

Citation	Danneel*, S., Geukens*, F., Maes, M., Bastin, M., Bijttebier, P., Colpin, H., Verschueren, K., & Goossens, L. (2020). Loneliness, social anxiety symptoms, and depressive symptoms in adolescence: Longitudinal distinctiveness and correlated change. <i>Journal of Youth and Adolescence</i> , 49, 2246-2264. doi:10.1007/s10964-020-01315-w
Archived version	Author manuscript: the content is identical to the content of the published paper, but without the final typesetting by the publisher
Published version	doi:10.1007/s10964-020-01315-w
Author contact	www.marliesmaes.com

(article begins on next page)

Abstract

Loneliness, social anxiety symptoms, and depressive symptoms are internalizing problems that are highly intertwined and often co-occur during adolescence. This overlap and co-occurrence raises the question whether three different labels are used for the same underlying phenomenon. The present study adopts a comprehensive approach to this issue by investigating the development of the three phenomena simultaneously. Specifically, this study aimed to investigate (1) the developmental trend for all three internalizing problems separately, (2) whether they are best described by a single developmental trend, (3) how they co-develop across adolescence, and (4) gender differences in this co-development. The analyses were run in three three-wave longitudinal samples of adolescents with one-year intervals in order to verify the robustness of the findings. Sample 1 (roughly ages 15, 16, and 17) comprised 549 adolescents (63% girls), and Samples 2 and 3 (roughly ages 13, 14, and 15) comprised 811 adolescents (46% girls) and 1,101 adolescents (52% girls), respectively. Latent Growth Curve Modeling for the three phenomena separately showed either small increases or stable patterns. A comparison of a Multiple Indicator Linear Growth Model (MILGM) with a Parallel Process Latent Growth Curve Modelling (PPLGCM) showed that the three internalizing problems followed unique, but related, developmental trends across adolescence. The intercepts of the three phenomena were positively correlated with one another in all samples and increases in loneliness were associated consistently with increases in social anxiety symptoms. Only in Sample 3 evidence was found for a similar association between loneliness and depressive symptoms and between social anxiety symptoms and depressive symptoms. Except for differences in initial levels, gender differences in the development of the three problems were limited. Overall, the results of the present study clearly indicate that the three internalizing problems are longitudinally distinct from one another, but co-develop across adolescence.

Keywords. Loneliness, social anxiety symptoms, depressive symptoms, adolescence, co-development

Introduction

A common internalizing problem in adolescence is loneliness (Qualter et al., 2013). Although an increasing amount of research is devoted to the topic, loneliness still tends to be conceptually confused with social anxiety symptoms and depressive symptoms. Additionally, previous research has indicated that these internalizing problems often co-occur at one point in time (Epkins & Heckler, 2011), and that this co-occurrence predicts more social and academic difficulties and greater life dissatisfaction (Newman, Moffitt, Caspi, & Silva, 1998). However, less is known about the longitudinal associations among these problems. These three internalizing problems are known to peak during adolescence (Qualter et al., 2013; Wong & Rapee, 2015; Adkins, Daw, McClay, & van den Oord, 2012), but it remains unclear whether their developmental trends are distinct from one another and whether they show correlated changes over time. Therefore, the current study had four aims: (1) to replicate previous research on the developmental trends in adolescence of loneliness, social anxiety symptoms, and depressive symptoms, (2) to examine whether the development of these three internalizing problems is best described by a single developmental trend or by three distinct but related trends, (3) to examine their correlated changes over time, and (4) to explore gender differences in this co-development.

Loneliness, Social Anxiety Symptoms, and Depressive Symptoms: Links and Divergences

Internalizing problems comprise emotions, such as worry and sadness, that are experienced within the individual and that are therefore not necessarily visible for other people. Loneliness is commonly categorized as an internalizing problem behavior (Blossom & Apsche, 2013) and conceptualized as an emotional problem (Matthews et al., 2016). More specifically, loneliness is defined as the negative feeling that people experience when they perceive their network of social relationships as deficient, either in a quantitative or a qualitative way (Perlman & Peplau, 1981). Depression and social anxiety are among the most prevalent internalizing problems in youth (Gueldner & Merrell, 2011) and are both highly co-morbid with loneliness and each other (Epkins & Heckler, 2011). Depressive symptoms comprise two core symptoms, that is, sad mood and loss of interest and pleasure in activities as well as physical symptoms (i.e., change in appetite and/or sleeping habits and somatic complaints) and depressogenic thoughts (i.e., pessimism) (American Psychiatric Association, 2013). Social anxiety, by contrast, is characterized by a prominent fear of one or more situations in which one is exposed to unfamiliar others or possible scrutiny by others (American Psychiatric Association, 2013).

Although each internalizing problem is defined in a distinctive way, the phenomena also show many conceptual similarities and are highly intertwined. For instance, a core element of each phenomenon is the

CO-DEVELOPMENT OF INTERNALIZING PROBLEMS

presence of high negative affect. Additionally, all three are characterized by similar interpersonal behaviors (Danneel et al., 2019a). For example, loneliness (Spithoven, Bijttebier, & Goossens, 2017), social anxiety symptoms (Knappe, Sasagawa, & Creswell, 2015), and depressive symptoms (Wang, Hsu, Chiu, & Liang, 2012) are related to poor social skills, increased sensitivity for social threat, and social withdrawal. In addition, similar risk factors are associated with all three internalizing problems (Dill & Anderson, 1999), such as peer victimization (Iyer-Eimerbink, Scielzo, & Jensen-Campbell, 2015) and low self-esteem (Sowislo & Orth, 2013; Vanhalst, Goossens, Luyckx, Scholte, & Engels, 2013a; van Tuijl, de Jong, Sportel, de Hullu, & Nauta., 2014). Another common aspect to each of the phenomena is the presence of cognitive biases in social information processing (Spithoven et al., 2017). Specifically, adolescents suffering from one of these internalizing problems are often subject to negative interpretation biases and attention biases with regard to social information (Spithoven et al. 2017; Klein, de Voogd, Wiers, & Salemink, 2018). These similarities in biases in social information processing could indicate that similar underlying cognitive mechanisms are at work in all three phenomena. In sum, loneliness, social anxiety symptoms, and depressive symptoms are expressed in similar interpersonal behaviors, share common risk factors and intrapersonal characteristics (i.e., negative affect and cognitive biases), peak in adolescence, and they often co-occur (Epkins & Heckler, 2011). These similarities raise the question whether the jingle jangle fallacy is at play, that is, are different concepts used for the same internalizing problem?

