August 2025</b>		
<b>Room GR06/GR07, <a href="#">Faculty of English, 9 West Rd</a>, Cambridge</b> (ca. 20 min walk from Sidney Sussex College)		
<b>Time</b>	<b>Presentation</b>	<b>Presenter</b>
9:30 – 10:00	Welcome with Tea & Coffee	
10:00 – 10:45	Welcome Address and Introduction	<i>Manuel Eisner Denis Ribeaud Lilly Shanahan Preveen Panakkal</i>
10:45 – 11:00	Short Break	
<b>11:00 – 12:30</b>	<b>Session 1 (90’): ADD-ON DATA COLLECTIONS SHOWCASE (Chair: Michelle Loher)</b>	
	Comparing school experiences across Brazilian, Swiss, and Uruguayan adolescents: A measurement invariance study	<i>César Luquine</i>
	Sanctions against juvenile offenders	<i>Gian Ege</i>
	Adolescent peer victimization through a trauma lens: Heightened startle response, increased pupil dilation, elevated cortisol, and reduced heart rate variability in young adulthood	<i>Jens Heumann</i>
12:30 – 13:50	Lunch at <a href="#">Selwyn College</a> , followed by a visit to the gardens	
<b>14:00 – 15:30</b>	<b>Session 2 (90’): AGGRESSIVE BEHAVIOR (Chair: Lukas Eggenberger)</b>	
	Estimating the reproducibility of ML model in predicting aggressive behavior	<i>Yongtian Cheng</i>
	Moving in and out of physical family aggression: Longitudinal patterns and predictors in a prospective-longitudinal cohort study	<i>Laura Bechtiger</i>
	Normative developmental patterns of violent and aggressive behaviours from age 7 to 24	<i>Manuel Eisner</i>
15:30 – 16:00	Tea & Coffee Break	
<b>16:00 – 17:00</b>	<b>Session 3 (60’): VIOLENT IDEATIONS &amp; PSYCHOPATHY (Chair: Andreas Bauer)</b>	
	Childhood predictors of vengeance cognitions and fantasies in early adulthood	<i>Andrea Tam</i>
	Childhood indirect aggression as a developmental precursor to adult psychopathic tendencies: A longitudinal study using z-proso data	<i>Cheryl Peng</i>
17:00 – 18:00	Criminal Cambridge Tour I (walk to <a href="#">Sidney Sussex College</a> )	<i>Manuel Eisner</i>
18:30 – 19:30	Criminal Cambridge Tour II (meet outside Sidney Sussex College)	<i>Manuel Eisner</i>
19:30 – 22:30	Informal Dinner at <a href="#">Fort St George Pub</a> , Midsummer Common, Cambridge, CB4 1HA	

**Friday, 29<sup>th</sup> August 2025**  
**Room GR06/GR07, [Faculty of English, 9 West Rd](#), Cambridge**

<b>Time</b>	<b>Presentation</b>	<b>Presenter</b>
8:45 – 9:00	Welcome with Tea & Coffee	
<b>9:00 – 10:30</b>	<b>Session 4 (90’): TRAJECTORIES &amp; DYNAMICS (Chair: C��zar Luquine)</b>	
	Are supporters of violent extremism unique? Evaluating the development of violent extremist attitudes alongside other forms of violence	<i>Amy Nivette</i>
	The double edge of goodness? Exploring the links between prosocial behavior and internalizing symptoms from childhood to emerging adulthood	<i>Fabiola Silletti</i>
	Unravelling the temporal dynamics of bullying: A longitudinal Bayesian network approach	<i>Andreas Bauer</i>
10:30 – 11:00	Tea & Coffee Break	
<b>11:00 – 12:00</b>	<b>Session 5 (60’): SUBSTANCE USE I (Chair: Laura Bechtiger)</b>	
	Patterns of change in illicit substance use during emerging adulthood and its cognitive and mental health outcomes: Findings from a longitudinal cohort study with hair testing	<i>Lukas Eggenberger</i>
	Psychiatric medication use in z-proso: Implications from hair and self-report	<i>Boris Quednow</i>
12:00 – 12:50	Lunch at the <a href="#">Institute of Criminology</a>	
<b>12:55 – 13:55</b>	<b>Separate Meetings for ECRs and Seniors at the Institute of Criminology</b> (free time for other participants)	
<b>14:00 – 15:00</b>	<b>Session 6 (60’): SUBSTANCE USE II (Chair: Fabiola Silletti)</b>	
	Substance use influences brain structural remodeling in young adulthood	<i>Anna Jacobsen</i>
	Adolescent familial risk factors in young adults’ non-medical use of opioids	<i>Michelle Loher</i>
15:00 – 15:30	Tea & Coffee Break	
<b>15:30 – 16:30</b>	<b>Session 7 (90’): GUEST STUDIES SHOWCASE (Chair: Manuel Eisner)</b>	
	Life-course processes as cause and effect of trends in gun violence	<i>Charles Lanfear</i>
	The Peterborough Adolescent to Adult Development Study (PADS+): An introduction to the study and its key findings	<i>Kyle Treiber</i>
<b>16:30 – 17:00</b>	<b>Collaborative Roadmap: Open Discussion &amp; Closing Address (Manuel Eisner)</b>	
18:45 – 22:00	Festive Reception Dinner at <a href="#">Christ’s College</a> 18:45 – Drinks Reception in the Fellows Gardens (Old Combination Room if weather dictates) 19:30 – Dinner in the Old Combination Room	

