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Research paper

Developmental trajectories of self-injurious behavior, suicidal behavior and substance misuse and their association with adolescent borderline personality pathology

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ABSTRACT

Objective: Adolescent risk-taking and self-harm behaviors are associated with affect dysregulation and impulsivity, both core features of borderline personality disorder (BPD). We hypothesized that the developmental courses of these behaviors i) tend to cluster rather than appear individually, and ii) might indicate adolescent BPD pathology. Therefore, we explored the developmental trajectories of self-injurious behavior (SIB), suicidal behavior (SB) and substance misuse (SM) in a community sample of adolescents; and we investigated the trajectories' overlap and its associations with BPD traits.
Method: 513 adolescents, aged 15–17 years, were followed for two years as part of the Saving and Empowering Young Lives in Europe study and its subsequent follow-up. Distinct developmental trajectories were explored using general growth mixture modeling.
Results: Three distinct classes were identified within each of the harmful behaviors SIB, SB and SM. Both the high-risk SIB trajectory and the high-risk SB trajectory demonstrated elevated initial degree of engagement, followed by a gradual decrease. The SM high-risk trajectory had a medium initial degree of engagement, which increased over time. There was a high degree of overlap (80–90%) among the high-risk trajectories for the three behaviors (SIB, SB and SM), and this overlap was significantly associated with elevated levels of BPD pathology.
Limitations: The data collection was based on participants' self-report.
Conclusion: The findings indicate a similar pattern of reduction over time between SIB and SB for the high-risk trajectories, whereas the high-risk trajectories for SM show a pattern of increase over time. The observed symptom shift is associated with borderline personality pathology in adolescents. Therefore these behaviors might represent early indicators of risk supporting potential early detection.

1. Introduction

Borderline personality disorder (BPD) is a severe mental disorder with long-term outcomes characterized by severe, extensive and persistent functional disability (Gunderson et al., 2011) and a suicide rate of 8% (Pompili et al., 2005). BPD usually has its onset in adolescence and emerging adulthood and can be reliably and

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validly diagnosed in this age group (Kaess et al., 2014a). Onset at this age results in high potential for a malignant course but also provides a unique opportunity for early detection and intervention (Chanen and McCutcheon, 2013).

Self-injurious behavior (SIB), defined as intentional, self-directed acts to physically harm oneself (Nock, 2010), suicidal behavior (SB) defined as thoughts and behaviors ranging between passive death wishes and attempted suicide, and substance misuse (SM) of nicotine, alcohol and illegal drugs, are among the most common diagnostic criteria met by youth with BPD (Kaess et al., 2013). These behaviors appear to be related to problems with emotion dysregulation and impulsivity. Adolescents with BPD show a strong affinity to SIB due to experiencing aversive emotions as intolerable and impulsively trying to ameliorate those (Kaess et al., 2014a). Likewise, the most commonly reported function of SIB is to reduce negative affect (Klonsky and Muehlenkamp, 2007; Laye-Gindhu and Schonert-Reichl, 2005) Similarly, adolescent SB is commonly related to a lack of adaptive and effective capacity for emotion regulation (Spirito and Esposito-Smythers, 2006; Zlotnick et al., 1997). Also, with regard to SM, marijuana, alcohol and nicotine are often consumed as part of a pattern of impulsive reaction to stress or as a coping strategy (Kassel et al., 2003; Kuntsche et al., 2005).

Adolescent risk-taking and self-harm behaviors tend to cluster. This has led to the previous description of a 'risk-behavior syndrome', which is associated with increased risk of both morbidity and mortality (Jessor, 1991). For example, repetitive SIB leads to more than a thirtyfold increased risk of suicide, compared with the general population (Cooper, 2005). Yet an even greater risk of suicide occurs among youth who engage in SIB and SM (Cheung et al., 2013). However, risk-taking and self-harm behaviors, particularly during adolescence, may also serve as an adaptive strategy, wherein adolescents utilize these behaviors in order to be accepted by peers, adapt to their environment and/or gain increasing autonomy (Kaess et al., 2014a). While many individuals might engage in a period of risk-taking and self-harm behaviors during adolescence and subsequently reduce this as they approach adulthood (Moran et al., 2012a; Wichstrøm, 2009), some individuals show an abnormal development course that is associated with increased risk for later psychopathology, such as BPD.

