

Paper III

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Subjective health complaints and being bullied in early
adolescence: A longitudinal study

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Abstract

This 2-year longitudinal study investigated the subjective health complaints, incidence of being bullied, and school support of Norwegian adolescents (aged 13 at the start of the study). Data were collected systematically from 386 students at 6-month intervals. The analysis employed univariate, bivariate, and conditional multivariate latent growth models with examination of autoregressions and crosslags. The analyses yielded three primary results. First, while being bullied over the four time intervals was best explained by a one-factor latent curve model (intercept), subjective health complaints were best explained by a two-factor latent curve model (intercept and slope). Second, the bullying intercept was associated with the subjective health complaints slope, indicating the possible causal influence of bullying on subjective health complaints. Finally, student support, but not teacher support, was significantly negatively related to being bullied, while there were significant direct effects from both support sources and initial levels of subjective health complaints detected. The paper concludes with implications of the research for future research and practice.

Keywords: Early adolescence; bullying; health complaints

Subjective health complaints and bullying in early adolescence: A longitudinal study

Adolescents experience different kinds of psychosocial stressors in their daily life that may have consequences for their subjective health and wellbeing. One such possible stressor is the phenomena of being a victim of bullying that is characterized by: *negative actions* from one or more persons that are *repeated over time*, where there is an *imbalance of power* between the offender(s) and the victim (Olweus, 1999b). It is common to distinguish between direct forms of bullying, entailing relatively open attacks on the victim, whether physical or verbal, and indirect forms of bullying, involving some form of social isolation or intentional exclusion from a third party (Olweus, 1999b). It is well-documented that bullying is a considerable problem in schools (Olweus, 1986; O'Moore & Hillery, 1989; Whitney & Smith, 1993), and being a victim of bullying is likely to cause considerable distress, with long-term effects including increased incidence of depression and reduced self-esteem as young adults (Nansel et al., 2001).

In particular, there has been an increasing recent focus on possible effects of being a victim of bullying on different health outcomes in early adolescents (Forero, McLellan, Rissel, & Bauman, 1999; Kaltiala-Heino, Rimpela, Rantanen, & Rimpela, 2000; Nansel et al., 2001; Rigby, 2000; Wilkins-Shurmer et al., 2003). Hawker and Boulton's (2001) meta-analysis concludes that the strongest psychosocial effects of being bullied have been demonstrated in the area of depression, although being bullied has been consistently connected to other forms of psychological maladjustment, such as anxiety, general self-esteem, loneliness, and social self-esteem. While some of the effect sizes may be attributable to shared variance, a significant correlation has been found between victimization and psychosocial functioning (Hawker & Boulton, 2001), even in studies avoiding shared method variance.

The conclusions formed by Hawker and Boulton (2001) have generally been supported in more recent cross-sectional studies not included in the meta-analysis, using indicators such as depression (Craig, 1998; Fekkes, Pijpers, & Verloove-Vanhorick, 2004; Kaltiala-Heino et al., 2000), anxiety (Craig, 1998; Fekkes et al., 2004; Kaltiala-Heino et al., 2000), and psychosomatic symptoms (Fekkes et al., 2004; Kaltiala-Heino et al., 2000). In contrast, Forero et al. (1999) did not find a significant relationship between victimization and psychosomatic symptoms or between victimization and a general measure of mental health (happy/not happy), although victims tended to report being lonely more than those who were not involved in bullying.

Despite frequent calls for longitudinal research illuminating the possible causal links between being bullied and mental health (Kaltiala-Heino et al., 2000; Nansel et al., 2001; Rigby & Slee, 1999), such research is generally lacking and largely inconclusive as to directionality. Hodges and Perry (1999) discovered that there was reciprocal causation between victimization and internalizing (but not externalizing) problems. Greater victimization at Time 1 predicted greater internalizing problems at Time 2, with the effect being moderated by peer rejection. In contrast, Bond, Carlin, Thomas, Rubin, and Patton (2001) found that students who were bullied in Grade 8 but did not report symptoms of depression at that time (as compared to those neither bullied nor depressed) were more likely to report depression in Grade 9. The reverse, however, was not true. Finally, Wilkins-Shurmer et al. (2003) found almost no causal effects of internalizing or externalizing behaviours as reported by mother at child's age 5 on children's self-reports of bullying at age 14.

Bullying often occurs within the school arena (Whitney & Smith, 1993). Therefore, teachers and peers might prove important resources to help stop victimization (Rodkin & Hodges, 2003). Peers provide the primary context within which bullying occurs and can directly

or indirectly support its continuance (Greene, 2003; Hazler & Denham, 2002; Rodkin & Hodges, 2003). Teachers can provide contexts in which bullying is tacitly tolerated or successfully curtailed (Greene, 2003; Rodkin & Hodges, 2003). In a study by Rigby and Bagshaw (2003), a sizeable minority of both boys (40.3%) and girls (39.7%) felt that teachers were “not really” or “only sometimes” interested in stopping bullying. However, teachers may not be always aware of bullying taking place (Rodkin & Hodges, 2003). This problem becomes compounded as many adolescents who are bullied fail to tell their teachers with the percentage reporting tending to decrease as students move into secondary school (Whitney & Smith, 1993). As well, teachers and other students may not intervene to prevent bullying on a consistent basis (Rigby & Bagshaw, 2003; Whitney & Smith, 1993).

Teacher and peer support have also been linked to more positive psychosocial functioning. Torsheim and Wold (2001) found that, among Norwegian adolescents, important factors related to psychosomatic health complaints included classmate support. Teacher support was not found to be significant. However, in another study by Torsheim and Wold (2001) students who had low teacher and peer support and perceived high levels of school-related stress were more likely to have weekly somatic complaints. Furthermore, after controlling for stress, low peer support students were more likely to have somatic complaints compared to high peer support students. Adolescents in an American study who did not have close bonds with their teachers or schools rated themselves as having greater anxiety and depression compared to those who had close bonds with their teachers and schools (Murray & Greenberg, 2000). Conversely, Kuperminc, Leadbeater, and Blatt (2001) reported limited effects of teacher support.

Social support may moderate the link between bullying and poor well-being. For example, in a study of British male adolescents, Flouri and Buchanan (2002) found that, whereas

bullied respondents who had a low level of father support had poor life satisfaction, the gap between bullied and non-bullied students decreased as father support increased. Rigby has explored this buffering hypothesis in two studies (Rigby, 2000; Rigby & Slee, 1999). Using suicidal ideation as the outcome variable, Rigby and Slee (1999) found in two separate Australian studies that overall social support (teacher, best friend, students in class, mother, father), social support from teacher, and victimization were all related in the expected direction to suicidal ideation. However, while social support and victimization both contributed to understanding suicidal ideation in a multiple regression equation, their interaction was not significant, thereby rejecting the buffering hypothesis. Similar patterns were found in Rigby (2000) using a variety of psychosocial health outcome variables.