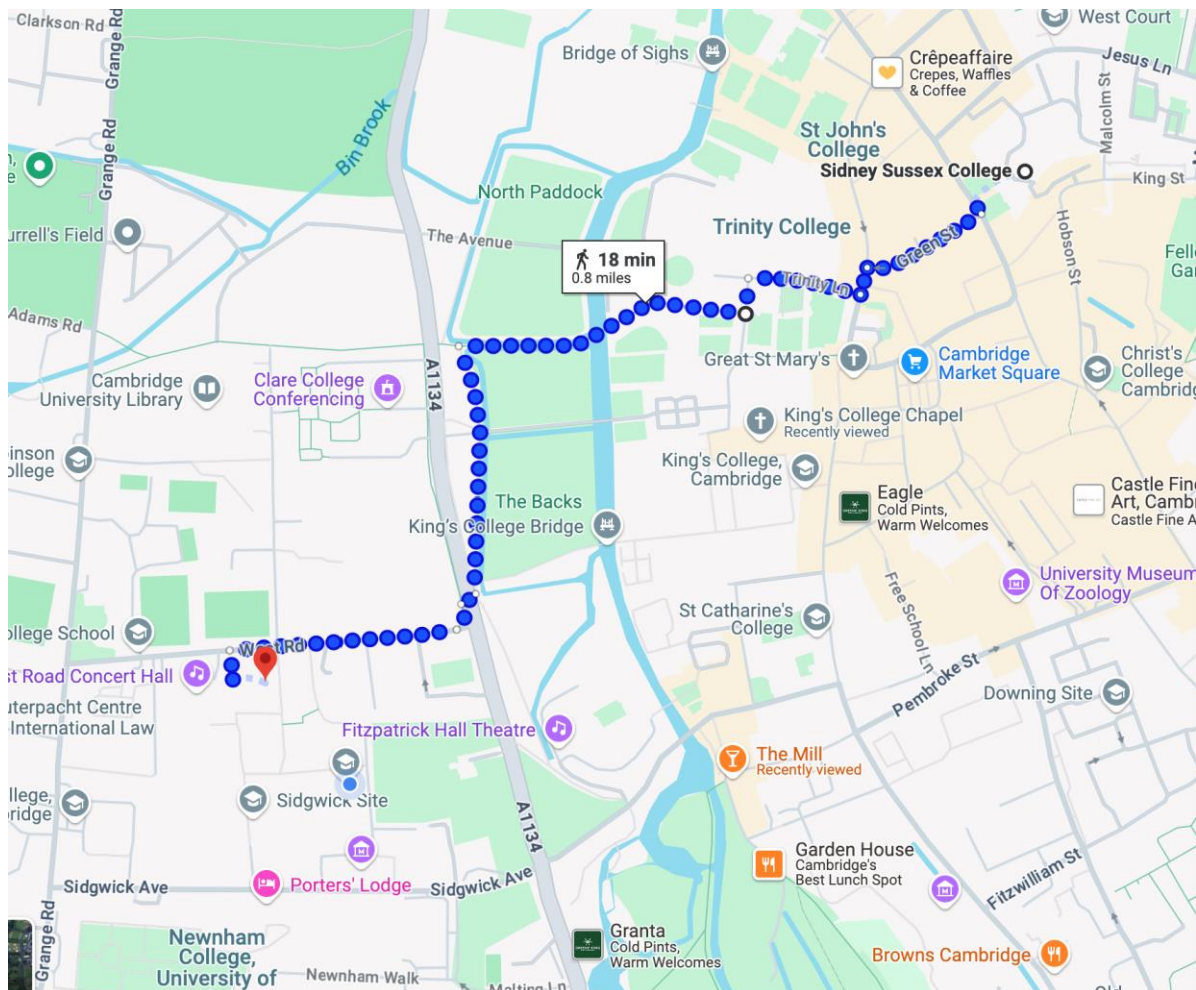
**Saturday, 30<sup>th</sup> August 2025**

