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ORIGINAL CONTRIBUTION

Multifinality of peer victimization: maladjustment patterns and transitions from early to mid-adolescence

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Abstract Peer victimization is a common and pervasive experience in childhood and adolescence and is associated with various maladjustment symptoms, including internalizing, externalizing, and somatic problems. This variety suggests that peer victimization is multifinal where exposure to the same risk leads to different outcomes. However, very little is known about the relative likelihood of each form of maladjustment. We used a latent profile approach to capture multiple possible outcomes and examined prediction by peer victimization. We also examined the role of peer victimization with regard to stability and change in maladjustment. Maladjustment symptoms and peer victimization were assessed from the participants of the large cohort study TRacking Adolescents' Individual Lives Survey in early and mid-adolescence. Latent profile and latent transition analyses were conducted to examine associations between victimization and maladjustment profile and to test the role of victimization in maladjustment profile transitions. Four maladjustment profiles were identified for early adolescence (Low, Internalizing, Externalizing, Comorbid) and three profiles (Low, Internalizing, Externalizing) were identified for mid-adolescence. Internalizing problems were more likely in victimized adolescents than low symptom levels or externalizing problems. Victimized adolescents were at greater risk to develop internalizing problems between early and mid-adolescence than non-victimized adolescents. Peer victimization is multifinal mostly when outcomes are examined separately. If multiple outcomes are tested simultaneously, internalizing problems seem to be the most likely outcome

Keywords Multifinality · Peer victimization · Internalizing · Externalizing · Latent profiles · Latent transition

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Introduction

Peer victimization is common and affects between 15 and 25 % of adolescents [1], with estimates varying as a function of gender and age and also mode of assessment and time span covered. A multitude of studies have reported associations between peer victimization and internalizing [2, 3], externalizing [4, 5], and somatic problems [6]. Peer victimization in adolescence has been linked to depressive symptoms [7], social anxiety [8], withdrawal and loneliness [9], self-harm [10], and even increased risk for personality disorders [11] and suicidality [12]. With respect to the externalizing spectrum, peer victimization increased the risk for delinquency and aggression [4, 13, 14]. Notably, peer victimization also affects physiological processes such as hormonal stress response [15] and has been related to somatic symptoms [16, 17]. This variety of outcomes suggests that peer victimization is multifinal—exposure to the same

adversity can result in several forms of maladjustment [18, 19]. Put differently, multifinality describes heterogeneity in outcomes of particular risk or adverse experiences [18]. The concept has been derived from general systems theory [20] and specifies that "ongoing dynamic transaction[s] of risk and protective processes experienced uniquely by individuals will eventuate in different outcomes unfolding over the course of development" (p.11, [18]). Naturally, understanding mechanisms of multifinality of peer victimization requires the assessment and analysis of at least two types of maladjustment, thus, studies that focused on one outcome exclusively [4, 16, 21] can inform about sizes of associations between peer victimization and extent of a specific maladjustment problem such as depressive symptoms. These studies, however, do not account for co-occurrence of several different types of maladjustment and are not able to shed light on the relative likelihood of a specific problem compared to other forms of maladjustment.

Some studies [22–27] have examined more than one outcome, often by controlling for overlap using potentially comorbid or co-occurring outcomes as covariates in regression models. This approach informs about patterns of associations between victimization and specific types of maladjustment (e.g., internalizing) while controlling for other types (e.g., externalizing). However, examining different types of maladjustment in separate models only allows for eyeballing differences in effect sizes but such models do not address several outcomes at the same time and are therefore not suited to inform about the relative likelihood of particular types of maladjustment. Perren, Ettekal, and Ladd [14] estimated a structural equation model in which externalizing and internalizing problems were simultaneously tested as outcomes of peer victimization thus controlling for overlap between both types of maladjustment. Although their model describes multifinality in showing that both maladjustment types were associated with peer victimization, it did not inform about the relative likelihood of either one type of maladjustment compared to the other.

Explicitly tackling multifinality of peer victimization, Hanish and Guerra [28] used cluster analyses to identify patterns of maladjustment in children, revealing that victimization rates were significantly higher in the externalizing, disliked, and symptomatic clusters compared to others. Their study represents a valuable comparison of different types of maladjustment and the cluster analytic approach responds to calls for person-centered techniques when examining individual functioning [29].