While these studies collectively have started to give us an understanding of being bullied, subjective health complaints, and school support, there appears to be three lacks in the present research. First, while being bullied and psychosomatic health complaints are clearly connected, there appears to be a developmental decreasing trend in victimisation from childhood into early adolescent years (Forero et al., 1999; Nansel et al., 2001; Olweus, 1999a; Whitney & Smith, 1993). In contrast, the normative development of psychosomatic health complaints seems to peak later, in early to mid adolescence for both boys and girls (Aro, Paronen, & Aro, 1987; Hetland, Torsheim, & Aarø, 2002; Rauste-von Wright & von Wright, 1981) or at least for girls (Holsen, Kraft, & Vittersø, (2000)). Therefore, the developmental trends associated with both being bullied and experiencing psychosomatic health complaints must be examined concurrently to discover if the variant findings are the result of using different samples.

Second, most existing studies in the field are based on cross-sectional data, only giving information about the existing associations between bullying and these outcomes, and not the causal direction of the relationship. As Hawker and Boulton (2001) suggest, based on their meta-analysis of studies published between 1979 and 1997, “there is little need now for further cross-sectional studies of peer victimization and psychological maladjustment” (p. 453). In addition, to understand how being bullied is related to subjective health complaints over time it is important to take into account the possible developmental changes in the two constructs, and how these developmental changes may be related. Furthermore, there may exist bi-directional relations between being bullied and complaints beyond these developmental processes. The present study thus addresses the reciprocal relationship between being a victim of bullying and subjective health complaints from a developmental perspective, using data from a 2-year follow-up study from the age of 13 to the age of 15.

Finally, most studies have connected the three constructs of bullying, psychosocial health, and school support pair-wise, rather than examining the concepts concurrently. Nansel et al. (2001) found that, in their American sample, victims of bullying had significantly poorer relationships with classmates and greater self-reported loneliness than their peers not involved in bullying but perceived the general school climate in similar terms. Natvig et al. (2001), reporting on a Norwegian study, concluded that students who were bullied were more likely to suffer from a range of psychosomatic symptoms. Degree of victimizing and support from other pupils (but not from teachers) both predicted number of psychosomatic symptoms for boys, whereas degree of victimizing and support from teachers (but not from other pupils) were significant predictors for girls. Neither of these studies examined the interaction between school support and victimization in understanding psychosocial complaints.

In summary, the present study builds upon previous research in three significant ways. First, unlike many previous studies, it examines the issues of bullying and psychosocial health longitudinally to provide a better sense of their developmental trend. Second, in contrast to the existing longitudinal studies on psychosocial health and bullying, the present study takes into account the possible individual variation in developmental trajectories in the two constructs, allowing for a more fine-grained analysis of interactions across time. Finally, rather than exploring the constructs of bullying, psychosocial health, and school support solely in pair-wise analyses, it combines the constructs of interest to explore their interconnections more fully. Our specific research questions for the study were:

- 1) How do being bullied and subjective health complaints change over time?
- 2) How do being bullied and subjective health complaints influence each other over time?
- 3) How are initial levels of teacher and student support related to these developmental trends and associations?

To answer these three research questions, we used an Autoregressive Latent Trajectory (ALT) model approach, combining autoregressive models and latent trajectory models. Furthermore, conditional ALT models controlling for teacher and student support were tested.

Method

Data Sources

Data used in the present study stem from the European Network of Health Promoting Schools study, a World Health Organization (WHO), European Union (EU), and European Community (EC) co-operative project. Within this project, all schools in Norway were invited to formulate an application for participation in the Norwegian network. Based on these applications, 10 schools were selected to participate as piloting schools, including three primary

schools, five secondary schools, and two mixed primary and secondary schools. The full study sample consisted of 1601 students from the 10 pilot schools. A cohort of 386 students, 180 boys and 206 girls, in Grade 8 (aged 13) from the full study sample (autumn 1994) was used for the current analyses. Three follow-up studies were conducted at 6-month intervals in spring 1995, autumn 1995, and spring 1996. The estimated participation rate at baseline was 78%, and the main reasons for non-participation were parental non-consent and absenteeism on the day the survey was conducted. Analyses of missing data reveal that 175 (45.3%) of the students in the cohort answered all questions on all occasions, while eight of the respondents did not answer any of the study variables at any of the four time points. These eight cases were excluded from the dataset before handling the missing data and conducting analyses. Furthermore, no systematic difference was found between participants and non participants on any of the study variables. Missing cases were treated by full-information maximum likelihood (FIML) within the AMOS 5.0 software, where missing values are imputed by estimating a likelihood function for each individual based on the variables present in the model. Maximum likelihood based methods, like FIML, have been shown to produce unbiased parameter estimates and standard errors, when data are missing at random (Roth, 1994; Wothke, 2000).

Procedure

Data were collected through anonymous, self-report questionnaires administered by a teacher during an ordinary class-hour to the students who were present and whose parents had given informed consent for participation. Teachers used standardized procedures to ensure comparability of results across classes. Once teachers had collected the questionnaires, the class set was mailed to the researchers.

Materials

Health Behaviour in School-aged Children-symptom checklist (HBSC-SCL) extended version

Subjective health complaints were measured by a revised version of the HBSC symptom checklist (Torsheim, Wold, & Samdal, 2000). The respondents reported the frequency of 15 symptoms (headache, stomach-ache, back pain, higher-back pain, sleeping difficulties, dizziness, feeling low, nervousness, irritability, fatigue, anxiety, body-ache, palpitations, nausea, and pain in arms and legs) on a 5-point frequency scale ranging from “daily” (5) to “seldom or never” (1). The HBSC-symptom checklist and other scales with similar structures have shown adequate internal consistency for adolescent populations (Wisniewski, Naglieri, & Mulick, 1988). In previous confirmatory factor analyses, it was shown that the scale reflects two highly correlated sub-factors, subsuming psychological and somatic complaints (Haugland, Wold, Stevenson, Aaroe, & Wojnarowska, 2001; Hetland et al., 2002). To optimize the statistical power, the two sub-scales were combined for analyses in this study. Internal consistency analysis for HBSC-SCL items at the baseline measurement yielded an acceptable Cronbach’s alpha of .87.

Olweus Bully/Victim Questionnaire

Being a victim of bullying was measured by two questions from the Olweus Bully/Victim Questionnaire (1986), addressing direct and indirect bullying. The questions were preceded by the following explanation:

The next questions are about bullying. We say a pupil is being bullied when another pupil, or a group of pupils, says or does nasty and unpleasant things to him or her. It is also bullying when a student is hit, kicked, threatened, and shut in a room by others or something similar. This may take place often, and it is difficult for the student that is bullied to defend him- or herself. It is also bullying when a pupil is teased repeatedly in a

way he or she doesn't like. But it is NOT bullying when two pupils of about the same strength quarrel or fight.

In the first question, addressing direct bullying, the students were asked how often they had been bullied in school during the ongoing term. In the second question, addressing indirect bullying, the students were asked how often other students did not want to spend time with them at school and they ended up being alone. The respondents reported using the following response categories: "I haven't... (question 2: it hasn't happened...) (1)," "once or twice" (2), "sometimes" (3), "about once a week" (4), and "several times a week" (5). The two items were computed into a mean sum score of "being bullied" reflecting both indirect and direct bullying. Internal consistency analysis for the two items at the baseline measurement yielded an acceptable Cronbach's alpha of .69.