Although the strong association and conceptual overlap among the three phenomena is clear and suggests that they are one and the same, arguments for their distinctiveness can be made as well. That is, the three phenomena do not overlap completely. Specifically, dissatisfaction with social relationships (in either quantity, quality, or both), which is the core element of loneliness, is not necessarily experienced by adolescents who are socially anxious or depressed. Socially anxious adolescents experience anxiety or fear with regard to their social relationships, but this does not mean that they are inevitably dissatisfied with these social relationships. Conversely, anxiety, which is the central component of social anxiety symptoms, is not necessarily experienced by lonely or depressed adolescents. Depressed adolescents can experience negative affect in multiple domains in life, which does not necessarily include dissatisfaction with social relationships. Conversely, lonely adolescents do not necessarily experience the general state of negative affect that characterizes depressed adolescents, that is, the negative affect in lonely adolescents is experienced specifically with regard to their social relationships. The general state of negative affect encountered in depressed adolescents is not characteristic for adolescents with social anxiety symptoms either. So, one can feel lonely without being socially

anxious or depressed, and vice versa. Moreover, the three phenomena are differentially related to psychosocial outcomes. For example, lonely adolescents experience greater life dissatisfaction than socially anxious adolescents (Zhu, Huebner, & Tian, 2019), and loneliness is no longer associated with suicidal ideation when controlling for depression, whereas the association between depression and suicidal ideation holds when controlling for loneliness (Lasgaard, Goossens, & Eklit, 2011). Research on the associations among these three phenomena using factor analytic techniques supports the conceptualization of these internalizing problems as distinct but related latent constructs at one point in time (Danneel et al., 2019a).

These related internalizing problems follow their own research traditions. However, given their high interrelatedness and conceptual similarities, current understanding of these three internalizing problems could be enhanced by investigating them all three simultaneously and by focusing on subtle differences between them (Fung, Paterson, & Alden, 2017). A first important step towards such a comprehensive approach is to investigate whether these phenomena follow the same developmental trend, or whether their developmental paths are distinct but associated.

Longitudinal Trends

A limited number of longitudinal studies on the development of loneliness found a slight decreasing trend for loneliness across adolescence (e.g., Vanhalst, Luyckx, Scholte, Engels, & Goossens et al., 2013b) or no change in loneliness across mid- to late adolescence (Danneel, Maes, Vanhalst, Bijttebier, & Goossens, 2018). The latter finding has been supported by a recent meta-analysis, which showed that loneliness remained relatively stable throughout adolescence (Mund, Freidig, Möbius, Horn, & Neyer, 2020). For depressive symptoms, it has been frequently documented that they increase across adolescence with a peak in middle to late adolescence and stabilization in young adulthood (e.g., Adkins et al., 2012). However, stability across adolescence, that is, a flat curve, has been found as well (e.g., McLaughlin & King, 2015). Regarding the development of social anxiety symptoms, most studies have found a stable pattern across adolescence (e.g., Nelemans et al., 2014). However, a few studies reported a decreasing trend followed by a leveling off of this decrease and a subsequent slight increase in symptoms from middle to late adolescence (e.g., Van Oort, Greaves-Lord, Verhulst, Ormel, & Huizink, 2009).

Taking together these findings, it appears that inconsistencies have been found for the developmental trends for each internalizing problem. However, most of these studies reported rather small changes during adolescence in these three phenomena, which suggests that they remain relatively stable throughout this period of life. The first aim of the present study, therefore, is to identify the developmental trends for these internalizing

problems during adolescence. Moreover, although cross-sectional research has shown that adolescent loneliness, social anxiety, and depressive symptoms are distinct but related concepts (Danneel et al., 2019a), it remains unknown whether these internalizing problems also show distinct yet related growth characteristics. All three phenomena are heightened during adolescence and stable patterns, aside from other developmental patterns, are suggested for all three as well (McLaughlin & King, 2015; Mund et al., 2020.; Nelemans et al., 2014). Hence, the second aim of the present study is to examine the longitudinal distinctiveness of the three internalizing problems.

Associations over Time

It is well-known that loneliness, social anxiety symptoms, and depressive symptoms often co-occur (Epkins & Heckler, 2011). However, less is known about the prospective associations among internalizing problems. By investigating the dynamic associations among loneliness, social anxiety, and depressive symptoms, more insight could be gained into (a) whether these internalizing problems potentially function as risk factors for each other and (b) whether they potentially maintain and reinforce each other. This knowledge is essential for enhancing current understanding of these associated internalizing problems and for the development of effective intervention programs.

Previous studies examining the dynamic associations among these internalizing problems in adolescence typically focused on their temporal associations by using cross-lagged analyses. More specifically, these studies provided indications about the direction of effects among loneliness, social anxiety symptoms, and depressive symptoms by investigating which internalizing problems potentially precede others or whether there is a vicious cycle between two types of internalizing problems across time (e.g., Maes et al., 2019a). So far, only two studies investigated the temporal associations among all three internalizing problems simultaneously. In this comprehensive model including loneliness, social anxiety symptoms, and depressive symptoms, only loneliness and social anxiety symptoms were reciprocally associated over time in both studies. Loneliness and depressive symptoms as well as social anxiety symptoms and depressive symptoms, in turn, were only related to each other in a unidirectional way but the direction of these effects differed both within and across the two studies (Danneel et al., 2019b; Lim, Rodebaugh, Zyphur, & Gleeson, 2016).

Cross-lagged studies are relevant in that they can provide insight into the directionality of effects. However, a drawback of those models is that they use individuals' standings, relative to the other individuals in the sample, and, hence, are not informative regarding the actual changes of individuals (Selig & Little, 2012). In other words, even though an individual's standing regarding a particular concept can be stable, it would still

CO-DEVELOPMENT OF INTERNALIZING PROBLEMS

remain unknown whether the actual score of that individual remained stable, increased, or decreased. Using combined growth models, on the other hand, researchers can examine how key components of development, that is, the starting level or intercept and the rate of change or slope, for one problem are correlated with these same components for the other problems. These correlations indicate (a) whether changes over time for one internalizing problem are associated with changes over time for another internalizing problem (i.e., slope-slope correlations) and (b) whether adolescents with high levels for one of the internalizing problems at a specific moment in time are at greater risk of experiencing increases in the other types of internalizing problems over time (i.e., intercept-slope correlations).