Current study

Based on the literature on peer victimization, we argue that examining multiple outcomes simultaneously is informative because maladjustment symptoms tend to co-occur and should be studied as such. The variety of types of maladjustment as a consequence of peer victimization needs to be taken into account in statistical analyses. Responding to this need, we aimed to extend previous findings on the association between peer victimization and maladjustment symptoms in adolescence using a longitudinal person-centered approach and information on withdrawal and anxiety as symptoms from the internalizing spectrum, delinquency and aggression from the externalizing spectrum, and somatic complaints. These symptoms represent common adjustment problems in adolescence and simultaneously denote well-studied outcomes of peer victimization.

We drew on the advantages of latent profile analyses to identify maladjustment profiles characterized by distinct maladjustment symptom endorsement patterns: (1) classification probabilities are assigned, thus analyses that follow on from latent profile analyses control for misclassification error, (2) fit diagnostics are provided, and (3) covariates can be tested without biasing profile derivation [30, 31]. Once profiles were derived, we examined associations with peer victimization. Based on prior research, we hypothesized that profiles with higher levels of maladjustment symptoms would be more common in victimized adolescents. The latent profile approach yields estimates of relative risk. We were thus able to elucidate whether, for instance, a maladjustment pattern of high delinquency and aggression but low anxiety and withdrawal is more likely following victimization or whether, for instance, a pattern high in withdrawal, anxiety, and somatic complaints is more likely. This analytic strategy meant that we were able to simultaneously model a range of possible outcomes.

We further examined whether peer victimization contributed to change in maladjustment using latent transition analyses. Latent transition analyses are longitudinal extensions of latent profile analyses that capture profile movements over time. In brief, latent profile models are estimated for each time point and probabilities for profile transitions can be estimated across different levels of a covariate. For instance, an adolescent who initially shows a well-adjusted profile but becomes exposed to peer victimization may show a maladjusted profile later on whereas another adolescent who is not victimized remains well adjusted. Latent transition analyses neatly inform about developmental dynamics and the role of victimization on stability and change in maladjustment. In sum, our analyses not only respond to calls for person-centered analytic approaches but also elucidate the relative likelihood of particular and previously established outcomes of peer victimization in the presence of other possible outcomes.

Method

Participants

This study includes data from the second and third wave of the TRacking Adolescents' Individual Lives Survey (TRAILS), corresponding to early and mid-adolescence. TRAILS is a prospective cohort study of Dutch adolescents, with bi- or triennial follow-up assessments. Initially, 135 schools were approached of which 122 agreed to participate. Parents were informed about the study and both parents and children were asked to provide informed consent for study participation. Ethical approval for the study was obtained from the Dutch national ethics committee Centrale Commissie Mensgebonden Onderzoek. A total of $n = 2{,}935$ children were invited to participate of whom $n = 2{,}230$ did so at the first wave in 2001 (mean age 11.6 years). Initial participation was more likely when adolescents were female, from higher socioeconomic status background, and showed better school performance. Retention at wave two was excellent at 96.4 % ($n = 2{,}149$) and at wave three 81.4 % ($n = 1{,}816$) participants were still in the study. Those lost to attrition were more often male, of non-Western ethnicity, with divorced parents, low socioeconomic status, low IQ and academic achievement, poor physical health and externalizing problems as well as low peer status [32]. More detail about the study is published elsewhere [33, 34]. Data collection for the waves used here took place when adolescents were on average 13.6 years old and again when adolescents were on average 16.3 years old.

Measures

Maladjustment in early and mid-adolescence was assessed with the Youth Self-Report [35, 36] using five subscales with identical item content at both occasions and a response range from 0 (never) to 2 (definitely/often). Withdrawal/depression ('withdrawal') consisted of eight items such as "I am rather alone than with others". Anxiety/depression ('anxiety') consisted of 13 items, for example "I'm afraid of certain animals, situations and places". Somatic complaints ('somatic') consisted of ten items like "I have headaches for no specific reason". Delinquent behavior ('delinquency') was measured on a 15-item scale (e.g., "I do not live by the rules at home or at school") and aggressive behavior ('aggression') was measured on a 17-item scale (e.g., "I fight a lot"). Internal consistency ranged from $\alpha = 0.69$ to 0.83.