**SOCIAL EVENT**

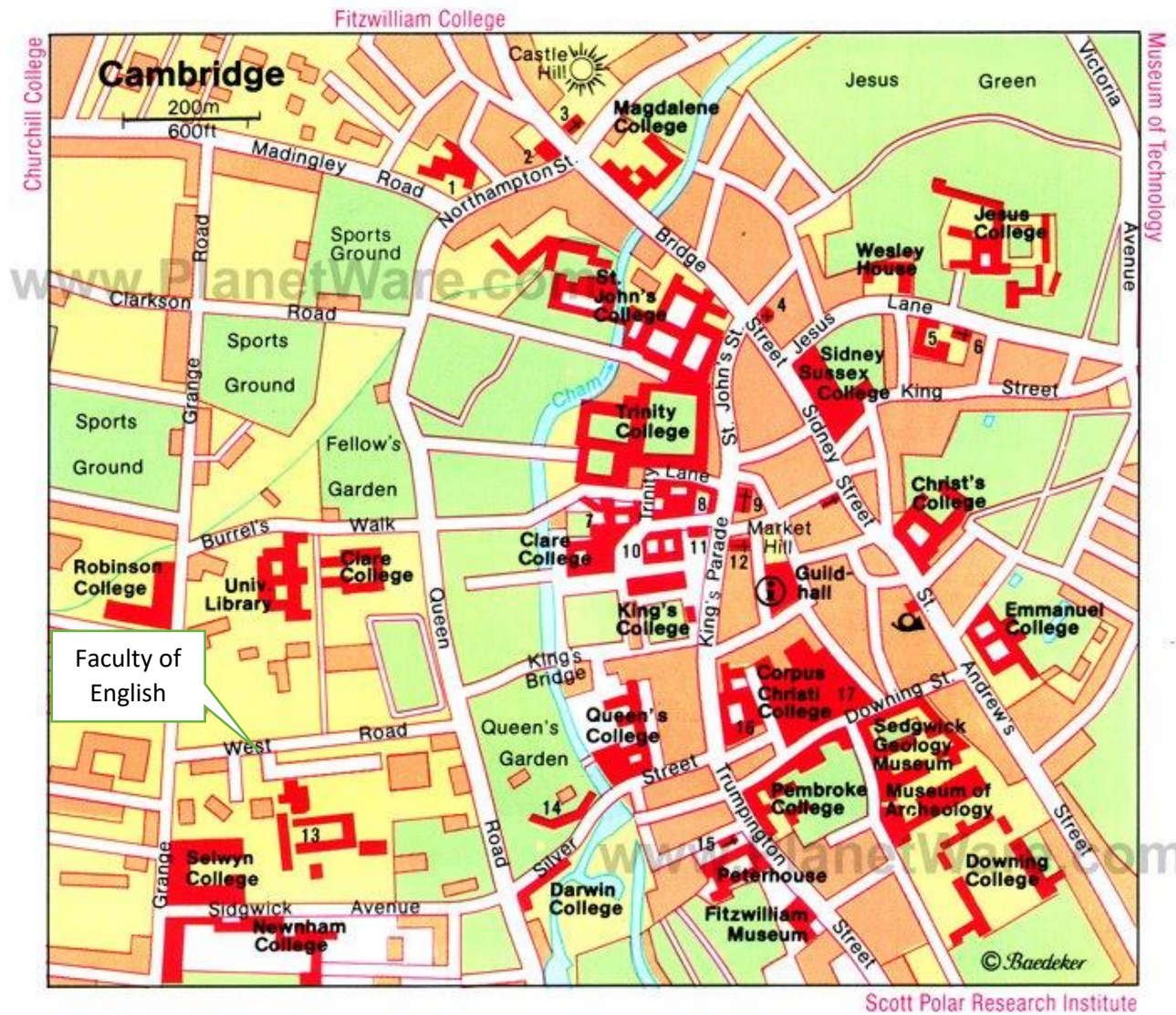
**Excursions to King's College Chapel and Grantchester Meadows**

Time	Activity
09:25	Meet outside <a href="#">King's College main entrance</a> , King's Parade
09:30 – 10:30	Visit to King's College Chapel
10:45	Meet at <a href="#">Scudamore's Punts</a> across from the Mill Pub
11:00 – 12:30	Chauffeured Punt to Grantchester Meadows
12:45 – 13:45	Lunch at <a href="#">The Green Man</a> , Grantchester
14:00 – 15:30	Chauffeured Punt to Cambridge

**Walk from Sidney Sussex College to the Faculty of English**



## Key Sites in Central Cambridge



- |                       |                              |  |
|-----------------------|------------------------------|--|
| 1 Westminster College | 7 Trinity Hall               | 13 University Arts Buildings,<br>Museum of Classical Archaeology |
| 2 Folk Museum         | 8 Gonville and Caius College | 14 Fisher Court  |
| 3 St. Giles           | 9 St. Michael                | 15 St. Mary the Less   |
| 4 Round Church        | 10 Old Schools               | 16 Whipple Museum  |
| 5 Westcott House      | 11 Senate House              | 17 Zoology Museum  |
| 6 All Saints          | 12 St. Mary the Great        |  |

# Presentation Abstracts – zReN Research Meeting 2025

Thursday, 28<sup>th</sup> August 2025

## Session 1: ADD-ON DATA COLLECTIONS SHOWCASE

### **Comparing school experiences across Brazilian, Swiss, and Uruguayan adolescents: a measurement invariance study**

*Cézar D. Luquine Jr., Roberta C. Astolfi, Clarissa Janousch, Lukas Eggenberger, Nico Trajtenberg, Manuel Eisner, Lilly Shanahan, Denis Ribeaud, Maria Fernanda T. Peres*