The Teacher and Classmate Support Scale (extended version)

To measure student and teacher support, an extended version of *The Teacher and Classmate Support Scale* (Torsheim et al., 2000) was used. In the original version, support from teacher(s) was measured by the following four items: "I'm encouraged to express my own views in my class," "our teachers treat us fairly," "when I need extra help, I can get it," and "my teachers are interested in me as a person." The version used in the present study was extended with the following item: "most of my teachers are kind and helpful." The respondents reported using the response keys: "strongly disagree" (1), "disagree" (2), "neither agree nor disagree" (3), "agree" (4), and "strongly agree" (5).

Student support was in line with the original version of the *Teacher and Classmate Support Scale* and was measured by the following four items: "the students in my class enjoy being together," "most of the students in my class are kind and helpful," "other students accept

me as I am,” and “when a student in my class is feeling down, someone else in class tries to help.” The respondents reported with the following response keys: “never” (1), “rarely” (2), “sometimes” (3), “often” (4), and “always” (5). At baseline, analysis of the internal consistency of *The Teacher and Classmate Support Scale* yielded a Cronbach’s alpha of .79 and .74, respectively. Furthermore, the original version has shown good test-retest reliability (Torsheim et al., 2000). Calculation of mean sum-scores of the two scales was performed at Time 1 only.

Analysis

To study the reciprocal relationship between being bullied and subjective health complaints, an Autoregressive Latent Trajectory (ALT) model approach (Figure 1) was undertaken by the use of AMOS 5.0. This figure represents the initial conceptual model with all paths that were subsequently tested. The ALT model is a synthesis of two broadly applied strategies for analyzing panel data, usually referred to as autoregressive models and latent trajectory models (Bollen & Curran, 2004). Traditionally, researchers have viewed the two strategies as two independent ways of analyzing longitudinal data (Bollen & Curran, 2004); some researchers even see them as competing strategies (Bast & Reitsma, 1997; Rogosa & Willett, 1985). In contrast to this perspective, within the ALT model, autoregressive models and latent trajectory models are regarded as complementary. An advantage of the ALT model approach is therefore that both time-specific and random growth components can be estimated simultaneously (Bollen & Curran, 2004) in contrast to more traditional autoregressive and latent trajectory models. The analyses were performed in three main steps by: 1) testing different univariate models for the repeated measures of being bullied and subjective health complaints separately to observe developmental trends (research question 1; reported subsequently in Table 2), 2) testing bivariate models combining the univariate models of being bullied and subjective

health complaints to see their interrelationships (research question 2; Table 3 following), and 3) testing of conditioned bivariate models including student support and teacher support to explore the relationships among all constructs of interest (research question 3; Table 4 following).

To evaluate the goodness of fit of the models the following indices were applied: root-mean-square error of approximation (RMSEA), comparative fit index (CFI)¹. In the analysis, the different models were also compared by evaluating the change in chi-square (χ^2) relative to the change in degrees of freedom. For example, when adding a path in the model is followed by a significant decrease in chi-square, it supports the validity of adding the path.

Results

Table 1 presents the mean levels and standard deviations for the study variables, as well as intercorrelations among the study variables. Preliminary examination of the mean and standard deviations of the four measurements of subjective health complaints suggest that they may increase as a function of time. In contrast, the corresponding summary statistics of being bullied may suggest that being bullied decreases over time. However, a formal test of these assumptions is needed and is performed within the subsequent univariate SEM models. Furthermore, Table 1 reveals significant intercorrelations between all the study variables, except between being bullied at Time 3 and teacher support at Time 1.

¹ A value of RMSEA less than .05 indicates a good fit, while values as high as .08 represent reasonable errors of approximation in the population (Browne & Cudeck, 1993) Originally a CFI over .90 was considered to be representative of a well fitting model (Bentler, 1992); however, a revised cut-off value close to .95 has more recently been advised (Bentler & Yuan, 1999).

Insert Table 1 about here.

Univariate models

For the four repeated measurements of subjective health complaints and being bullied, five univariate models were tested for each of the two constructs to: 1) test if the means and variances of the two constructs were changing across the four time points, and 2) identify the models that best represented these constructs across the four time points to be used in subsequent bivariate and conditional analysis. We here first turn to the modeling of subjective health complaints and then to the measurements of being bullied.

We started by testing for equality of means across time for the four measurements of subjective health complaints. A just-identified model with the four measurements including covariances (Model 1a, Table 2) was compared with a model with imposed equality constraints on the means (Model 2a, Table 2). The model with imposed equality constraints on the repeated measurements of subjective health complaints resulted in a significant increase of chi-square relative to the change in degrees of freedom when it was compared with the just-identified model ($\Delta\chi^2 = 10.08, p < .05$), indicating inequality of the means between the measurements.

In the next step, we tested a one-factor latent curve model (LCM) for the repeated measures of subjective health complaints separately (Model 3a, Table 2). The one-factor LCM implies that all the repeated measures are equally influenced by a single underlying latent factor

(intercept), and that this shared influence is responsible for the observed covariance and mean structure (Curran & Bollen, 2001). As illustrated in Figure 1, the factor loadings relating the four measurements to the intercept factor were therefore fixed to 1, while the mean and variance of the intercept factor were freely estimated. Not surprisingly, given this rejection of equality of means, the one factor LCM (Model 3a) also fit the observed data quite poorly (RMSEA = .108; CFI = .94). However, the latent intercept factor showed both a significant mean ($\mu_{\alpha} = 1.79$, $p < .01$, SE = .03) and variance ($\sigma_{\alpha}^2 = .34$, $p < .01$, SE = .03), supporting the existence of an important underlying stable component of the four measurements of subjective health complaints. The rather poor model fit of the one factor LCM and the rejection of equal means together suggested that adding a slope factor in the model probably was necessary. Following this assumption, a second latent factor (slope) was added to account for the potentially systematic change in the measures of subjective health complaints across time in Model 3a. The slope factor of subjective health complaints is illustrated in Figure 1 as a circle in the lower right corner of the figure, and the covariance between the growth factors is represented by a two-headed arrow between the two circles. As shown in Figure 1, the factor loadings relating the four measurements to the slope factor were fixed to 0, 1, 2, and 3, representing linear growth², while the mean and variance of the slope factor, as well as the covariance between the intercept factor

² Examination of the mean difference across age in subjective health complaints and bullying revealed a curvilinear trend for both constructs. Nevertheless, employing curvilinear rather than linear estimations did not result in substantive changes in the models. Therefore, the analyses here report linear estimations.

and the slope factor were freely estimated. Supporting the assumption of a linear increase of subjective health complaints over time, the linear LCM (Model 4a) showed an improved fit over the one factor model (Model 3a, $\Delta\chi^2 = 31.66$, $p < .01$). The overall fit of Model 4a was also acceptable (RMSEA = .061, CFI = .99). Both the intercept factor ($\mu_\alpha = 1.74$, $p < .01$, SE = .03) and the slope factor ($\mu_\beta = .04$, $p < .01$, SE = .01) had significant mean values, thereby giving evidence of a meaningful starting point and positive rate of linear change in subjective health complaints over time. Furthermore, the intercept factor ($\sigma_\alpha^2 = .33$, $p < .01$, SE = .03) and the slope factor ($\sigma_\beta^2 = .03$, $p < .01$, SE = .01) were characterized by significant variances indicating substantial individual variability around the starting point and slope of subjective health complaints. Furthermore, the correlation (-.12, n.s.) between the intercept and slope factor was not significant, indicating that the rate of change was not an effect of regression towards the mean.