Peer Victimization was assessed in early and mid-adolescence, enabling the analysis of effects of acute or short-term as well as more enduring victimization. The self-report assessment in early adolescence was conducted using the item "Were you bullied?" from a life events scale developed specifically for TRAILS that covered the past 2 years. Adolescents responded to this question with yes (1) or no (0). The teacher assessment in early adolescence was conducted using a three-item scale ("Student is target of gossip", "Student is excluded from activities", and "Student is ignored when someone is mad at him/her"; response range 1 = never to 5 = always) developed for TRAILS with high internal consistency ($\alpha = 0.85$).

The self-report assessment in mid-adolescence was conducted using the event history calendar interview [37], which assessed events that had occurred between the very first TRAILS assessment at age 11 (preceding the early adolescent assessment) and the current assessment as well as the precise timing of the event. We utilized the item that referred to being a victim of bullying (yes/no response and follow-up question to determine timing). Of those who completed the EHC ($n = 1{,}513$), $n = 402$ (26.6 %) reported at least one instance of being victimized. We used information about timing to determine whether victimization had already taken place before the early adolescent assessment ($n = 284$, 12.8 %) or whether victimization had also occurred between early and mid-adolescence ($n = 107$, 4.8 %).

Statistical analyses

Following derivation of maladjustment profiles, we examined their prediction by self- and teacher-reported victimization, and examined whether transitions between profiles were similar for adolescents with different victimization histories. Latent profile analyses were conducted using full information maximum likelihood estimation and latent transition analyses were based on cases with victimization information.

For the first step, we used a cross-sectional mixture model procedure (LPA) to derive maladjustment profiles and examine their associations with peer victimization. LPA identifies unobserved population heterogeneity based on continuously measured responses to several variables and yields a nominal variable that reflects the latent profile for which an individual has the highest probability and which subsequently functions as dependent variable. Models with increasing numbers of profiles were compared and the decision for the best fitting solution was based on entropy (preferably >0.80), group size (no group smaller than 5 % of the full sample), Bayesian information criterion (BIC), and Lo–Mendell–Rubin (LMR) test. In the second step, latent profiles were related to victimization using R3STEP in Mplus 7 which examines links between latent profiles and a covariate without biasing the LPA [30]. This procedure corrects for classification error [38]. In the third step, we modeled the transition from maladjustment profile

in early to mid-adolescence (LTA) both covariate-free and with victimization included as covariate using an adjusted version of the Mplus user manual example 8.13 [39]. These models inform whether peer victimization affected the probability to transition from one profile to another.

Results

Descriptive analyses

Means and standard deviations are depicted in Table 1 and pairwise correlations can be found in Table 2. Maladjustment symptoms were inter-related at both assessments with associations ranging from modest ($r = 0.12$ between anxiety and delinquency in mid-adolescence) to strong ($r = 0.67$ between withdrawal and anxiety). Generally, lower coefficients were yielded for associations between internalizing and externalizing symptoms. Stability of maladjustment symptoms was moderate and ranged from 0.50 for somatic complaints to 0.55 for anxiety. Self-reported victimization in early adolescence was associated with all maladjustment symptoms in early adolescence. Moreover, self-reported victimization in early adolescence was associated with withdrawal, anxiety, somatic complaints, and aggression in mid-adolescence. Victimization assessed in mid-adolescence was also stably linked to most maladjustment symptoms with victimized adolescents showing higher withdrawal, anxiety, somatic complaints, and aggression in early and mid-adolescence. The pattern for teacher-reported victimization was similar although associations were more modest and no correlations were found between victimization and mid-adolescent delinquency or aggression. Finally, teacher and self-reports correlated moderately and the different self-assessment also showed significant albeit moderate overlap.