No study has examined these correlations for all of the three internalizing problems. However, two studies analyzed them for adolescent depressive symptoms and various types of anxiety symptoms including social anxiety. The findings were mixed regarding slope-slope associations. One study (McLaughlin & King, 2015) found no such correlations across a one-year interval and the other study (Hale, Raaijmakers, Muris, Van Hoof, & Meeus, 2009) found substantial correlations between changes in depressive symptoms and changes in anxiety symptoms. Some intercept-slope correlations were also found. One study found that higher initial symptom severity of social anxiety and depressive symptoms was associated with an increase in the symptoms of depression and social anxiety, respectively, but only in an at-risk sample covering early to mid-adolescence (Hale et al., 2009). The other study (McLaughlin & King, 2015) also reported an association between initial levels of depressive symptoms and the development of social anxiety symptoms in early to mid-adolescents. However, higher initial levels of depressive symptoms were associated with a slower decline in social anxiety symptoms over time.

Based on these studies, significant slope-slope correlations among social anxiety and depressive symptoms are to be expected when examined across a larger time interval. It is unclear to what extent these findings can be extended when loneliness is also included in the model. The third aim of the present study, therefore, is to examine how the growth factors of the three phenomena are correlated with one another throughout adolescence.

The Role of Gender

Gender differences in depressive symptoms are well-documented with girls generally reporting higher mean symptom levels from early adolescence onwards, and this gender difference becomes smaller when entering early adulthood (Salk, Hyde, & Abramson, 2017). Results regarding gender differences in the developmental trend for depressive symptoms are mixed. Some studies have found no gender differences in the

CO-DEVELOPMENT OF INTERNALIZING PROBLEMS

general developmental trend of adolescents' depressive symptoms (e.g., Finan, Ohanessian, & Gordon, 2018), whereas other studies found increases in depressive symptoms for adolescent boys while girls' depressive symptoms leveled off (Leadbeater, Thompson, & Gruppuso, 2012).

Regarding social anxiety symptoms, most studies indicate that adolescent girls generally report higher mean levels of social anxiety symptoms than boys from early adolescence onwards (e.g., Nelemans et al., 2014). Regarding developmental trends for social anxiety, some studies report no gender differences (e.g., McLaughlin & King, 2015), whereas another study showed a decreasing trend in social anxiety for girls and a stable trend for boys (Ohanessian, Milan, & Vannucci, 2017). A decreasing trend for boys and an increasing trend followed by a decrease in mid-adolescence for girls has also been reported (Nelemans et al., 2014).

In contrast to the gender differences found for depressive and social anxiety symptoms, results from a recent meta-analysis indicate that mean levels of loneliness do not differ between adolescent boys and girls (Maes, Qualter, Vanhalst, Van den Noortgate, & Goossens, 2019). Both theoretical work and empirical longitudinal studies addressing gender differences in the development of loneliness are limited (Weeks & Asher, 2012). A longitudinal study investigating gender differences in loneliness in adolescents from ages 13 till 18 found that loneliness remained stable over time in girls, but decreased in boys (Van Roekel, Scholte, Verhagen, Goossens, & Engels, 2010). However, no gender differences in initial levels nor in the average developmental trend for loneliness have been found in a study of 15- to 18-year-olds (Danneel et al., 2018).

Given that research on correlations among growth components for loneliness, social anxiety symptoms, and depressive symptoms is scarce, little is known regarding gender differences in such correlations. Earlier work did not find gender differences in the prospective association between adolescents' social anxiety symptoms and depressive symptoms (McLaughlin & King, 2015), but a comprehensive approach including all three phenomena is again lacking. The fourth aim of this study, therefore, is to investigate gender differences in correlated changes among the three internalizing problems.

The Current Study

The current study aimed to gain more insight into divergences and associations among loneliness, social anxiety, and depressive symptoms across adolescence through several types of longitudinal analyses in three different adolescent samples. First, the present study aimed to replicate earlier studies on the average developmental trends for the three types of internalizing problems separately in three large longitudinal samples of adolescents. Based on what has been most frequently documented in the empirical literature, a decrease in adolescent loneliness, stability in social anxiety symptoms and an increase in depressive symptoms was expected.

Second, the current study aimed to examine whether growth in these internalizing problems is best defined by a single developmental trend or by three distinct, but related trends. Based on cross-sectional work and in line with an earlier study that found distinct but related developmental trends for depressive symptoms and social anxiety symptoms (Hale et al., 2009), the expectation was to find similar results when focusing on the three types of internalizing problems, that is, loneliness, social anxiety symptoms, and depressive symptoms.

Third, if loneliness, social anxiety, and depressive symptoms represented three distinct internalizing problems with separate, yet related developmental trends, another aim of this study was to examine the correlated changes for these problems. Specifically, this study examined whether initial levels of one of the internalizing problems are associated with changes over time in other internalizing problems and whether changes over time for one internalizing problem were associated with changes over time for another internalizing problem. Given the bidirectional temporal relationship between loneliness and social anxiety symptoms across time as found in earlier cross-lagged studies (e.g., Danneel et al., 2019b), the expectation was that growth in loneliness would be associated with growth in social anxiety symptoms. However, given the absence of prior studies examining such correlations for all three internalizing problems simultaneously, these analyses in the current study were exploratory in nature.

Fourth, this study aimed to examine gender differences in correlated changes for adolescent internalizing problems in an exploratory way by conducting multiple group analyses. The examination of these associations were also exploratory in nature.

Method

Participants

In order to replicate the findings of the current study and to investigate the robustness of the results, data from three larger and independent longitudinal studies conducted in Flanders, the Dutch-speaking part of Belgium, were used. All three studies were designed to investigate the development of internalizing problems in adolescence and comprised multiple annual measurement waves. For the current study, three waves of data were used for each longitudinal study. The resulting three independent samples all comprised Flemish adolescents attending secondary school, with the majority of pupils attending the academic track.