We propose that not only the occurrence of SIB, SB and SM, but particularly the duration, frequency and developmental course of these behaviors might be a valuable indicator for adolescent BPD pathology. Thus, the developmental trajectories of adolescent risk-taking and self-harm behaviors might serve as markers for elevated risk of BPD development in adolescence.

The goal of this study was to separately explore whether certain developmental trajectories of SIB, SB and SM may be associated with late adolescent BPD traits, and could therefore be used as a marker for increased risk for BPD pathology in a non-clinical sample of adolescents. Using three waves of data from a two-year prospective, longitudinal study, separate developmental patterns were identified for each of the three behaviors using general growth mixture modeling (GGMM). GGMM focuses on the relationship among individuals in a heterogeneous population and classifies them into homogeneous trajectories according their based on their onset value and developmental pattern (Muthén and Muthén, 2000). It was utilized here to explore, whether certain developmental trajectories, reflecting different patterns of harmful behaviors, might later be associated with adolescent BPD features.

2. Methods

2.1. Participants

Data were obtained from the German cohort of the 'Saving and Empowering Young Lives in Europe' (SEYLE) project and the SEYLE follow-up. The German cohort was recruited from 26 schools, chosen by a school randomization list, using a sampling procedure that is thoroughly described elsewhere (Wasserman et al., 2010). This cohort consisted of a representative sample of 1444 adolescents in the first assessment (T0), 1202 in the second assessment (T1) and 515 in the third assessment. Age at T0 ranged from 13 to 17 years. Only participants who participated in all three assessments were included in this study. Due to attrition (n=929) and missing data (n=2), the final sample consisted of 513 pupils (mean age=14.53 ± 0.72; F/M: 320/194), i.e., nearly 36% of the initial sample. Table 1 includes sociodemographic, psychopathological and behavioral data of both the study sample and the sample lost to follow-up (drop-out).

2.2. Design

Three annual assessments took place between 2010 and 2012, and were conducted in January of each year. The SEYLE project tested the effectiveness of various school-based interventions, which were performed over four weeks after the first assessment. Whereas the first two assessments took place in schools, the final assessment (i.e., the SEYLE follow-up study) was conducted exclusively in Germany and used mainly Internet but also postal questionnaires.

2.3. Measures

SIB was measured by a modified 6-item version of the Deliberate Self-Harm Inventory (Brunner et al., 2014), which assessed frequency and five types of methods (i.e., self-cutting,-burning,-hitting,-biting, and skin damage by other methods) of self-directed injury to one's body surface. General prevalence and frequency of SIB were summed and coded for each assessment in an ordinal-scaled manner. Youth who had not engaged in any self-injury

Table 1
Socio-demographic description and self-harm behaviors of the study sample versus dropouts at T0. Study sample: subjects who participated in all measurement occasions; drop-out: loss to follow-up; SD, standard deviation; SDQ, Strengths and Difficulties Questionnaire; PSS, Paykel suicidal scale; SIB, self-injurious behavior; SM, substance misuse.

	Study sample (n=515)	Drop-out (n=929)	***P value***
Sex (female)	62.14%	46.50%	*< .001*
Age at T0 *mean years* (± *SD*)	14.72 (± 0.84)	14.53 (± 0.72)	*< .001*
SDQ *mean score* (± *SD*)	11.38 (± 5.16)	11.51 (± 5.22)	*.670*
PSS			*.170*
None	52.92%	58.18%	
Life not worth living	13.04%	12.25%	
Wished oneself dead	6.03%	5.31%	
Thoughts of taking life	15.76%	11.16%	
Seriously considered taking life	11.28%	12.13%	
Attempted suicide	0.97%	0.87%	
Repetitive SIB reported			*.950*
Yes	10.35%	10.46%	
No	89.65%	89.54%	
SM			*< .001*
No SM	78.47%	65.51%	
Misuse of one substance	17.03%	24.52%	
Misuse of two substances	3.91%	7.05%	
Misuse of three substances	0.59%	2.93%	