Table 1 Descriptive statistics of study measures

	M	SD	Range
Maladjustment early adolescence			
Withdrawal	0.38	0.32	0–1.75
Anxiety	0.29	0.29	0–2.00
Somatic complaints	0.30	0.28	0–1.50
Delinquency	0.32	0.24	0–1.40
Aggression	0.31	0.23	0–1.47
Maladjustment mid-adolescence			
Withdrawal	0.34	0.30	0–1.88
Anxiety	0.31	0.29	0–1.92
Somatic complaints	0.33	0.29	0–1.70
Delinquency	0.26	0.20	0–1.53
Aggression	0.31	0.24	0–1.53
Teacher-rated peer victimization	1.37	0.59	1–5

Latent maladjustment profiles in early and mid-adolescence

Models with increasing numbers of profiles were computed for early and mid-adolescent maladjustment symptoms (supplementary material). While in mid-adolescence the three-profile solution yielded the BIC closest to zero and the best entropy, the best solution for early adolescence was less obvious. Here, BIC increasingly deviated from zero, the more classes were added. Yet the LMR statistic suggested a four-profile model, which also had a better entropy than the three-profile model. In light of these comparisons, and considering interpretability of classes, we retained four maladjustment profiles for early adolescence and three maladjustment profiles for mid-adolescence.

Figure 1 depicts raw symptom scores for the four early adolescence maladjustment profiles. The largest group (58.1 %, Low in the following) showed low levels across the symptom spectrum whereas approximately one in four adolescents presented with elevated levels of withdrawal, anxiety, and somatic symptoms (Internalizing, 24.2 %); 10.5 % of adolescents showed considerably higher levels of delinquency and aggression than the majority of adolescents (Externalizing). A small group (7.2 %, Comorbid) showed elevated levels of all symptoms.

Turning to mid-adolescence, the three-profile solution (Fig. 2) yielded a large group (Low, 69.4 %) with invariably low scores across the symptom spectrum, one group of adolescents who scored high on aggression and delinquency (Externalizing, 16.2 %) and one group who scored high on withdrawal, anxiety, and somatic problems but low on delinquency and aggression (Internalizing, 14.4 %).

Associations between maladjustment profiles and peer victimization

We next examined associations between maladjustment profiles and peer victimization using Mplus' R3STEP multinomial logistic regression. Adolescents who reported victimization in early adolescence were more likely to present with any early adolescent maladjustment profile when compared to the Low profile: Internalizing versus Low $\beta = 0.93$, $p < 0.001$, Externalizing versus Low $\beta = 0.93$, $p < 0.001$, and Comorbid versus Low $\beta = 1.54$, $p < 0.001$. Victimization also distinguished between the Internalizing and Externalizing profiles: $\beta = 0.47$, $p = 0.04$, and between the Comorbid and Internalizing ($\beta = 0.61$, $p = 0.01$) and Comorbid and Externalizing ($\beta = 1.07$, $p < 0.001$) profiles.

We also examined these associations using the mid-adolescent EHC assessments and largely replicated the results: Those who reported victimization were more likely

Table 2 Pairwise correlations between maladjustment measures and peer victimization

		1	2	3	4	5	6	7	8	9	10	11	12
1	SR peer victimization (EA)												
2	TR peer victimization (EA)	0.22***											
3	SR peer victimization (MA)	0.32***[a]	0.23***										
4	EA withdrawal	0.19***	0.17***	0.18***									
5	EA anxiety	0.24***	0.15***	0.20***	0.63***								
6	EA somatic complaints	0.18***	0.07*	0.11***	0.42**	0.52***							
7	EA delinquency	0.04*	0.10**	0.01	0.25***	0.24***	0.25***						
8	EA aggression	0.16***	0.09*	0.09***	0.40***	0.44***	0.36***	0.64***					
9	MA withdrawal	0.14***	0.08*	0.19***	0.52***	0.40***	0.22***	0.15***	0.23***				
10	MA anxiety	0.17***	0.07*	0.11***	0.42***	0.55***	0.33***	0.10***	0.22***	0.67***			
11	MA somatic complaints	0.12***	0.10**	0.23***	0.29***	0.37***	0.50***	0.19***	0.27***	0.42***	0.52***		
12	MA delinquency	0.02	0.06	0.00	0.10**	0.11***	0.15***	0.52***	0.39***	0.15***	0.12***	0.24***	
13	MA aggression	0.12***	0.05	0.07**	0.22***	0.27***	0.22***	0.40***	0.51***	0.34***	0.39***	0.37***	0.63***

SR self-report, *TR* teacher-report, *EA* early adolescence, *MA* mid-adolescence

[a] Kendall's tau coefficient, all correlation coefficients involving self-reported victimization obtained using point-biserial correlation analyses