Sample 1. For the first sample data from the PALS study (i.e., Personality and Loneliness/Solitude) were used, a study on the development of psychosocial well-being, personality, and identity throughout mid- and late adolescence for which data collection started in February 2010 (for details, see Teppers et al., 2013). The

CO-DEVELOPMENT OF INTERNALIZING PROBLEMS

sample consisted of 549 adolescents (62.66% girls). At Time 1 (T1), adolescents had a mean age of 14.82 years ($SD = 0.79$) and attended Grades 9 and 10. The majority of the adolescents lived with both their parents (83.06%) at T1. At Time 2 (T2) and 3 (T3), a total number of 429 (78.14%) and 413 (75.23%) adolescents participated in the study, respectively. A total number of 373 (67.94%) adolescents participated in all three measurement waves, 96 (17.49%) participated in two out of three measurement waves, and 80 (14.57%) participated in one wave only.

Sample 2. For the second sample data from the STRATEGIES study (i.e., Studying Transactions in Adolescence: Testing Genes in Interactions with Environments) were used, a study on problem behavior in adolescence for which data collection started in February 2012 (for details see Janssens et al., 2015). The sample consisted of 811 adolescents (46.09% girls). At T1, adolescents had a mean age of 13.38 years ($SD = 0.68$) and attended Grades 7 and 8. The majority of the adolescents were born in Belgium (94.74%) and lived with both their biological parents (79.15%) at T1. At T2 and T3, a total number of 727 and 653 adolescents participated in the study, respectively. A total number of 626 (76.43%) adolescents participated in all three measurement waves, 116 (14.16%) participated in two out of three measurement waves, and 69 (8.42%) participated in one wave only. Eight participants were excluded from the current analyses because they had no data for the study variables.

Sample 3. For the third sample data from the EDA study (i.e., Emotional Development in Adolescence) were used, a large longitudinal study on the emotional development of adolescents for which data collection started in February 2014 (for details see Bastin et al., 2016; Nelis et al., 2016). The sample consisted of 1,101 adolescents (52.23% girls). At T1, adolescents had a mean age of 13.19 years ($SD = 0.67$) and attended Grades 7 and 8. The majority of the adolescents had the Belgian nationality (94.37%) and had parents who were married (80.56%) at T1. At T2 and T3, a total number of 915 (83.11%) and 745 (67.67%) adolescents participated in the study, respectively. A total number of 709 (64.40%) adolescents participated in all three measurement waves, 242 (21.98%) participated in two out of three measurement waves, and 150 (13.62%) participated in one wave only.

Attrition analyses. In all three samples, adolescents who dropped out of the study were compared to adolescents who participated in all three measurement waves. First of all, it is important to note that all the significant effects that were found were small and inconsistent across samples. In all samples, both groups did not differ significantly from each other in terms of social anxiety symptoms at T1, but adolescents who dropped out reported significantly higher levels of depressive symptoms at T1. Only in Sample 3 did adolescents who

CO-DEVELOPMENT OF INTERNALIZING PROBLEMS

dropped out of the study report significantly higher levels of loneliness and they also had a higher average age compared to adolescents who participated in all three measurement waves. In addition, in Sample 1, a significant gender difference was found, with more girls than boys continuing their participation across the three measurement waves. The results of these attrition analyses are shown in Table 1.

Missing value treatment. Percentages of missing data in Samples 1, 2, and 3 across the three measurement waves were 16%, 14%, and 17%, respectively. To examine whether the data could be considered as missing completely at random, participants with and without complete data were compared using Little's missing completely at random test (MCAR, Little, 1998) in all three samples. In all samples, the normed χ^2 values were acceptable (i.e., < 3 ; Ulman 2013). Therefore, data could be considered as missing completely at random and the full information maximum likelihood (FIML) estimator was used to handle missing data.

Procedure

Permission for the studies was obtained from the Institutional Review Board (IRB; S54020 – ML7972) at the researchers' university. Prior to data collection, in Samples 1 and 2, active consent was obtained from both adolescents and parents. In Sample 3, adolescents and their parents gave active and passive consent, respectively. Paper-and-pencil questionnaires were administered to the participants in their classroom or in larger lunchrooms during regular school hours. Research assistants were present during the test sessions to answer questions and to emphasize the voluntary and anonymous character of students' participation.

Measures

To assess feelings of loneliness, social anxiety symptoms, and depressive symptoms well-established self-report questionnaires were used. All measures were administered in Dutch, the native language of the participants.

Loneliness. The peer-related loneliness subscale of the Loneliness and Aloneness Scale for Children and Adolescents (LACA; Goossens, 2016), originally developed for use with Dutch-speaking participants, was used to assess feelings of loneliness in all three samples. This subscale consists of 12 items (e.g., "I feel left out by my friends"), which are answered on a 4-point Likert scale ranging from 1 (*never*) to 4 (*often*). Respondents' scores were averaged across items with higher mean scores representing higher levels of loneliness. Cronbach's alphas across the different waves in all three samples were high (i.e., .86 - .92).

Social anxiety symptoms. To measure symptoms of social anxiety, the Social Anxiety Scale for Adolescents (SAS-A; La Greca & Lopez, 1998) was used in all three samples. In Sample 1, the Dutch adaptation of the original 18-item version of the SAS-A was used, whereas in Samples 2 and 3 the Dutch adaptation of the

CO-DEVELOPMENT OF INTERNALIZING PROBLEMS

12-item short version (see Nelemans et al., 2019) was administered to the participants (e.g., “I get nervous when I meet new people”). Items are answered on a 5-point Likert scale ranging from 1 (*never*) to 5 (*often*). Respondents’ scores were averaged across items with higher mean scores reflecting higher levels of social anxiety symptoms. Cronbach’s alphas across waves in all three samples were high (i.e., .90 - .92).

Depressive symptoms. To assess depressive symptoms, different measures were used across the three samples. Specifically, the Dutch adaptations of the original 20-item version (Hooge, Decaluwé, & Goossens, 2000) and the shortened 12-item version (Bouma, Ranchor, Sanderma, & Van Sonderen, 1995) of the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) were used in Samples 2 and 1, respectively, and the Dutch adaptation (Timbremont & Braet, 2002) of the Child Depression Inventory (CDI; Kovacs, 2003) was used in Sample 3.

The CES-D items were answered on a 4-point Likert scale ranging from 0 (*rarely or never*) to 3 (*mostly or always*) (e.g., “During the past week my sleep was restless”). Respondents’ scores were averaged across items with higher scores reflecting higher levels of depressive symptoms. Cronbach’s alphas across waves were high in Sample 1 and 2 (i.e., .82 - .93).

The CDI consists of 27 items that are answered on a scale ranging from 0 to 2. For each item, adolescents choose one out of three statements describing different levels of symptom severity (e.g., “I am sometimes sad”, “I am often sad”, and “I am sad all the time”). Respondents’ scores were averaged across items with higher values being indicative of greater symptom severity. Cronbach’s alphas across waves were high (i.e., .87 - .88).