In the previous models, the relations among the repeated measures were exclusively modeled as continuous rates of change within the latent curve model framework. As a first step towards integrating the latent curve model approach with the autoregressive simplex model approach, the validity of autoregressive parameters between the measures of subjective health complaints were tested. The autoregressive parameters are represented in Figure 1 as one-headed arrows between time-specific measures of subjective health complaints, representing group level influences present at the prior time point. Based on the results from the preceding models, a linear LCM with autoregression parameters between the four measurements of subjective health complaints was tested. In line with the recommendations of Curran and Bollen (2001), the loadings between the Time 1 measurement of subjective health complaints and the intercept and slope factors were freely estimated because of the possibility that the loadings may take other values than 1 and 0 (Model 5a, Table 2). No significant improvement of the fit was found when

adding autoregressions to the linear LCM (Model 5a, $\Delta\chi^2 = 7.32$, n.s.); neither were the autoregression estimates significant, disconfirming the validity of autoregressions in the model. Based on the preceding univariate analysis of the four measurements of subjective health complaints, the linear LCM was thus regarded as the most appropriate model for the subsequent analyses.

We followed the same sequence of analyses for the four measurements of bullying. In contrast to the findings on the measurement of subjective health complaints, imposed equality constraints on the means of being bullied measurements (Model 7a) did not result in a significant increase of the chi-square over the just-identified model (Model 6a, $\Delta\chi^2 = 7.51$, n.s.), indicating equality in the mean level across the four occasions. In accordance with the validity of equal means in the being bullied measurements, the one factor LCM (Model 8a) showed a good fit to the observed data (RMSEA = .056, CFI = .97). Furthermore, the intercept factor was characterized by both a significant mean ($\hat{\mu}_\chi = 1.4$, $p < .01$, SE = .03) and variance ($\hat{\sigma}_\chi^2 = .31$, $p < .01$, SE = .03), indicating meaningful levels of “being bullied,” and individual variability in these levels of “being bullied” in the sample. In the next step, when adding the slope factor in the linear LCM (Model 9a), there was a significant decrease of chi-square ($\Delta\chi^2 = 9.44$, $p < .05$), giving support to the validity of the slope factor. However, although the mean level of the slope factor also was significant ($\hat{\mu}_\delta = -.04$, $p < .05$, SE = .02), the slope factor was not characterized by significant variance ($\hat{\sigma}_\delta^2 = .004$, n.s., SE = .01). The insignificant slope variance indicates that there is not sufficient interindividual variance in the slope of being bullied to conduct the subsequent associative models. The one-factor LCM model is therefore regarded as a more adequate model over the linear LCM for the subsequent analyses.

Finally, a one-factor LCM with autoregression parameters was tested for the four measurements of being bullied (Model 10a, Table 2) to address possible time-specific group level influences in the model. In this model, we freely estimated the loading between the Time 1 measurement of being bullied and the intercept factor. Although a significant improvement of the fit was found when comparing the model to the one factor LCM (Model 10a, $\Delta\chi^2 = 11.95$, $p < .05$), examination of the autoregression estimates revealed that they were all insignificant (.08, n.s., .09, n.s., .3, n.s, respectively), disconfirming the validity of the autoregressions in the model.

In conclusion, based on the earlier confirmation of equality of means, and the nonsignificant individual variability of linear change found, we regarded the one-factor LCM to be the most adequate model for the subsequent bivariate analyses of being bullied.

Insert Table 2 about here.

Bivariate models

Based on the previous univariate analysis, which indicated that a linear LCM was the best fit for subjective health complaints and that a one-factor LCM was the most appropriate for being bullied (neither with autoregression), four bivariate models combining a linear LCM of subjective health complaints with a one-factor LCM of being bullied were tested. Table 3 presents model fit and comparisons of the four models combining the latent curve models of subjective health complaints and being bullied. In the baseline model (Model 1b), possible associations between the growth factors of being bullied (intercept) and subjective health complaints (intercept and slope) were modelled by imposing covariances between these factors

(Figure 1). However, as shown in Table 3, the baseline model showed a poor fit to the observed data (RMSEA = .106, CFI = .89), suggesting that additional parameters needed to be added to the model. In accordance with the ALT model (Figure 1), within-time covariances for each of the time-specific residuals were added to test for possible time-specific effects between the measurements of being bullied and subjective health complaints (Model 2b). This introduction of within-time covariances in the model resulted in a significant improvement of model fit ($\Delta\chi^2 = 98.15, p < .01$), as well as acceptable model fit (RMSEA = .050, CFI = .98), confirming the validity of time-specific effects in the model.

Based on the earlier disconfirmation of autoregressive parameters in the univariate analysis of the two constructs, the final step remaining to model a synthesized autoregressive latent curve model was to control for possible time-specific cross-lagged effects between the two constructs. Two additional models were therefore performed examining possible cross-lagged effects from the measures of being bullied on the measures of subjective health complaints and vice versa (Figure 1). In the first model, we extended the model by adding cross-lagged effects in which the subsequent measure of being bullied regressed onto the prior measure of subjective health complaints (Model 3b, Table 3). Adding cross-lagged effects from being bullied to subjective health complaints did not significantly improve the fit of the model ($\Delta\chi^2 = 3.96, n.s.$), indicating that there were no time-specific effects from being bullied on subjective health complaints over and above the underlying growth processes in the model. However, in the second model (Model 4b), when adding cross-lagged effects from the measures of subjective health complaints on the measures of being bullied, a significant improvement of the fit model was found ($\Delta\chi^2 = 9.64, p < .05$), as well as a good model fit (RMSEA = .045, CFI = .99), supporting the validity of cross-lagged effects from subjective health complaints on the measures

of being bullied in the model. Figure 2 represents the results from Model 4b. In the model, all three of the growth factors were characterized by significant means and variances. Significant associations were found between the intercept factor of bullying and both the intercept factor ($r=.45, p<.01$) and slope factor ($r=.19, p<.05$) of subjective health complaints. These correlation coefficients indicate that higher initial levels of being bullied were significantly related to higher initial levels of subjective health complaints as well as a steeper increase in subjective health complaints. Furthermore, all the within-time correlations were significant, except at Time 2 ($r=-.02, n.s$). The within-time correlation at Time 4 was high compared to the other within-time correlations in the model ($r=.80$). Finally, the significant cross-lagged effects from subjective health complaints on bullying ($\beta=-.05, p<.05$ to $.01$) suggest that some short-time mechanism may exist over and above the underlying growth processes in the model.

Insert Table 3 about here.

Conditional multivariate latent curve models

To control for possible effects of student support and teacher support at baseline, the final model identified in the previous bivariate analyses (Figure 2) was then extended into four conditional models including the two variables. Table 4 presents model fit and comparisons for the four conditional models, controlling for the influence of student support and teacher support in the prediction of individual developmental trajectories of being bullied and subjective health complaints.