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

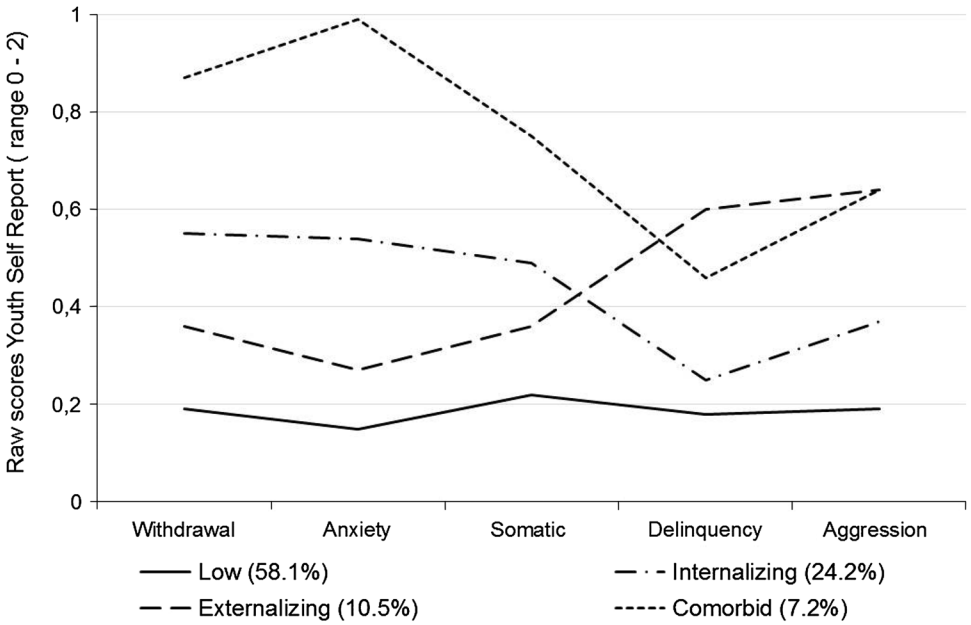

Fig. 1 Latent maladjustment profiles in early adolescence

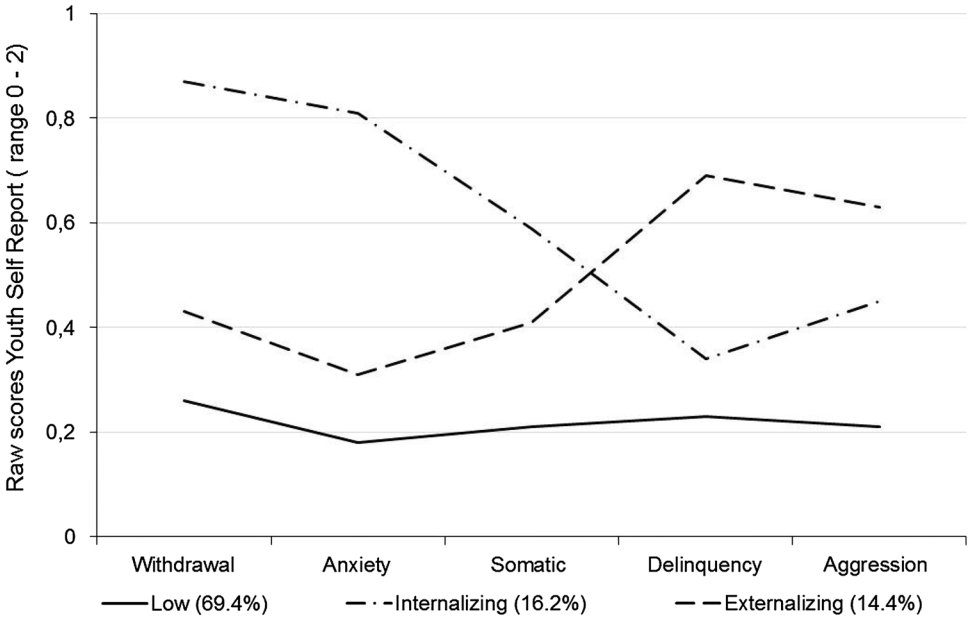

Fig. 2 Latent maladjustment profiles in mid-adolescence

to present with an Internalizing ($\beta = 1.00$, $p < 0.001$) or Comorbid ($\beta = 1.19$, $p < 0.001$) compared to a Low profile in early adolescence. Both the Internalizing ($\beta = 0.91$, $p < 0.001$) and Comorbid ($\beta = 1.10$, $p < 0.001$) profiles were also more likely than the Externalizing profile in victimized adolescents.