Statistical Analyses

First, to examine the average developmental trend for loneliness, social anxiety symptoms, and depressive symptoms, Latent Growth Curve Models (LGCMs) were estimated for each internalizing problem separately in *MPlus* Version 8.0 (Muthén & Muthén, 1998-2017). At each measurement wave, the mean levels of loneliness, social anxiety symptoms, or depressive symptoms were represented as indicators of two latent growth factors, that is, the initial mean level (i.e., intercept) and the mean linear change in one of these internalizing problems (i.e., slope) (Duncan & Duncan, 2009). To assess the model fit of the LGCMs, several model fit indices were evaluated, that is, the robust Satorra-Bentler chi-square statistic ($S-B\chi^2$; Satorra & Bentler, 2001), the Root Mean Square Error of Approximation (RMSEA), the Standardized Root Mean Square Residual (SRMR), and the Comparative Fit Index (CFI). Given that Chi square statistics, which should be as small as possible, are highly sensitive to sample size (Barrett, 2007), it is important to rely on the other indices as

CO-DEVELOPMENT OF INTERNALIZING PROBLEMS

well. An RMSEA and SRMR value lower than .06 and .08, respectively, and a CFI value that exceeds .95 are indicative of a well-fitting model (Hu & Bentler, 1999). RMSEA and SRMR values lower than .08 and .10, respectively, and CFI values exceeding .90 are indicative of adequately fitting models (Kline, 2005).

Second, to examine whether loneliness, social anxiety symptoms, and depressive symptoms are indicators of one general factor with a single developmental trend or whether they represent three distinct internalizing symptoms with separate, yet related developmental trends, two types of Linear Growth Curve Models (LGCs) were tested and compared to each other. Specifically, both a Multiple Indicator Linear Growth Model (MILGM) and a Parallel Process Linear Growth Model (PPLGM) were estimated. In the MILGM, at each measurement occasion, scores for loneliness, social anxiety symptoms, and depressive symptoms were specified as indicators of a latent factor. In other words, three latent factors were specified with each factor being identified by the scores of all three internalizing problem behaviors at a specific moment in time. Given that a MILGM requires measurement invariance of the three latent factors across time, the intercepts and factor loadings of the factor indicators were held equal over time (Muthén & Muthén, 1998-2017). Subsequently, the developmental trend of the three latent factors was modeled by two second-order factors that define the growth factors, that is, intercept and slope. The intercept and slope factor were allowed to covary (Muthén & Muthén, 1998-2017). In the PPLGM, by contrast, latent growth factors, that is, intercepts and slopes, were specified separately for loneliness, social anxiety symptoms, and depressive symptoms. Each growth factor was identified by repeated observations for one of these internalizing problems. In addition, correlations were modelled between slopes and intercepts pertaining to the same internalizing problem and among slopes and intercepts of different internalizing problems. To evaluate the model fit of the MILGMs and PPLGMs similar model fit indices were used as for the evaluation of the model fit of the LGCs. In addition, to compare the model fit of the MILGM and PPLGM, the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC) were evaluated (Kline, 2005). The AIC and BIC are suited to compare model fit of different non-nested models with the same observed variables. Lower values of AIC and BIC are indicative of better model fit.

Third, if the results showed that loneliness, social anxiety, and depressive symptoms exhibit distinct but related developmental trends across adolescence, the PPLGM model for these internalizing problems was examined more closely. Specifically, the correlations between the intercepts and slopes and among the slopes of the different internalizing problems were evaluated.

Fourth, again in the case of distinct but related growth trends for loneliness, social anxiety, and depressive symptoms multiple group PPLGMs were used to examine gender differences in the co-development among the

CO-DEVELOPMENT OF INTERNALIZING PROBLEMS

internalizing problems in an exploratory fashion. First, gender differences in the initial values of the developmental trends of each internalizing problem were examined by comparing a fully constrained model against a model in which the intercepts were freely estimated for boys and girls. Second, gender differences in the slopes were tested by comparing the fully constrained model to a model in which the slopes were allowed to vary between boys and girls. Third, gender differences in patterns of correlations among the growth components for the different internalizing symptoms were investigated by comparing the fully constrained model to a model in which the covariances among the intercepts and slopes were allowed to differ for boys and girls. A significant difference in model fit between the restricted and less restricted models indicates that, depending of the specific model, the intercepts, the slopes, or the covariances vary between boys and girls and that the less restricted model needs to be retained. This is the case when both the p-value for $\Delta S-B\chi^2$ is below .05 (Satorra & Bentler, 2001) and ΔCFI exceeds .01 supplemented by $\Delta RMSEA$ exceeding .015 or $\Delta SRMR$ exceeding .010 (Chen, 2007). If the results indicated that there were gender differences, the Wald chi-square test of parameter equalities was used to investigate whether the intercepts, slope means, and/or covariances among the intercepts and slopes differed significantly for boys and girls.

Results

Descriptive Statistics

Observed mean values and standard deviations for loneliness, social anxiety symptoms, and depressive symptoms at all measurement occasions for all three samples are presented in Table 2. In addition, Table 2 presents ranges of cross-sectional correlations among the internalizing problems across waves off the diagonal and ranges of 1-year stability correlations for each internalizing problem across successive waves on the diagonal. All correlations were significant. The cross-sectional correlations among the internalizing problems were positive and moderate to high and the 1-year stability correlations for each internalizing symptom were positive and high, indicating high stability across the different measurement occasions.

Developmental Trends

Fit indices for the LGCMs of each internalizing problem separately are presented in Table 3 along with the unstandardized means and variances of the intercepts and slopes. In all three samples, fit indices indicated that the different models showed a good fit to the data. Results regarding the slope factors for loneliness, social anxiety symptoms, and depressive symptoms were inconsistent across the three samples. Specifically, non-significant negative and positive slope factors were found in Samples 1 and 3, respectively, for both social anxiety symptoms

CO-DEVELOPMENT OF INTERNALIZING PROBLEMS

and depressive symptoms indicating that the mean scores for these two internalizing problems did not change across the three measurement waves. However, in Sample 2 significant positive slope factors were found for social anxiety symptoms and depressive symptoms, which suggested an increase in mean levels for these problems across time. For loneliness, significant positive slope factors in Samples 1 and 3 indicated that the mean scores for loneliness increased across the three measurement waves. However, this slope was non-significant in Sample 2. In all three samples, significant variances were found around all intercepts and around most of the slope factors, except for the slope factor for loneliness in Sample 1 and the slope factor for depressive symptoms in Sample 2. These significant variances indicated the existence of substantial inter-individual differences in the developmental trends for loneliness, social anxiety symptoms, and depressive symptoms. Finally, it is important to note that the slopes for the different internalizing problems were small in all three samples.