School experiences fundamentally shape adolescent development, yet the cross-cultural validity of measurement approaches remains underexplored, particularly when extending research frameworks developed in high-income contexts to less privileged global settings. This study leveraged the unique opportunity provided by z-proso replication studies to evaluate measurement invariance of a multidimensional school experience scale across three culturally and socioeconomically distinct urban contexts: Zurich (Switzerland,  $n = 1,447$ ), Montevideo (Uruguay,  $n = 2,148$ ), and São Paulo (Brazil,  $n = 2,680$ ). Participants were approximately 15 years old, attending secondary schools randomly selected to form community representative samples in each city. Using multiple-group confirmatory factor analysis with ordinal indicators, we tested a second-order factor model comprising four first-order dimensions: bond to class, bond to teacher, commitment to the future, and school difficulties. The hierarchical model demonstrated excellent fit across all measurement invariance levels: configural (CFI=.964, RMSEA=.070, SRMR=.051), metric (CFI=.963, RMSEA=.067, SRMR=.062), and scalar (CFI=.953, RMSEA=.068, SRMR=.057). Changes in fit indices between sequential models were minimal ( $\Delta CFI \geq -.010$ ,  $\Delta RMSEA \leq .002$ ,  $\Delta SRMR \leq .011$ ), supporting full measurement invariance. These findings reveal that despite contextual differences, adolescents across cities conceptualize school experiences in structurally equivalent ways, with comparable relationships between observed indicators and latent constructs. The established scalar invariance validates meaningful cross-cultural comparisons, showing that z-proso participants reported higher (i.e. better) overall school experiences compared to Montevideo and São Paulo, with particularly pronounced differences in classroom bonds and academic difficulties, yet remarkable consistency in future orientation was observed across cities. This measurement framework contributes to methodologically rigorous research in cross-cultural educational psychology and to the substantive understanding of how school experiences operate across diverse developmental contexts, providing a foundation for future comparative research within the international z-proso network.

**Current status of the paper/project:** submitted for publication/under review

### **Sanctions against juvenile offenders**

*Gian Ege, Niccolò Giorgio Armandola, Nicole Jehle, Séverine Suter, Ronja Kieft, Manuel Eisner, Denis Ribeaud*

Swiss juvenile criminal law offers a multifaceted framework for responding to youth delinquency, encompassing a range of punitive and protective measures as well as alternative approaches such as mediation. While the legal structure allows flexibility, there remains limited empirical insight into how specific offenses correlate with particular sanctions. This study contributes to closing this knowledge gap by analyzing data z-proso. The research focuses on identifying the factors associated with the initiation of criminal proceedings and the imposition of various sanctions on juvenile offenders. Particular attention is paid to how these decisions relate to the foundational principles of Swiss juvenile justice—namely, education, proportionality, and individualization—and whether any systematic biases emerge in practice. The results reveal that individual characteristics such as age, gender, and social background play a significant role in determining whether a young person becomes involved in criminal prosecution. However, once a case proceeds, the severity of sanctions is largely shaped by the nature of the offense and patterns of recidivism. Repeat offenders are notably more likely to receive harsher penalties, aligning with the legal system's emphasis on escalating responses to continued delinquency. These findings offer critical insights into the practical functioning and fairness of juvenile justice in Switzerland.

**Current status of the paper/project:** submitted for publication/under review

**Adolescent peer victimization through a trauma lens: Heightened startle response, increased pupil dilation, elevated cortisol, and reduced heart rate variability in young adulthood**

*Jens Heumann, Boris B. Quednow, Justin Chumbley, Manuel Eisner, Denis Ribeaud, Lilly Shanahan, Michael J. Shanahan*

**BACKGROUND:** Adolescent peer victimization (PV) is a prevalent social stressor associated with potential long-term psychological and physiological consequences. Yet, the mechanisms underlying enduring alterations in stress-regulatory systems remain underexplored. This multimodal study examines autonomic, endocrine, and affective reactivity in young adults with a history of severe PV.

**METHODS:** Eyeblink startle electromyograms, pupil dilation, hair cortisol, resting heart rate variability (RHRV), and self-reported state anxiety were assessed in 183 young adults with longitudinal data on adolescent PV. Effects were estimated using a counterfactual framework with genetically informed inverse probability weighting—leveraging polygenic risk scores and genetic ancestry—and adjustment for time-varying confounders.

**RESULTS:** Victims exhibited heightened startle amplitudes compared to controls, with negative stimuli (angry faces) further exaggerating amplitude and prolonging latency. Pupil dilation increased in response to negative stimuli, but was otherwise blunted. Victims also showed reduced RHRV, elevated hair cortisol, and slower state anxiety recovery across the session. Depression moderated several effects; more depressed victims showed hypocortisolism and reduced autonomic reactivity.

**CONCLUSIONS:** Findings provide converging evidence and mechanistic insight into potential links between PV and trauma-like physiological effects, suggesting sustained alterations into young adulthood. Targeted interventions are needed to reduce PV and its stress-related dysregulation, preventing potential long-term psychiatric and societal sequelae.

**Current status of the paper/project:** submitted for publication/under review

**Session 2: AGGRESSIVE BEHAVIOR**

**Estimating the reproducibility of ML model in predicting aggressive behavior**

*Yongtian Cheng, Aja Murray*

Supervised Machine Learning (SML) has gained traction in psychological research for generating predictive insights. Although some scholars suggest that SML models offer greater reproducibility, empirical validation of this claim remains limited. This study evaluates the reproducibility of a predictive model developed by Cheng et al. (2024), which aimed to forecast aggressive behavior using data from the Zurich Project on the Social Development from Childhood to Adulthood (z-proso) and D2M studies at age 20. The original study found that an elastic net model with rebalancing achieved the best performance.