Longitudinally, adolescents who reported victimization exposure in early adolescence were more likely to have an Internalizing than Low ($\beta = 1.03$, $p < 0.001$) or Externalizing profile ($\beta = 0.90$, $p < 0.001$). Peer victimization did not distinguish the Externalizing from the Low maladjustment profile. Again, victimization assessed using the EHC differentiated the Internalizing from the Low ($\beta = 1.12$, $p < 0.001$) and from the Externalizing ($\beta = 1.073$, $p < 0.001$) profiles but, in line with results using the early adolescent victimization assessment, did not distinguish the Low and Externalizing profiles.

The pattern for teacher-reported victimization was less pronounced in that it differentiated the Internalizing ($\beta = 0.53$, $p = 0.003$), Externalizing ($\beta = 0.60$, $p = 0.01$), and Comorbid ($\beta = 0.94$, $p < 0.001$) profiles from the Low profile; but did not distinguished between the three maladjustment profiles. Longitudinally, teacher-reported

victimization distinguished only the Externalizing and Low profiles ($\beta = 0.51$, $p = 0.01$) in mid-adolescence.

Stability and change: latent transition analysis

Next, we examined profile transitions and tested whether transition probabilities differed across experiences of peer victimization. Note that we did not examine or specify measurement invariance across time as the LTA models differed with regard to number of profiles. As a result of classification uncertainty, profile frequencies differ slightly between LPA and LTA, which is common to mixture models but did not affect the overall profile structure. Moreover, transition probability comparisons across levels of the victimization variable are descriptive because, in contrast to latent profile models including covariates, it is not possible (yet) to formally compare frequency differences.

Transition probabilities obtained from a covariate-free LTA suggest that the vast majority (89.4 %) of those with an early adolescent Low profile showed a Low profile in mid-adolescence as well. However, about 10 % of adolescents transitioned into one of the maladjustment profiles. Notably, stability for the Internalizing profile was modest (43.2 %) and most adolescents (47.9 %) recovered as suggested by their transition into the Low profile. Only few of those with an Externalizing profile in early adolescence transitioned into an Internalizing profile (4.0 %), most stayed within the Externalizing (72.2 %) or moved into the Low profile (23.8 %). Of note, many of those with an Internalizing profile in mid-adolescence displayed a Comorbid profile earlier (64.3 %).

We next entered peer victimization into the model, using the EHC assessments, which were coded to reflect three groups: no victimization, victimization already occurred prior to early adolescent assessment, and victimization also occurred since early adolescent assessment. Table 3 shows transition probabilities for these groups. The probability to stay in the low group was reduced for recently victimized adolescents, as was the probability to move into the Externalizing group. In contrast, a transition into the Internalizing group was more likely for recently victimized than non-victimized adolescents (19.4 % compared to 2.3 %). In other words, almost one on five adolescents who showed a low profile in early adolescence and were subsequently victimized transitioned into the internalizing profile while this transition was observed in only 2.3 % of non-victimized adolescents.

Notably, victimization made little difference to transitions out of the Externalizing or Internalizing groups, but whether or not someone reported recent victimization differentiated transitions out of the Comorbid group. That is, victimized adolescents were more likely to transition into the internalizing profile with fewer non-victimized adolescents showing this movement whereas more non-victimized adolescents transitioned into the Externalizing profile than victimized adolescents.