Longitudinal Distinctiveness

Table 4 presents the results on model fit for both the MILGM and PPLGM in each sample. In all three samples, fit indices indicated that the MILGM (i.e., a single developmental trend) showed a poor fit to the data, whereas the PPLGM (i.e., three distinct but related developmental trends) fitted the data well. In addition, the AIC and BIC values indicated that the PPLGM fitted the data better compared to the MILGM in each sample. These results indicated that loneliness, social anxiety symptoms, and depressive symptoms do not follow a single developmental trend and are thus longitudinally distinct from one another. Therefore, it was decided to continue with the PPLGMs.

Co-Development: Correlations Among Growth Factors

Table 5 presents the correlations among the intercepts and slopes derived from the PPLGMs (i.e., distinct but related developmental trends). In all three samples, significant high and positive correlations were observed among all intercepts for the internalizing problems. These correlations were in line with the cross-sectional correlations. Regarding the correlations among the slopes, in all three samples, significant positive correlations were found between the slope of loneliness and the slope of social anxiety symptoms. These correlations imply that loneliness and social anxiety symptoms co-develop in the same direction. The slope-slope correlations with depressive symptoms, however, were less consistent across the three samples. The slope of depression was positively and significantly related to the slope of loneliness and to the slope of social anxiety symptoms in Sample 3 only. So, in Sample 3 all three internalizing problems seemed to co-develop in the same direction. It is worth noting that the correlations with the slope of depression were positive and of considerable effect size, though non-

CO-DEVELOPMENT OF INTERNALIZING PROBLEMS

significant, in Samples 1 and 2. Therefore, we should not completely disregard these correlations with the slope of depression in Samples 1 and 2.

The correlations between the intercept and slope factors were inconsistent across the three samples. Specifically, in Sample 1 the intercept and slope of social anxiety symptoms were significantly and negatively correlated with each other. This negative association indicates that higher initial levels of social anxiety symptoms were associated with greater decreases in social anxiety symptoms. In Sample 2, a moderate negative correlation between the intercept and slope of loneliness was found. This negative association indicates that higher initial levels of loneliness were associated with smaller increases in loneliness. In Sample 3, many intercept-slope correlations were significant. First, the slope of loneliness was negatively associated with the intercepts of all three internalizing problems. Specifically, higher initial levels of any of the internalizing problems were associated with smaller increases in loneliness. Second, the slope of social anxiety symptoms was negatively associated with the intercept of social anxiety symptoms. Specifically, higher initial levels of social anxiety symptoms were associated with smaller increases in social anxiety symptoms. Third, the slope of depressive symptoms was negatively associated with the intercept of depressive symptoms. Specifically, higher initial levels of depressive symptoms were associated with smaller increases in depressive symptoms over time.

The Role of Gender

Table 6 presents the results on model fit for the multiple group PPLGMs. These exploratory analyses revealed a significant gender effect for mean intercept levels, but not for mean slope levels or the covariances among the growth factors. Additional Wald chi-square tests of parameter equalities, as presented in Table 7, indicated that girls had a significantly higher mean intercept level than boys for social anxiety symptoms and depressive symptoms in both Samples 2 and 3 and for loneliness in Sample 3. It should be pointed out here that these analyses led to estimation issues in several cases (i.e., in Sample 1 for all three types of analyses and in Sample 2 for the covariance analysis), probably due to over-complexity of the models tested with the data at hand. So, except for differences in initial levels, the findings showed limited sensitivity to the effects of gender.

Discussion

Given the conceptual overlap between loneliness, social anxiety, and depressive symptoms and the intra- and interpersonal risk factors that they share, the three phenomena are often confused with one another. Earlier research has found both links and divergences between the three constructs. However, these studies were cross-sectional in nature and typically concentrated on just two of the problems (e.g., social anxiety and

CO-DEVELOPMENT OF INTERNALIZING PROBLEMS

depressive symptoms). The present study used longitudinal analyses and adopted a comprehensive approach by examining the development of all three problems simultaneously. Such an approach has been recommended earlier as it is bound to enhance current understanding of how these problems interact and what makes them different from one another (Fung et al., 2017). The findings of the present study clearly indicated that loneliness, social anxiety, and depressive symptoms are not best described by a single developmental trend, but that they each have their unique developmental trend throughout adolescence. However, the three problems also showed correlated changes over time. So loneliness, social anxiety, and depressive symptoms are longitudinally distinct across adolescence, but they co-develop during that period of development.

Developmental Trends

The inconsistencies in the literature regarding the developmental trends of adolescent loneliness, social anxiety symptoms, and depressive symptoms imply that there is a need for additional research in order to elucidate these discrepancies and to gain a better understanding of the actual developmental trends. The present study aimed to improve current understanding of these developmental trends by conducting replication analyses. However, given that the results of the current study regarding these developmental trends were inconsistent across the three samples, still no firm conclusions regarding these trends can be drawn. The inconsistent results found in the current study, that is, no consistent developmental trend for each internalizing problem across the three samples, might be explained by several reasons, such as the use of different age ranges and measures across the different samples. Therefore, in order to ultimately elucidate the developmental trends of adolescent loneliness, social anxiety symptoms, and depressive symptoms, more comprehensive studies that examine these trends across the entire adolescent period including the transition from elementary school to secondary school and from secondary school to higher education or the labor market are highly needed.

Importantly, the fact that only small mean level changes (i.e., slopes) were observed in all three samples might also explain the inconsistent findings across the samples. Specifically, in all three samples the slope factors varied closely around zero. However, in some of the samples of the current study the slope was situated just below zero and in others just above zero and only in some samples did the slope factors reach significance. This might imply that mean developmental changes for loneliness, social anxiety symptoms, and depressive symptoms are limited, which might explain why it appears so difficult to identify normative developmental trends. Perhaps the development of these internalizing problems in adolescents is characterized by a certain level of stability or by individual differences, as the results of the current study suggested. With regard to loneliness, this suggestion of a stable pattern is in line with results of a recent meta-analysis (Mund et al., 2020).