In the initial model (Model 1c, Table 4), all possible regression paths from student support and teacher support and the three growth factors were included. The model (Model 1c)

showed poor fit (RMSEA = 143.06, CFI = .89) indicating that some modification of the model might be necessary. Examination of parameter estimates revealed that the paths from student support and teacher support to the slope factor of subjective health complaints, as well as the path from teacher support on the intercept factor of bullying, were nonsignificant. Not surprisingly, removing the nonsignificant paths from the two support variables (Model 2c) did not result in a significant increase of chi-square ($\Delta\chi^2 = 3.66$, n.s.), and the model now showed a good fit to the observed data (RMSEA = .055, CFI = .97). As illustrated in Figure 3, higher support from students was associated with both lower initial levels of both subjective health complaints ($\beta = -.17$, $p < .01$) and being bullied ($\beta = -.49$, $p < .01$). In addition, there was a small negative association between teacher support and initial levels of subjective health complaints ($\beta = -.14$, $p < .01$). Furthermore, the slope factor of subjective health complaints and the two intercept factors of subjective health complaints and being bullied were all characterized by significant means ($\hat{\mu}_\beta = .04$, $p < .01$, $\hat{\mu}_\alpha = 2.8$, $p < .01$, and $\hat{\mu}_\chi = 3.1$, $p < .01$, respectively) and variances ($\hat{\sigma}_\beta^2 = .03$, $p < .01$, $\hat{\sigma}_\alpha^2 = .32$, $p < .01$, and $\hat{\sigma}_\chi^2 = .24$, $p < .01$, respectively). In line with the unconditional model, there was a clear association between higher initial levels of being bullied and higher levels of subjective health complaints. However, the relationship between initial levels (intercept) of being bullied and increases (slope) of subjective health complaints ($r = .16$, $p < .10$) was only marginally significant in the conditional model when including the effects of student support and teacher support. All the within-time correlations were significant, except at Time 1 ($r = .01$, n.s.). Finally, the cross-lagged effects from previous measures of subjective health complaints on being bullied remained significant after controlling for the support variables across all time points ($\beta = -.05$, $p < .01$, $\beta = -.04$, $p < .05$, $\beta = -.05$, $p < .01$, respectively).

To examine possible changes in the relationships between the growth factors, and the time-specific cross-lagged effects in the model, with and without controlling for student support and teacher support, two final models were estimated. In the first model, the paths from student support to the intercept factors of being bullied and subjective health complaints were removed. Removing the paths resulted in a significant increase of chi-square ($\Delta\chi^2 = 74.01$, n.s.) and a worsening of fit (RMSEA=.091, CFI=.91). No changes were found in the cross-lagged effects. However, a small increase in the association between the slope factor of subjective health complaints and the intercept of bullying was found, and the correlation between the two factors now became significant ($r = .19$, $p < .05$). In addition, a small increase was seen in the correlation between the intercept factors of the two constructs ($r = .43$, $p < .01$). In the second model, when removing the path from teacher support to the intercept of subjective health complaints, a small, but significant, increase of the chi-square ($\Delta\chi^2 = 74.01$, n.s.), as well as a worsening of fit (RMSEA=.091, CFI=.91) were found. However, no substantial changes of either cross-lagged effects or the associations between the growth factors were observed. Based on these analyses, we concluded that Model 2c represented the best fit to the data.

Insert Table 4 about here.

Discussion

Following the order set forth in the results section, we discuss our findings sequentially, beginning with the developmental trends in subjective health complaints and being bullied,

followed by an examination of the reciprocal relationship between the two constructs, and continuing with an exploration of the role of teacher and student support. This sequence also matches our three initial research questions. We conclude by focusing on implications of the study for research and practice.

Developmental trends

Based on previous research, we expected to find an increasing developmental trend of subjective health complaints (Aro et al., 1987; Hetland et al., 2002; Rauste-von Wright & von Wright, 1981) and a decreasing developmental trend of being bullied (Olweus, 1999a; O'Moore & Hillery, 1989; Whitney & Smith, 1993). However, there was only sufficient evidence of a developmental trend in subjective health complaints and not for being bullied. The developmental increasing trend of complaints may reflect that adolescence is a period in life characterized by increasing normative life changes and events that are experienced as disruptive (Larson, Moneta, Richards, & Wilson, 2002; Petersen, Kennedy, & Sullivan, 1991). The findings from the present study also indicate a substantial amount of individual variation in the rate of change and levels of subjective health complaints. Some students experience steeper increases and others lower increases than the mean rate of change, and some may even have a decrease of subjective health complaints.

Although the study does not support the existence of a decreasing trend in being bullied, there is proof of a substantial amount of individual variance in the initial levels of being bullied, where some students experience higher levels and others lower levels of being bullied over time (Olweus, 1999a; Whitney & Smith, 1993). Our failure to find support for a developmental trend in being bullied may reflect that the decreasing trend in being bullied becomes less pronounced

during adolescence (Genta, Menesini, Costabile, & Smith, 1996; Olweus, 1999a; O'Moore & Hillery, 1989).

The relationship between being bullied and subjective health complaints

The few existing longitudinal studies addressing the causal relationship between being bullied and subjective health among adolescents (Bond et al., 2001; Hodges, Malone, & Perry, 1997; Wilkins-Shurmer et al., 2003) have not taken into account the possible individual variation in developmental trajectories of either health outcomes or the extent of being bullied. The analysis used in the present study both captures the individual developmental growth processes as well as possible cross-lagged influences from immediate prior time points. Our results indicate that those students who experience higher levels of being bullied also report elevated levels and show steeper developmental increases of subjective health complaints over time. This finding indicates a clear relationship between being bullied and subjective health complaints over time.

There also seems to be an aggregated effect from being bullied over time on the development of subjective health complaints. Students who were bullied persistently tended to have a steeper developmental increase in subjective health complaints. Furthermore, the results also confirm the existence of time-specific simultaneous effects between the two constructs, suggesting that being bullied and subjective health complaints may be affected by several common factors, such as parental support (Flouri & Buchanan, 2002), friendships (Cowie & Olafsson, 2000; Naylor & Cowie, 1999), and personality factors (Hodges & Perry, 1999).

These findings are in line with the assumption that the developmental relationship between victimisation and mental health is complex and is likely to be affected by both contextual aspects and individual characteristics. Along these lines, it has been suggested that the

developmental relationship between bullying and internalising symptoms can be characterized as a negative cycle (Craig, 1998; Wilkins-Shurmer et al., 2003). According to this hypothesis, adolescents showing internalising symptoms (e.g., anxiety) are more likely to be selected as victims of bullying, and that being bullied again results in an increase of internalising symptoms. The present study indicates that ongoing bullying is related to the development of health complaints and not the reverse. However, it is possible that, by addressing younger age groups, who tend to show a higher degree of normative change within both being bullied and subjective health complaints, one may find support for a reciprocal relationship between the two constructs over time, supporting the existence of a negative cycle.