Discussion

Peer victimization is an acknowledged risk for adolescent maladjustment but we know little about the relative likelihood of specific maladjustment profiles. Moreover, research regarding the role of peer victimization in affecting stability and change in maladjustment patterns is scarce. Aiming to tackle these gaps in the literature, we first set out to replicate the results of Hanish and Guerra's [28] study on children and found that peer victimization most consistently predicted internalizing problems, which is in line with many studies [2, 3, 23, 26], but contrasts Hanish and Guerra [28], who reported significant associations between victimization and externalizing maladjustment. These divergent results may be a consequence of focusing on different age groups, that is, there may be differences in how children respond to peer victimization in comparison to adolescents. Neuroimaging studies point at developmental variation in activation of relevant brain regions following exposure to experiences similar to victimization [40–43]. Guyer et al., [40] for instance, reported that activation in regions involved in social affect and social reward increased linearly with age in a sample of 9–17 years old who completed a social interaction task in which they were

Table 3 Stability and change in profile membership based on transition probability by victimization in percent

	Mid-adolescence Low	Mid-adolescence Internalizing	Mid-adolescence Externalizing
Early adolescence Low	90.6/85.6/80.6	2.3/5.0/19.4	7.2/9.4/0.0
Early adolescence Internalizing	47.9/49.3/47.6	43.6/40.5/47.2	8.5/10.2/5.5
Early adolescence Externalizing	24.8/18.9/32.6	3.4/10.3/0.0	71.8/70.8/67.4
Early adolescence Comorbid	12.4/12.5/8.5	55.6/75.0/72.5	32.0/12.5/19.0

The first column in each cell refers to transition probabilities for non-victimized adolescents, the second column refers to adolescents who were already victimized prior to early adolescence (i.e., earlier than first transition point) and the third column refers to adolescents who were only victimized between early and mid-adolescence

confronted with acceptance and rejection ratings of virtual peers. A recent review [44] indicated that adolescence is a particularly sensitive period with regard to peer evaluations, and that the frequent onset of mental health problems in adolescence is likely linked to this heightened sensitivity. Thus, it may not be surprising that links between victimization and maladjustment differ by age.

Moreover, children are sometimes victimized as a consequence of their aggressive behavior [45, 46], suggesting that associations between externalizing behavior and victimization may be bi-directional in childhood but not in adolescence when externalizing behavior can be associated with status and popularity among peers [47, 48]. In other words, externalizing behavior may not be a consequence but an antecedent of victimization but this link may be specific to childhood.

Put broadly, our results suggest that peer victimization is multifinal only if different outcomes are considered separately but most strongly predicts internalizing maladjustment when symptoms are examined simultaneously. In other words, if the likelihood for different outcomes is tested at once, the association between victimization and externalizing problems appears to be suppressed in favor of internalizing problems. We do not argue that previously reported associations between peer victimization and externalizing problems are artifacts. What our results show, though, is that internalizing problems were more likely than externalizing problems in victimized adolescents.

It is possible that this greater likelihood of internalizing problems is only true when averaged across adolescents. That is, we know that the effect of peer victimization on maladjustment is not uniformly strong across individuals and that gender, temperament, and other factors affect the size of the association. It is possible that these moderating factors also determine the likelihood of a specific maladjustment profile. Thus, future studies are required that probe previously found moderators to elucidate whether they function as qualifiers on associations between peer victimization and relative likelihood of different maladjustment patterns. The findings of such studies could help in establishing specific associations between risk and outcome that exist for subgroups and may ultimately lead to targeted interventions. For instance, particular outcomes such as the Internalizing profile may be more likely in girls or individuals high on emotionality whereas the Externalizing profile may be more likely in boys or individuals low in self-control. Gendered interventions that also account for individual differences in temperament may thus be more successful.

Extending the latent profile models to describe stability and change in maladjustment, the transition model suggested that recently victimized adolescents more often began to show internalizing problems than their non-victimized counterparts whereas non-victimized adolescents more often reported externalizing problems than victimized adolescents. Starting out differently but essentially showing a similar pattern, those with comorbid maladjustment symptoms in early adolescence more often showed internalizing problems in mid-adolescence if they were victimized during this time than those who did not report peer victimization whereas the pattern was reversed for the transition into a profile with externalizing problems. Overall, these movements confirm that internalizing problems were not only more likely than symptom absence in victimized adolescents, but also more likely than externalizing problems. Notably, peer victimization may actually cushion the risk for externalizing behavior, which contradicts studies that found this association [4, 5] in single-outcome models. The origins of such different findings may again be found in study design (i.e., accounting for internalizing maladjustment, which seems to be the more likely correlate of victimization) and age. That is, externalizing behavior in adolescence is relatively common and often ascribed to peer groups' dynamics. Victimized adolescents lack access to such contexts and consequently may not find themselves in situations that are conducive to delinquency and aggression.