CO-DEVELOPMENT OF INTERNALIZING PROBLEMS

For social anxiety symptoms and depressive symptoms, no meta-analyses on their developmental trends in adolescence are available. This could be an interesting avenue for future research.

Longitudinal Distinctiveness

Although the specific developmental trends for adolescent loneliness, social anxiety symptoms, and depressive symptoms remain unclear, the current study clearly indicates that these internalizing problems are longitudinally distinct from one another. In line with earlier cross-sectional factor-analytic studies, which already indicated that loneliness, social anxiety symptoms, and depressive symptoms are best conceptualized as three distinct but related constructs (e.g., Danneel et al., 2019a), the results of the longitudinal analyses in the present study showed that the developmental courses of the three phenomena are related, but should not be described by a single developmental trend. An earlier longitudinal study also found that the growth characteristics of adolescent depression and anxiety were unique but related (Hale et al., 2009). The current study adds to this knowledge base because it found similar results for the development of adolescent loneliness, social anxiety symptoms, and depressive symptoms when examining all three simultaneously. The three internalizing problems follow unique developmental trends that are associated with one another, rather than one common developmental trend. Therefore, we can conclude that loneliness, social anxiety symptoms, and depressive symptoms are not three labels for one and the same underlying phenomenon.

One potential indication of their longitudinal distinctiveness, as pointed out by Danneel et al. (2019a), is that they are related to different outcomes. These different associations with outcomes could also be a reflection of the different developmental trends of the three phenomena. However, the reason why the three internalizing problems follow their unique developmental trends remains unclear thus far. Future developmental research could include relevant predictors for the growth factors of each phenomenon to shed more light on this issue. Another possible approach is to examine groups of adolescents who show certain developmental patterns for the three phenomena and to investigate what factors distinguish one group of adolescents from the other. Additionally, potential subgroups of adolescents exhibiting certain combinations of these three internalizing problems could be identified (e.g., predominantly lonely adolescents, adolescents who suffer from all three internalizing problems, and adolescents suffering only from loneliness and social anxiety symptoms). Identifying and examining these subgroups would add to the current literature by gaining more insight into the distinctiveness of the three phenomena and into their co-development

Co-Development

CO-DEVELOPMENT OF INTERNALIZING PROBLEMS

Closer examination of the correlations among intercepts and slopes for the three internalizing problems reveals that in all three samples, loneliness and social anxiety symptoms co-develop across adolescence. This consistent finding is in line with previous research on associations among the three internalizing problems across adolescence using cross-lagged analysis, in which the longitudinal association between loneliness and social anxiety symptoms was most pronounced across different adolescent samples (Danneel et al., 2019b). The findings also indicate that the development of depressive symptoms is associated with the development of loneliness and social anxiety symptoms, but these findings are less consistent across the samples. Although it was already well-known that loneliness, social anxiety symptoms, and depressive symptoms often co-occur and show high co-morbidity rates at a single point in time (Epkins & Heckler, 2011), the current study expands on this knowledge base by indicating that these internalizing problems also develop in a distinct but related way across adolescence. Specifically, given the high positive slope-slope correlations among the internalizing problems, it appears that adolescents experiencing increases in one of the internalizing problems are at higher risk of experiencing simultaneous increases in one of the other types of internalizing problems as well. In other words, symptom increases for a certain type of internalizing problem might result in a cascade of symptom increases for other types of internalizing problems.

Some potential explanations can be advanced to explain this co-development among loneliness, social anxiety symptoms, and depressive symptoms. First, co-morbidity among these three problem behaviors might result from risk factors that are shared by all three internalizing problems (Dill & Anderson, 1999). When adolescents are confronted with these risk factors, the likelihood increases that they will experience all three internalizing problems and that these problems will develop simultaneously. The three types of internalizing problems share similar environmental risk factors, especially in the interpersonal domain (Epkins & Heckler, 2011), such as peer victimization (Iyer-Eimerbrink et al., 2015). In addition, intra-individual risk factors, such as a cognitive bias resulting in negative interpretations of social situations (Spithoven et al. 2017) and low self-esteem and are common to loneliness (Vanhalst et al., 2013a), social anxiety symptoms (van Tuijl et al., 2014), and depressive symptoms (Sowislo & Orth, 2013). These shared inter- and intrapersonal risk factors might explain the co-development observed.

Second, behavior that is characteristic for one internalizing problem may constitute an etiological risk factor for another internalizing problem behavior (Starr & Davila, 2008). Therefore, closely related characteristics in the interpersonal domain, such as heightened sensitivity for signs of potential social threat (Qualter et al., 2015) and social withdrawal (for a review see Cummings, Caporino, & Kendall, 2014), and

CO-DEVELOPMENT OF INTERNALIZING PROBLEMS

excessive reassurance seeking (for a review see Hankin, 2006) have been found to be typical for loneliness, social anxiety symptoms, and depressive symptoms, respectively. When adolescents experience elevations in the symptom levels of one of these internalizing problems, the interpersonal behavior that is typical for a specific internalizing problem might become more expressed and this might result in an elevation of the symptom levels of another internalizing problem. For example, when adolescents become more depressed they might withdraw more from social encounters than before, which might result in an increase in their feelings of loneliness.

The results regarding the associations between initial levels of an internalizing problem and growth in that internalizing problem or another internalizing problem (i.e., intercept-slope correlations) were highly inconsistent. In all three samples, only some, and not always the same, of the intercept-slope pairs showed significant associations. Combining the findings of the three samples, it generally seems that adolescents with higher initial levels of a certain type of internalizing problem experience smaller increases in that type of internalizing problem and smaller decreases in another type of internalizing problem. This finding might suggest that when adolescents report high levels of an internalizing problem they potentially already reached a certain ceiling level for that internalizing problem leaving no room for further increases and hampering decreases in other types of internalizing problems. These results are partly in line with the results of an earlier study on depressive symptoms and social anxiety symptoms, in which higher initial levels of depressive symptoms were found to be associated with a slower decline in social anxiety symptoms over time (McLaughlin & King, 2015). However, given the inconsistencies across the three samples we do not elaborate further on these findings and call for additional research on this topic to further clarify whether levels of an internalizing problem at a certain moment in time are predictive of increases or decreases in that particular problem or other types of internalizing problems.