In contrast to the existing longitudinal studies on victimisation and health (Bond et al., 2001; Hodges & Perry, 1999; Wilkins-Shurmer et al., 2003), when the time-specific simultaneous effects and developmental growth processes are accounted for, there is limited evidence for cross-lagged effects between the two constructs at following time points. The cross-lagged effects we found from subjective health complaints to being bullied, although significant, were relatively small. From a methodological standpoint, this finding suggests that, by separately using the autoregressive approach, one may oversimplify the developmental processes that characterize the two constructs and also the causal relationship between them over time.

The role of student and teacher support

Bullying and subjective health complaints are likely to be affected by the social context in which they occur. In the present study, we address student support and teacher support as two potential protective resources within the school setting.

According to the “friendship protection hypothesis,” friendships and support systems may protect the individual from being bullied. In line with previous studies supporting this

hypothesis (Boulton, Trueman, Chau, Whitehand, & Amatya, 1999; Hodges et al., 1997), our results indicate that students who experience less support from classmates are more likely to be bullied. Because classmate support is used as a time invariant covariate (baseline) in the present study, the results provide only limited information regarding the causal direction of the association between classmate support and being bullied. The negative association between student support and persistent levels of being bullied may therefore also reflect that victims of bullying are less likely to perceive support from their fellow students.

No association between teacher support at baseline and persistent levels of being bullied was found. This result indicates that teacher support in general has little effect on the extent of bullying. Earlier research has shown that only half of the students being bullied tell anyone about it (Smith, 1991), and that teachers are less likely to be told than parents (Whitney & Smith, 1993). Furthermore, secondary students are less likely to tell anyone than younger students (Whitney & Smith, 1993). Based on these previous findings, the lack of association found in this study may reflect that the teachers are not aware of the bullying that is going on.

In line with existing research (Aro, Hanninen, & Paronen, 1989; Natvig, Albrektsen, Anderssen, & Qvarnstrom, 1999), a relationship between student support and subjective health complaints was found, indicating that a supportive classroom climate may have a protective function on the level of complaints. However, no association was found between student support at baseline and the developmental slope of subjective health complaints. In other words, the baseline level of student support did not explain the individual variation in developmental trajectories in subjective complaints.

The existing literature is less conclusive when it comes to the relationship between teacher support and students well being than what is the case for student support (Natvig et al.,

1999). In line with this literature, we found only a moderate relationship between teacher support and complaints. Furthermore, no association was found between teacher support and the individual growth in subjective health complaints. One possible explanation is that both the measures of student and teacher support serve as indicators of an overall supportive classroom climate, and therefore when taken into account simultaneously the effect of student support may rule out the effect of teacher support, as also occurred in Natvig et al. (1999). Another explanation is that the support measures were applied as time invariant covariates in the analysis, and, by using time variant measures of support, stronger associations might have been found.

Implications for research

The three major strengths of the present study encompass its longitudinal nature with a developmental perspective, its concurrent examination of the constructs in question, and its use of an advanced statistical technique to examine possible relationships. While each of these strengths builds upon the previous research in the field, they also suggest ways in which future studies might be improved.

In this research, the sample consisted of students who were in Grade 8 (age 13) at the start of the study. While the 2-year nature of the follow-up permitted examination of developmental trends in being bullied and subjective health complaints, the constricted time period is problematic in terms of development. It is likely that much of the changes in being bullied and subjective health complaints occur prior to Grade 8 (age 13). Considering this possibility, a longitudinal study beginning at a younger grade level and continuing over a longer time period is warranted.

Although this research examined the three constructs of being bullied, subjective health complaints, and school support concurrently, only the first two variables were time-variant. We

considered that the combination of autoregression and latent growth curve modelling with two time-variant models was sufficiently complex analytically. Future researchers might make either being bullied or subjective health complaints time-invariant so that support could be varied across time.

While the examination of the variables allowed us to suggest possible causal directions, such findings should be regarded as tentative. Regardless of statistical technique employed, longitudinal data are limited in their ability to address causality. In addition, although the mean level of the slope for the measurements of being bullied was significant, there was not sufficient interindividual variance in the slope. Unfortunately, significant variance in the slope is essential when conducting associative LC models, and it is not possible to model the slope factor in association with the growth factors of subjective health complaints. This limitation also limited our ability to analyze directionality. Furthermore, while the best mechanism for making causality claims is an experimental design, such a design is impossible for studying these constructs. Therefore, like us, future researchers must employ caution when interpreting longitudinal results.

Implications for practice

Three primary implications for practice emerge directly from the present results. First, the finding that bullying in subsequent years was largely predicated on an underlying bullying factor indicates a persistent problem for those students who are bullied. Therefore, it is imperative that parents and teachers work collaboratively to identify and assist those students who are bullied. Otherwise, these students will continue to suffer over a long time period.

Being bullied has consequences for subjective health complaints. Not only are the two constructs related across time, being bullied seems to contribute to increasing levels of subjective health complaints. Teachers and parents should, therefore, understand that adolescents who are

complaining about headaches, backaches, and feeling low may be indirectly indicating they are also suffering from bullying. Given that students tend not to report bullying (Smith, 1991), these indirect indicators may be the only clues that adults have to help students who are being bullied.

Once adolescents are known to have been bullied, these results suggest that student support might be a possible means through which to lessen the incidence and the effects of bullying. Peer anti-bullying programs (Cowie & Olafsson, 2000; Naylor & Cowie, 1999; Olweus, 1991) should therefore prove effective in combating such problems.

Bullying and subjective health complaints remain problems for adolescents in schools around the world. Despite a burgeoning interest in the two constructs within the school environment research, the present study indicates possibilities for a better understanding of both bullying and subjective health complaints and their relationship. While the use of the combination of autoregression and growth curve modeling helps answer some of the remaining empirical questions in the field and suggests possible directions for improved practice, there is still ongoing longitudinal research needed to expand our knowledge base.

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Table 1

Means, Standard Deviations, and Intercorrelations

Study variables	$\bar{x}$	Sd	N	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. T1 Complaints	1.71	.62	326	-								
2. T2 Complaints	1.76	.68	320	.71**	-							
3. T3 Complaints	1.84	.74	279	.62**	.74**	-						
4. T4 Complaints	1.82	.80	283	.55**	.63**	.67**	-					
5. T1 Bullied	1.49	.80	349	.37**	.30**	.21**	.24**	-				
6. T2 Bullied	1.40	.72	342	.30**	.33**	.28**	.39**	.57**	-			
7. T3 Bullied	1.38	.80	291	.27**	.25**	.30**	.18**	.44**	.56**	-		
8. T4 Bullied	1.37	.78	293	.31**	.32**	.16*	.54**	.42**	.48**	.36**	-	
9. T1 Stud. Sup.	3.89	.67	347	-.24**	-.16**	-.15*	-.25**	-.46**	-.34**	-.22**	-.37**	-
10. T1 Teac. Sup.	3.84	.70	344	-.19**	-.24**	-.15*	-.20**	-.16**	-.23**	-.06	-.15*	.37**

* $p < .05$ ** $p < .01$

Table 2

Fit and model comparisons for different univariate models of subjective health complaints and being bullied across time.