Of note, peer victimization explained only a modest proportion of variance in maladjustment. Mental health in adolescence is affected by a multitude of other potential risk factors ranging from neighborhood conditions and socioeconomic status [49] and family [50] to biological [51, 52] and genetic factors [53–55]. We cannot exclude the possibility that these factors also influenced the risk to be victimized by peers and would thus confound the associations found in the current study. In addition, exposure to more severe risks such as maltreatment, abuse, or extreme neglect would likely be more powerful in predicting adolescent mental health compared to peer victimization. However, we were keen on identifying the relative risk of a maladjustment profile compared to another profile as a function of peer victimization specifically. Our emphasis was on peer victimization and its outcomes rather than on finding the strongest predictor for externalizing or internalizing problems. For this question, the strategy applied in this study where we focused on a single rather than a set of predictor variables, was suited best as it is difficult to disentangle the respective contributions of peer victimization in affecting relative risk and likelihood for transition in the presence of several additional predictors. This is not to say that our models could not incorporate a greater number of predictors and other researchers are encouraged to further develop models in which a set of predictors is used to explain variation in outcomes.

Methodological considerations

The latent variable approach used here outperforms previous studies into peer victimization and maladjustment. Firstly, it accounts for the co-occurrence of different symptoms without reverting to artificial methods that attempt to eliminate shared symptom variance through use of regression residuals. Each profile contains information on endorsement of all symptoms, so information about withdrawal, anxiety, and somatic complaints is represented just as well as information on aggression and delinquency in all profiles. Secondly, deriving a variable that represents the distinct profiles opened the possibility to empirically test multifinality of peer victimization. Thirdly, latent transition analyses as longitudinal extensions of latent profiles allow for examining stability and change in maladjustment profiles, thus the advantages inherent to latent profile modeling are used in models that elucidate how movements over time are affected by covariates. Transition analyses are not limited to two assessments and the models presented here can be adapted to incorporate intermediate variables. Thus, we hope that our analyses provide a starting point for future studies that seek to understand different forms of maladjustment as outcomes of the same risk exposure and stability and change over time.

Limitations and future directions

Although this study is novel in methodological and substantive respect, findings need to be interpreted with some limitations in mind. For instance, we based many of our analyses on self-reports, which are more relevant to maladjustment but reflect subjective experiences rather than objective exposure of victimization and can be biased both up- and downwards [56]. The use of single victimization items does not allow differentiating forms of victimization. Although the rate of affected adolescents is comparable to other studies [1], the binary nature of the construct potentially reduced power to detect associations with maladjustment. It is reassuring that results using self-reports from different time points and to some extent also analyses using teacher reports yielded comparable results. With respect to the teacher reports it is important to note that the three items used here reflect relational aggression but are not informative about chronicity or power structure between victims and their perpetrators. Put differently, teachers were not given a conventional definition of bullying, which poses a limitation and may explain the absence of an association between teacher-reported victimization and mid-adolescent delinquency and aggression. Again, given this limitation, it is reassuring that a similar pattern of associations with latent profiles was obtained when using self-reports.

We focused on a restricted and relatively non-specific range of maladjustment symptoms. This selection was based on prior peer victimization research but latent profiles can be based on many more indicators and as such may reflect more specific maladjustment patterns. Inclusion of additional indicators of maladjustment such as suicidality and self-harming behavior could further define the profiles. Notably, we derived a Comorbid profile with high levels on all maladjustment scales in early but not in mid-adolescence. Future studies are needed to examine whether developmental mechanisms split the Comorbid into Internalizing and Externalizing profile. This could elucidate whether comorbidity is indeed more likely in pre- compared to mid-adolescence.

Notwithstanding these limitations, our results extend previous knowledge by showing that, in the presence of peer victimization, internalizing maladjustment is not only more likely than absence of maladjustment symptoms but also more common than externalizing problems. This pattern was also evident over time in that victimized adolescents more often transitioned from the Low into the Internalizing profile than non-victimized adolescents. Taken together, our findings make a clear case for considering multiple outcomes simultaneously to fully understand concurrent and longitudinal associations between risk and maladjustment.

Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

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