We re-examine this model using newly collected data from the same participants—z-proso at age 24 and D2M at age 26—to assess its generalizability and reproducibility. Specifically, we test whether the superiority of the elastic net and the rebalanced method persists in the new dataset. Additionally, we address a limitation in the original study by applying missing data imputation to the training dataset to investigate whether this improves and sustains predictive performance.

We hypothesize that the elastic net model will demonstrate superior reproducibility compared to logistic regression, and that the rebalanced method will continue to show advantages in terms of ROC analysis and balanced accuracy.

**Current status of the paper/project:** ongoing (first results can be presented)

**Moving in and out of physical family aggression: Longitudinal patterns and predictors in a prospective-longitudinal cohort study**

*Laura Bechtiger, Clarissa Janousch, David Bürgin, Denis Ribeaud, Manuel Eisner, Lilly Shanahan*

Physical family aggression is a major public health issue. While this has long been recognized for parental physical aggression against children, existing research has neglected the co-occurrence and dynamic interplay of parent-initiated (i.e., corporal punishment) and child-initiated (i.e., youth-to-parent aggression) physical aggression across adolescence. Also, it is unclear what risk factors are associated with changes in the experience of family aggression. We analyzed data from 1522 participants of the Zurich Project on the Social Development from Childhood to Adulthood (z-proso) who participated in at least one assessment between ages 11 and 17. Both youth-to-parent aggression and corporal punishment were self-reported by adolescents. We used manifest Markov modeling to document shifts between different patterns of family aggression (i.e., no family aggression, youth-to-parent aggression only, corporal punishment only, and reciprocal aggression). Time-varying risk factors of moving in and out of family aggression across adolescence were examined with logistic regressions. Overall, the majority of adolescents experienced family aggression at increased the likelihood of experiencing the same or another type of family aggression at the next assessment compared to those who did not experience family aggression. Overall, the stability of no family aggression and reciprocal family aggression increased across adolescence. Adolescents' cognitive, emotional, and social risk factors were consistently associated with moving into family aggression (i.e., entering and escalation), but less so with moving out of family aggression (i.e., desistance and de-escalation).

**Current status of the paper/project:** submitted for publication/under review

**Normative developmental patterns of violent and aggressive behaviours from age 7 to 24**

*Manuel Eisner*

The z-proso study comprises rich and varied multi-informant data on developmental trends in aggressive behaviour from childhood to early adulthood. Previous z-proso studies have described trends in single behaviour domains, such as bullying, violence against parents, or physical aggression. However, we currently lack an overview of normative developmental trends across all domains of aggressive behaviour and the entire age range from age 7 to 24.

In this paper we examine the normative developmental patterns for thirteen distinct aggressive behaviours measured across at least three waves in different social contexts (school, family, partnership, peers). This will include physical, reactive, proactive, and indirect aggression, bullying, aggressive conflict coping, cruelty against animals, violence against parents, physical, verbal, and sexual intimate partner violence, assault and robbery, and participation in group (gang) violence.

The analyses will aim to contribute to four general questions: Are there distinct age curves for different types of aggressive behaviour? Are there sex differences in age curves of aggressive behaviour? Are normative age-aggression curves mainly reflective of change in prevalence or by change in incidence?

We will discuss findings in the context of other major longitudinal studies on aggressive and violent behaviour, and with respect to implications for developmental theories of violence and aggressive behaviour.

**Current status of the paper/project:** ongoing (first results can be presented)

### Session 3: VIOLENT IDEATIONS & PSYCHOPATHY

#### Childhood predictors of vengeance cognitions and fantasies in early adulthood

*Andrea Tam, Manuel Eisner, Denis Ribeaud*

This longitudinal study explores the developmental antecedents of vengeance cognitions and fantasies, with a focus on childhood risk factors that may shape revenge-related thinking in early adulthood. While previous research has established a link between victimisation and revenge, relatively little attention has been directed toward how broader early-life predictors contribute to the development of revenge-related thoughts and desires. Using data from the Zurich Project on Social Development from Childhood to Adulthood (z-proso), the study examines the predictive impact of key childhood risk factors—including trait aggressiveness, poor impulse control, social rejection, exposure to violence, and adverse family environments—on the emergence of vengeance cognitions and fantasies at age 24. Employing linear regression and structural equation modelling, the analysis investigates the pathways through which early risk exposures influence later patterns of revenge-related thoughts. This study provides new insights into the childhood underpinnings of revenge-related cognitions, with implications for early intervention and violence prevention strategies.