Model	Model						
	χ^2	df	RMSEA	CFI	comparison	$\Delta\chi^2$	Δdf
Subj. health complaints							
M1a: Just-identified model	.00	0	-	1.00	-	-	-
M2a: Equal means	10.08	3	.078	.99	M1-M2	-10.08*	3
M3a: One factor model	43.92	8	.108	.94	-	-	-
M4a: Linear LC-model	12.26	5	.061	.99	M3-M4	31.66**	3
M5a: Linear LC-model w. autoreg.	4.94	1	.101	.99	M4-M5	7.32	4
Being bullied							
M6a: Just-identified model	.00	0	-	1.00	-	-	-
M7a: Equal means	7.51	3	.062	1.00	M6-M7	-7.51	3
M8a: One factor LC-model	17.80	8	.056	.97	-	-	-
M9a: Linear LC-model	8.36	5	.042	.99	M8-M9	9.44*	3
M10a: One factor model w. autoreg.	5.85	4	.035	.99	M8-M10	11.95*	4

* $p < .05$

** $p < .01$

Table 3

Fit and Model Comparisons for Different Bivariate Latent Curve Models (LCM) Of Subjective Health Complaints and Being Bullied Across Time

Model	Model						
	χ^2	df	RMSEA	CFI	comparison	$\Delta\chi^2$	Δdf
Model 1b	143.06	27	.106	.89	-	-	-
Model 2b	44.91	23	.050	.98	M1-M2	98.15**	4
Model 3b	40.95	20	.052	.98	M2-M4	3.96	3
Model 4b	35.27	20	.045	.99	M2-M3	9.64*	3

Model 1b: Bivariate LCM

Model 2b: Bivariate LCM with time-specific correlations

Model 3b: Bivariate LCM with time-specific correlations, cross-lagged from bullying to complaints

Model 4b: Bivariate LCM with time-specific correlations, cross-lagged from complaints to bullying

* $p < .05$

** $p < .01$

Table 4

Fit and model comparisons for different conditional multivariate latent curve models (LCM) of subjective health complaints, being bullied across time, and support

Model							
Model	χ^2	df	RMSEA	CFI	comparison	$\Delta\chi^2$	Δdf
Model 1c:	68.16	30	.057	.97			
Model 2c:	71.82	33	.055	.97	M1-M2	-3.66	3
Model 3c:	145.83	35	.091	.91	M2-M3	-74.01**	2
model 4c:	78.93	34	.059	.96	M2-M3	-7.11**	1

Model 1c: Conditioned bivariate LCM model. Student support and teacher support

Model 2c: Nonsignificant paths from student and teacher support removed

Model 3c: Student support to intercept of being bullied and s. h. complaints removed

Model 4c: Teacher support to intercept s. h. complaints removed

**p< .01

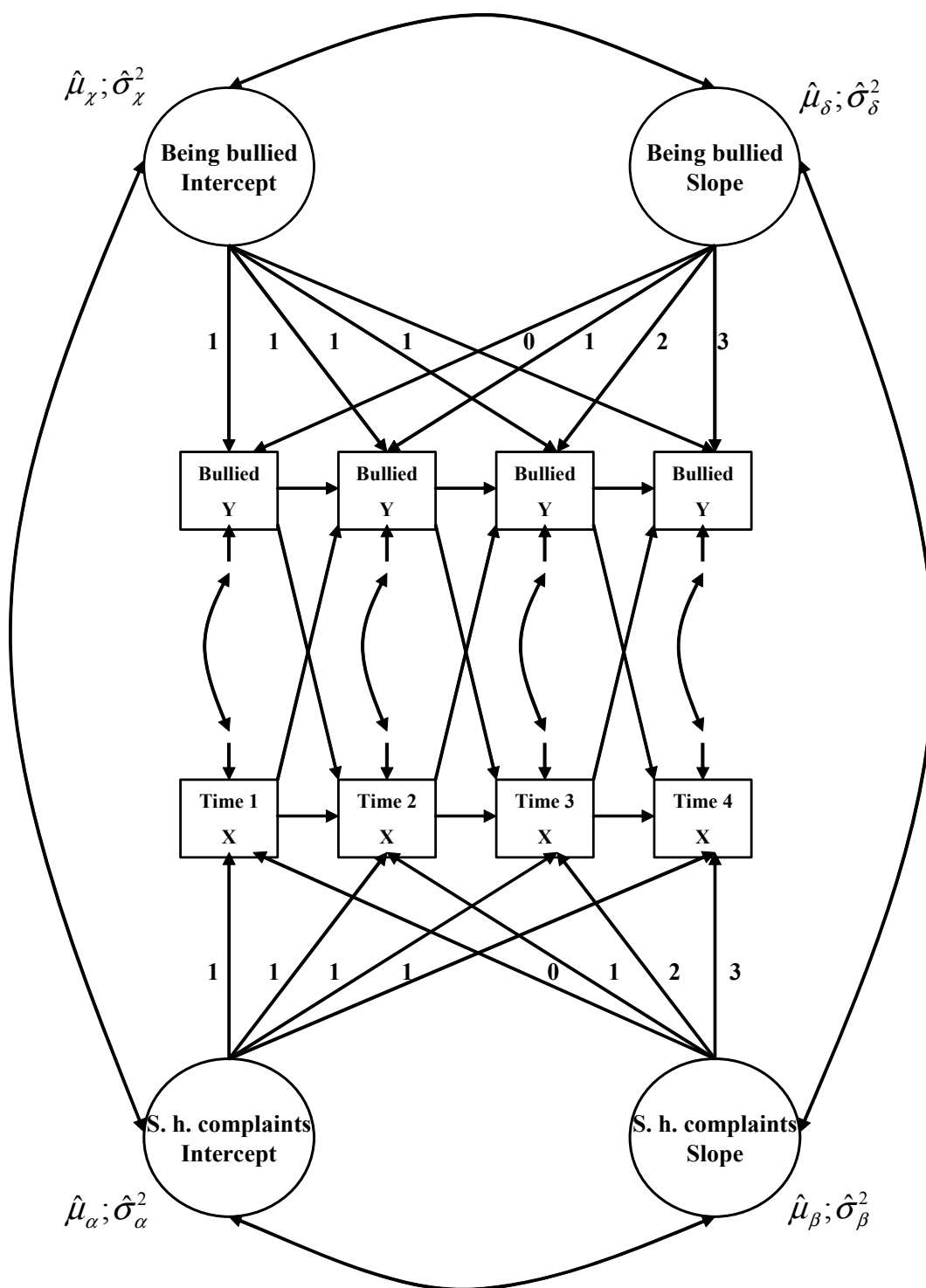


Figure 1. Autoregressive Latent Trajectory (ALT) model.