**Current status of the paper/project:** ongoing (first results can be presented)

#### Childhood indirect aggression as a developmental precursor to adult psychopathic tendencies: A longitudinal study using z-proso data

*Cheryl Shihan Peng, Manuel Eisner, Andrea Tam*

Psychopathic tendencies—characterised by traits such as dishonesty, interpersonal manipulation, lack of empathy, and a propensity for societal deviance (Hare, 2003; Hare & Neumann, 2008)—have long been of interest in developmental psychopathology. While much research has focused on externalising behaviour and callous-unemotional traits, relatively little is known about the role of early manipulative behaviours in the emergence of psychopathic tendencies in adulthood.

This study draws on data from the z-proso cohort to examine whether indirect aggression in childhood—defined as relationally manipulative acts such as spreading rumours, social exclusion, and betraying confidences—predicts psychopathic traits in early adulthood. Indirect aggression was measured through child self-report at multiple time points between ages 7 and 11. Adult psychopathic tendencies were assessed using a six-item short form of the “psychopathy” subscale from the Short Dark Triad (SD3; Jones & Paulhus, 2013), administered at ages 20 and 24. In order to capture the trait-like stability of psychopathy, the outcome will be modelled as the average score across both waves.

The study will first evaluate the psychometric properties of the abbreviated psychopathy scale, including internal consistency, factor structure, and measurement invariance across demographic subgroups. Structural equation modelling (SEM) will then be employed to test the prospective association between childhood indirect aggression and adult psychopathy, controlling for relevant covariates such as sex, language background, and early behavioural indicators.

By focusing on early relational aggression as a potential developmental precursor, this study aims to advance our understanding of the social-behavioural pathways leading to psychopathic traits, and to inform early risk identification strategies targeting manipulative behaviour patterns in childhood.

**Current status of the paper/project:** planned

# Presentation Abstracts – zIRen Research Meeting 2025

Friday, 29<sup>th</sup> August 2025

## Session 4: TRAJECTORIES & DYNAMICS

### **Are supporters of violent extremism unique? Evaluating the development of violent extremist attitudes alongside other forms of violence**

*Amy Nivette, Manuel Eisner, Denis Ribeaud, Lilly Shanahan*

There are a growing number of theories and perspectives on how individuals radicalize, or come to support violent extremism. However, a key question remains in the study of violent extremism: is the development of violent extremist attitudes unique, or is it just the development of violence applied in another context? The former would require new and specific theories about how violent extremist attitudes over time, while the latter would mean that we could apply existing theories of crime and violence to understand the process by which individuals justify and adopt attitudes to support the use of violence in different contexts. This paper investigates how violent extremist attitudes develop over time and to what extent these attitudes co-develop alongside other violent attitudes and behaviors. Using three waves of data from the Zurich Project on the Social Development from Childhood to Adulthood (ages 17, 20, 25), we will first map out overall trends in violent extremist attitudes over time. Next, we will use a variety of measures of violence in the dataset (e.g., moral neutralization of violence, violent ideations, violent masculinity, support for violence against women, and violent behaviors) to evaluate how and when violent extremist attitudes co-develop (or not) with other forms of violence over the life course. Results from this study can help us understand the nature of change in violent extremist attitudes in late adolescence and early adulthood, and to what extent we need unique theoretical explanations for this violent phenomenon.

**Current status of the paper/project:** ongoing (first results can be presented)

### **The double edge of goodness? Exploring the links between prosocial behavior and internalizing symptoms from childhood to emerging adulthood**

*Fabiola Silletti, Manuel Eisner, Denis Ribeaud, Pasquale Musso*

Within contemporary risk and resilience frameworks, prosocial behavior has been conceptualized as a form of “ordinary magic” that supports positive adjustment (Masten, 2001; Memmott-Elison et al., 2020). Empirical evidence supports this view, showing that prosocial behaviors are negatively associated with a range of externalizing problems (Eivers et al., 2012; Hay et al., 2021; Jambon et al., 2019; Kokko et al., 2006; Lahey et al., 2018; Memmott-Elison & Toseeb, 2022; Nantel-Vivier et al., 2014; Speyer et al., 2022). However, findings are less consistent regarding internalizing problems. Previous studies have reported negative (e.g., Flouri & Sarmadi, 2016; Perren & Alsaker, 2009), positive (e.g., Nantel-Vivier et al., 2014; Reimann et al., 2024; Silletti et al., 2023; Perren et al., 2017), or no associations (Hay & Pawlby, 2003) between prosociality and internalizing difficulties, raising important questions about when and for whom prosocial behavior may - or may not- be beneficial. Furthermore, much of the existing research relies on small, homogeneous samples and focuses on single developmental stages, limiting the generalizability of findings.

The present study adopts a developmental and multisystemic approach to examine the longitudinal association between prosocial behavior and internalizing problems across three key life stages: childhood, adolescence, and emerging adulthood. It also investigates individual and contextual moderators, such as gender and social support, that may shape these links. By addressing a major gap in the literature and leveraging a large, heterogeneous, longitudinal dataset (z-proso), this research aims to disentangle the complex, dynamic interplay between doing good and feeling well. Findings are expected to inform more developmentally sensitive and contextually tailored interventions that promote both mental health and prosocial engagement across the lifespan.

**Current status of the paper/project:** ongoing (first results can be presented)

**Unravelling the temporal dynamics of bullying: A longitudinal Bayesian network approach***Andreas Bauer, Pedro Henrique Ribeiro Santiago, Manuel Eisner, Denis Ribeaud, Maria Fernanda Tourinho Peres*

Understanding how different forms of bullying influence each other over time is critical for identifying mechanisms of bullying involvement. The current study investigates the longitudinal interplay among four specific bullying behaviours – social exclusion, verbal aggression, physical aggression, and property destruction – measured as both perpetration and victimisation across four time points from ages 11 to 17. Drawing on individual, family, and school-level factors, we apply Bayesian network modelling to uncover potential causal pathways. Bayesian networks represent variables as nodes and their probabilistic dependencies as directed edges within a Directed Acyclic Graph (DAG). Using data-driven structure learning algorithms, combined with expert knowledge, we estimate the most probable DAG structure. This approach allows us to move beyond traditional correlational models by generating hypotheses about causal mechanisms and identifying potential intervention targets. Findings from this ongoing study will contribute to a more nuanced understanding of how bullying behaviours develop, persist, and escalate throughout adolescence.

**Current status of the paper/project:** ongoing (first results can be presented)**Session 5: SUBSTANCE USE I****Patterns of change in illicit substance use during emerging adulthood and its cognitive and mental health outcomes: findings from a longitudinal cohort study with hair testing***Lukas Eggenberger, Clarissa Janousch, Lydia Johnson-Ferguson, Michelle Loher, Markus R. Baumgartner, Tina M. Binz, Denis Ribeaud, Manuel Eisner, Lilly Shanahan, Boris B. Quednow*

**Importance:** Emerging adulthood is a period with an increased risk for illicit substance use, which may affect neurocognitive development and mental health. Longitudinal, objective data on substance use patterns and their outcomes are limited.

**Objective:** To identify naturally occurring patterns of change in illicit substance use in young adults and examine their associations with cognitive and mental health outcomes.

**Design:** Longitudinal cohort study using latent profile analysis and robust regression models.

**Setting:** Community-based sample from Switzerland, assessed through the Zurich Project on Social Development from Childhood to Adulthood (z-proso).

**Participants:** 731 emerging adults (ages 20 and 24 years; 49% female) who provided hair samples and completed cognitive and mental health assessments.

**Exposure:** Changes in cumulative hair concentrations of illicit substances from age 20 to 24, categorized into cannabis, stimulants, sedatives, and others.

**Main Outcomes and Measures:** Cognitive functions (attention, working memory, declarative memory) were assessed with CANTAB at age 24. Mental health symptoms (anxiety/depression, ADHD, psychosis) were measured with the Social Behavior Questionnaire at age 20 and 24. These outcomes were analyzed in relation to substance use change profiles.

**Results:** Five substance use change profiles were identified: Low/Decreasers (n=288, 65.5%), Cannabis Increasesers (n=48, 10.9%), Club-Drug Increasesers (n=40, 9.1%), Medical Stimulant Increasesers (n=43, 9.8%), and Medical Sedative Increasesers (n=21, 4.8%). Compared to non-users, cannabis increasesers showed reduced attention (d=0.34), while club-drug increasesers exhibited lower composite cognitive score (d=0.39) and attention (d=0.41). Medical sedative increasesers showed reduced composite cognitive score (d=0.76), attention (d=0.74), and working memory performance (d=0.58). Declarative memory was unaffected. Regarding mental health, cannabis increasesers had increased anxiety/depression (d=0.53) and ADHD symptoms (d=0.38), while medical stimulant increasesers had a stronger increase in ADHD symptoms (d=0.82). No significant associations were present for psychotic symptoms.

**Conclusions and Relevance:** Emerging adults follow distinct substance use trajectories with specific cognitive and mental health risks. Objective, longitudinal monitoring may support targeted prevention strategies during this sensitive life stage.

**Current status of the paper/project:** submitted for publication/under review

**Psychiatric medication use in z-proso: implications from hair and self-report***Boris Quednow, Lukas Eggenberger, Lilly Shanahan*

Some of the z-proso participants provided detailed information about which medication they had been prescribed for which psychiatric disorder. In addition, the concentrations of psychiatric medication in the hair were determined in waves 8 and 9 (ages 20 and 24). This data has hardly been used to date, but represents an immense treasure trove of data, as it can provide information on psychiatric health, which is otherwise not specifically surveyed in z-proso. The talk is intended to present this type of medication data and encourage its use by the zReN members.

**Current status of the paper/project:** ongoing (first results can be presented)**Session 6: SUBSTANCE USE II****Substance use influences brain structural remodeling in young adulthood***Anna Jacobsen, Lena Mehnert, Jens Kuhle, Jens Heumann, Tina M. Binz, Lilly Shanahan, Todd Hare, Denis Ribeaud, Manuel Eisner, Boris B. Quednow, Francesco Bavato*