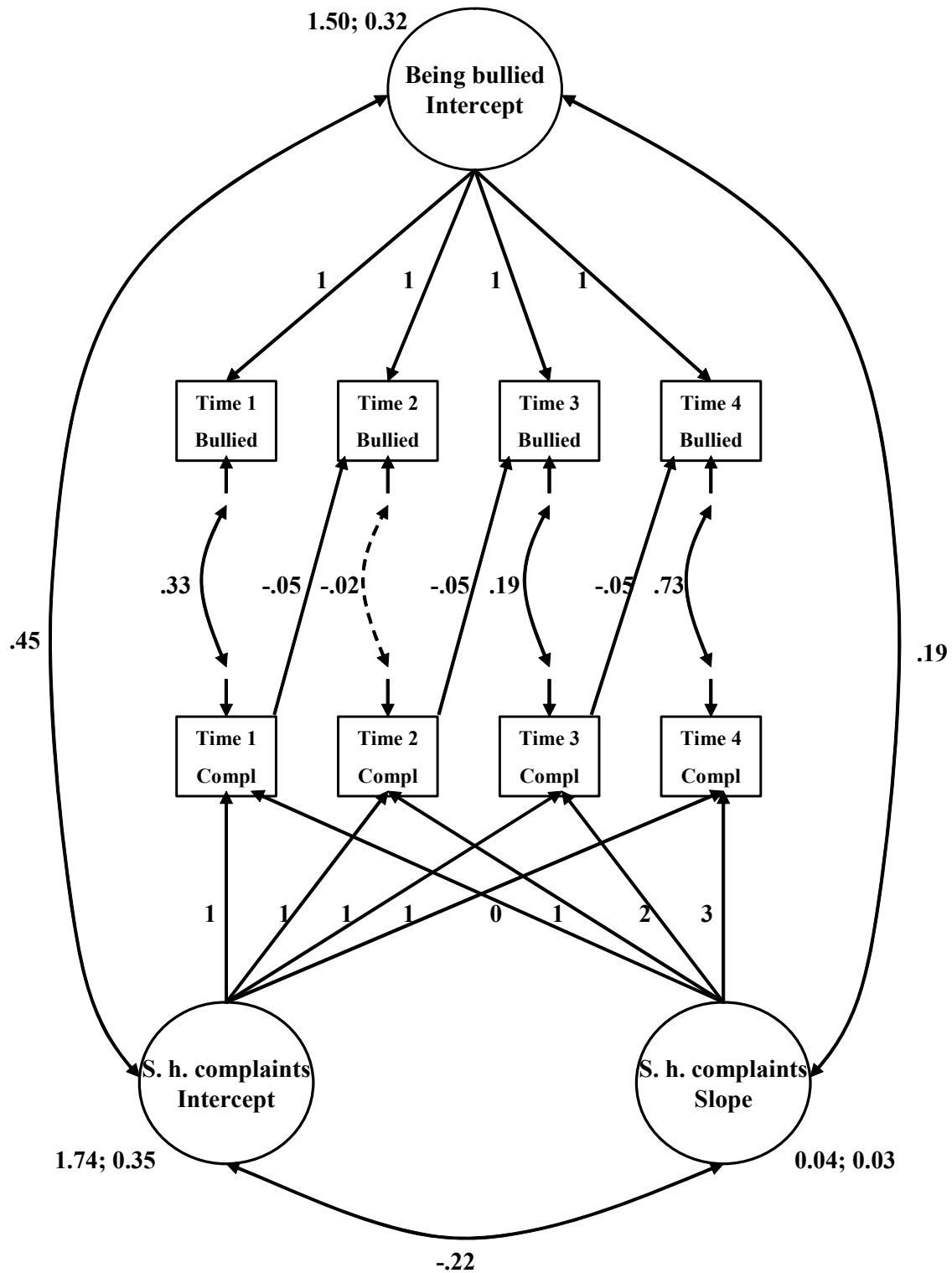


Figure 2. Bivariate latent curve model without lagged effects between indicators. Standardized values.

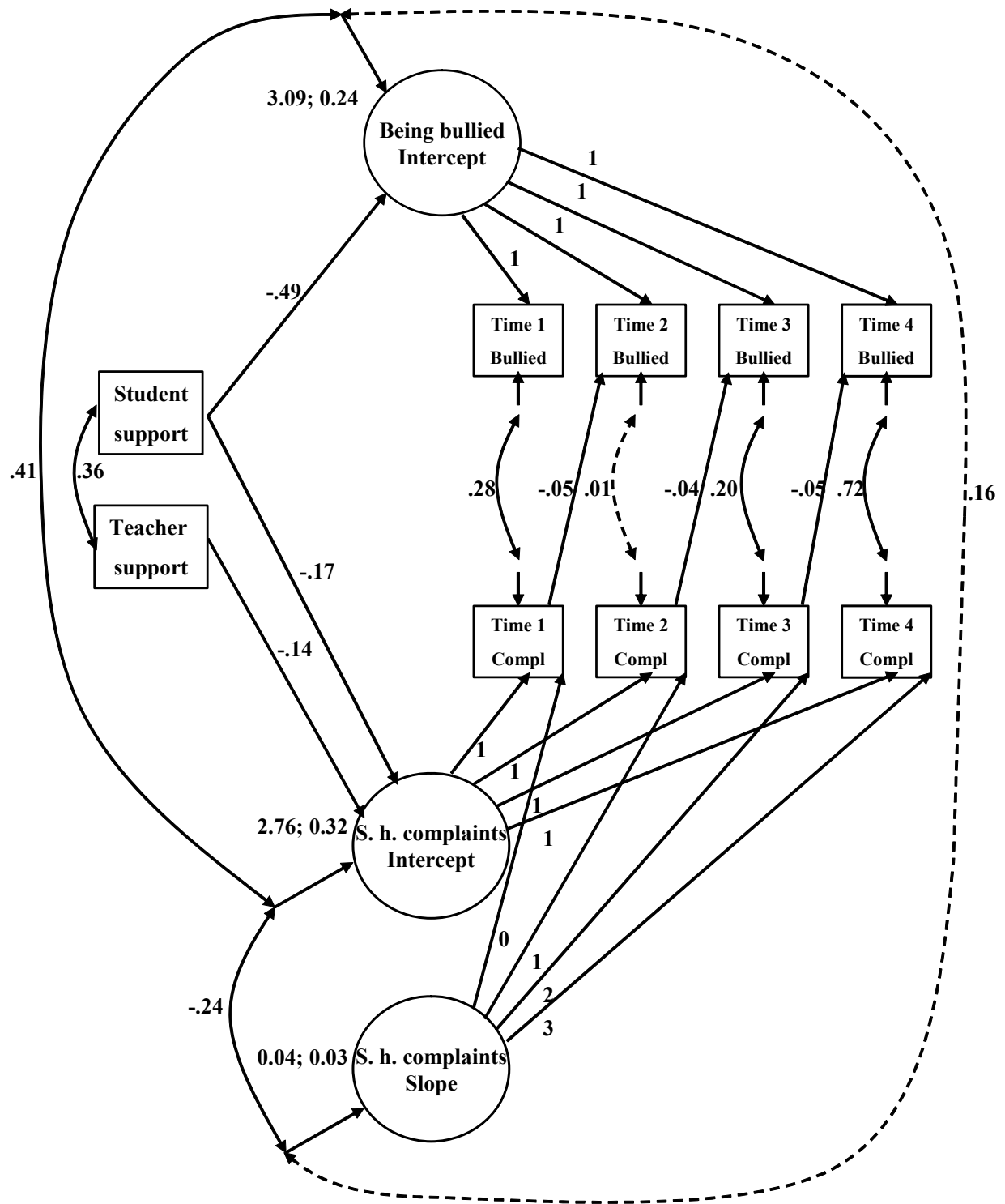


Figure 3. Conditional multivariate latent curve model. Standardized values.