Brain development continues throughout young adulthood. Substance use during this critical stage is thought to influence brain remodeling, with implications for cognitive development. However, the contributions of individual substances as well as polysubstance use to brain microstructure remain poorly understood. Here we combine structural brain MRI with blood neurofilament light chain (NfL) levels—a novel marker of brain changes—to investigate the interplay between substance use and brain structure in the z-proso cohort. This group is well suited to our research question given their high prevalence of substance use. In wave 8 of z-proso, participants answered questionnaires about current substance use and age of substance use initiation and provided hair samples to quantify recent substance use. We combined the subjective and objective substance use data to generate propensity scores for individual substance classes and for groups of substances. These propensity scores captured participant likelihood to use alcohol, tobacco, cannabidiol (CBD), tetrahydrocannabinol (THC), serotonergic substances (e.g. MDMA, psilocybin), stimulants, or opioids, as well as combinations of these substances. Participants selected for the z-GIG subsample also underwent structural MRI scans (N=128) and provided blood samples (N=188) to quantify serum NfL levels. We used mixed linear models to predict brain structure measures with NfL levels. We used least squares regression with stabilized inverse probability weights based on substance use to predict NfL levels. Using substance use propensity score weighting, we found that frequent use of THC alone or serotonergic substances alone predicted lower serum NfL levels ( $p < 0.05$ ). This effect persisted when considering the use of THC combined with CBD, stimulants, or serotonergic substances ( $p < 0.05$ ). Serum NfL levels were associated with gray matter structures throughout the brain predominantly in a negative direction. Our findings indicate that blood NfL levels in early adulthood capture brain structural remodeling processes that may be influenced by substance use.

**Current status of the paper/project:** ongoing (first results can be presented)

**Adolescent familial risk factors in young adults' non-medical use of opioids**

*Michelle Loher, Laura Bechtiger, Clarissa Janousch, Lukas Eggenberger, Denis Ribeaud, Manuel Eisner, Boris B. Quednow, Lilly Shanahan*

Substance use and its associated morbidity and mortality have risen to concerning levels among young adults including due to the non-medical use of prescription opioids. But what drives young people to initiate such substance use in the first place? To date, longer-term pathways to young adults' misuse of medical opioids are not fully understood.

Social factors, such as impaired social bonding at key stages of development, have been suggested to increase the risk of future opioid misuse. Previous work has linked adolescent family risk factors (e.g., high parental control, parental physical punishment, parental substance use) with later substance use. However, it remains less clear whether these pathways also extend to later non-medical use of prescription opioids. In addition, several potential moderating and mediating factors could shape the association between adolescent family risk factors and non-medical use of opioids in young adulthood – including factors at the individual level (e.g., chronic internalizing and externalizing symptoms, adolescent substance use), the interpersonal level (e.g., peer substance use, social support), and the school level (e.g., school attachment). These factors have mostly been linked to (illegal) substance use. Less is known about whether they also apply to the non-medical use of prescription opioids in young adulthood.

This study addresses these gaps by drawing on a large community sample, the Zurich Project on Social Development from Childhood to Adulthood (z-proso). Substance use was measured with self-reports beginning at age 11; the non-medical use of prescription opioids and codeine at ages 20 and 24. Age 13 data were used to assess adolescent familial risk factors; potential moderating and mediating factors were measured between ages 13 and 17, and chronic factors span ages 13 to 17, where possible.

Understanding pathways that contribute to substance use among young people is essential for guiding effective prevention and intervention efforts.

**Current status of the paper/project:** ongoing (first results can be presented)

## Session 7: GUEST STUDIES SHOWCASE

### Life-course processes as cause and effect of trends in gun violence

*Charles C. Lanfear, Robert J. Sampson*

Cohorts are comprised of individuals that, as a result of being born in a particular range of time, all experience macro-scale historical contexts at a similar age. Life course and demographic research on crime and deviance often focuses on the micro-level (individual) outcomes of macro-scale (societal) causes such as COVID-19. When societal (macro-scale) outcomes are considered, the focus is usually on aggregated individual outcomes such as mortality rates. Less often considered is how macro-level events affect crime-relevant social processes to produce emergent (i.e., not simple aggregate) macro-level outcomes. In this paper, we present a cohort micro-macro model of social change and use it to examine trends in concealed handgun carrying, legal cynicism, and gun violence in the US over the last 30 years. We argue that, despite similar aggregate levels of gun homicide, the peaks of violence in the early 1990s and 2016-2021 were dominated by different age-specific processes of handgun carrying. In turn, we hypothesize that these age-period interactions influence future social change through a variety of cultural and behavioral mechanisms. We discuss the implications of these emergent processes for criminal justice policy.

**Current status of the paper/project:** ongoing (first results can be presented)

### The Peterborough Adolescent to Adult Development Study (PADS+): An introduction to the study and its key findings

*Kyle Treiber*

PADS+ is an ongoing longitudinal study following a random sample of participants who entered secondary school in the UK city of Peterborough in 2002. The study is designed to test Situational Action Theory (SAT)'s situational explanation of crime as moral action resulting from the interaction of people's crime propensities and settings' criminogenic inducements, and its developmental explanation of how people come to have crime propensities and be exposed to criminogenic settings. PADS+ has followed participants from age 12, through adolescence (ages 13-17) and into young adulthood (ages 19, 21, and 24) and the next data collection is scheduled for September 2025, age 35). In this brief overview we will present the study's research design, its innovative methodologies, and its key findings regarding why crime and criminal careers happen.

**Current status of the paper/project:** accepted/published

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