Overall, the findings of the present study highlight the importance of studying loneliness, social anxiety symptoms, and depressive symptoms simultaneously, and thus for adopting a comprehensive research approach. Even though they are cross-sectionally (Danneel et al., 2019a) and developmentally distinct from one another, they are still strongly associated. Future research on the causes and outcomes of one of these internalizing problems should therefore consider including the other two internalizing problems as well, given that they might explain some of the effects found.

Gender Differences

The current study investigated gender differences in initial mean levels, growth, and co-development of loneliness, social anxiety symptoms, and depressive symptoms in exploratory fashion. In Samples 2 and 3 higher

initial mean levels of social anxiety symptoms and depressive symptoms were found for girls compared to boys. This finding is in line with earlier studies on gender differences in mean levels of social anxiety symptoms (e.g., Nelemans et al., 2014) and depressive symptoms (Salk et al. 2017). In Sample 3 girls were found to report higher initial mean levels of loneliness whereas in Sample 2 no gender differences were found. The latter finding is in line with earlier research on gender differences in loneliness (Maes et al., 2019b). However, the effect sizes were similar in both samples and were rather small, so it is possible that this gender difference for loneliness was detected in Sample 3 because of its larger sample size compared to Sample 2. No gender differences with regard to the development nor co-development of the three internalizing problems were found. So the current study clearly indicates that even when boys and girls generally show different mean levels for social anxiety symptoms and depressive symptoms this does not imply that their co-development also differs. In an earlier study on the co-development among social anxiety symptoms and depressive symptoms, no gender differences were found either (McLaughlin & King, 2015). However, studies on the prospective associations among clinical levels of internalizing problems did find gender differences, which suggests that gender differences in co-development might only be discernible at the clinical level (e.g., Costello, Mustillo, Erklani, Keeler, & Angold, 2003). As studies on gender differences in the co-development of internalizing problems are still scarce, replication studies are needed to confirm the results of the current study. Overall, gender differences seem to be limited in the development of the three internalizing problems. However, one should be aware that not all these analyses could be performed in all samples and that these findings should therefore be interpreted with some caution.

Clinical Implications

Based on the findings of the current study regarding the co-development among loneliness, social anxiety symptoms, and depressive symptoms, some interesting suggestions for clinical practice can be formulated. First, the findings of this study highlight the importance of inquiring and monitoring how an internalizing problem has developed before the start of treatment and how it develops during treatment in order to timely detect an elevation in the symptom level of these internalizing problems and to prevent a cascade of internalizing difficulties reinforcing each other. Adopting a more positive approach, the results of the current study might also indicate that efforts to alleviate a certain internalizing problem may result in a reduction of other types of internalizing problems.

Second, the current study not only confirms the high co-occurrence of adolescent loneliness, social anxiety symptoms, and depressive symptoms at a single point in time (Epkins & Heckler, 2011), but also indicates that these internalizing problems co-develop across adolescence. Therefore, in the treatment of either

CO-DEVELOPMENT OF INTERNALIZING PROBLEMS

loneliness, social anxiety symptoms, or depressive symptoms, it seems especially important to closely monitor potential signs of the other two types of internalizing problems given their strong associations. However, if monitoring efforts reveal that an adolescent is experiencing multiple internalizing problems, the question remains how the treatment of these different internalizing problems is best conducted. The primary internalizing problem might be selected to focus on, treatments for each internalizing problem might be sequenced, or interventions for these internalizing problems might be blended (Weersing, Rozenman, Maher-Bridge, & Campo, 2012). To tackle this issue, a transdiagnostic approach, which focuses on psychological factors common to the different problems at hand (Queen, Barlow, & Ehrenreich-May, 2014), seems promising (Weersing et al., 2012).

Strength and Limitations

The present study has multiple strengths worth mentioning. A first strength is the use of three large samples of adolescents, which allowed us to test for the robustness of the study findings. Second, well-established self-report measures were used to assess loneliness, social anxiety symptoms, and depressive symptoms. Third, longitudinal data were used to examine developmental trends.

Nevertheless, the study also has a number of limitations that should be acknowledged. First, given that all three samples comprised adolescents from Flanders with the majority of these adolescents attending the academic track, the study findings cannot be generalized to adolescents living outside of Flanders or attending different educational tracks. Second, as the study samples were limited to mid and late adolescence, the current study did not consider the entire age range of adolescence. In order to obtain a more complete picture of both the development and co-development of loneliness, social anxiety symptoms, and depressive symptoms across adolescence, we recommend future studies to cover early adolescence as well. Both the transitions from childhood to adolescence and from adolescence to young adulthood should be covered as well. Third, given the restriction to three data waves, only linear growth patterns could be tested. Therefore, it remains unclear whether quadratic or curvilinear trends better describe growth in the different internalizing problems.

Conclusion

Loneliness, social anxiety symptoms, and depressive symptoms are all highly prevalent in adolescence and show conceptual similarities. Given these similarities and their strong cross-sectional associations, a comprehensive approach regarding their longitudinal association was needed. This study examined the (co)-development of the three internalizing problems across adolescence in three large longitudinal samples. First, results regarding the developmental trend for each phenomenon separately were inconsistent across the three

samples. Second, the three types of internalizing problems are developmentally distinct, but related across adolescence. Third, closer examination of this co-development indicated that growth in each type of internalizing problem is associated with growth in the other types, suggesting that loneliness, social anxiety symptoms, and depressive symptoms show correlated changes across adolescence. Overall, these results add to the knowledge base on the development of each phenomenon in adolescence and represent important first steps in clarifying the co-development among these internalizing problems. Additionally, the findings highlight the importance of adopting a comprehensive research approach including all three internalizing problems.

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CO-DEVELOPMENT OF INTERNALIZING PROBLEMS

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CO-DEVELOPMENT OF INTERNALIZING PROBLEMS

Table 1

Results of Attrition Analyses for the Main Study Variables and Age and Gender in the Three Samples

Variable	Mean (SD) Participants at all waves	Mean (SD) Dropouts	<i>F</i>	<i>df</i>	η^2_p	χ^2	<i>df</i>	Cramer V
Sample 1								
Loneliness T1	1.54 (0.47)	1.52 (0.44)	0.37	(1, 540)	.001			
Social anxiety symptoms T1	2.45 (0.64)	2.39 (0.65)	0.93	(1, 540)	.002			
Depressive symptoms T1	0.82 (0.47)	0.94 (0.54)	6.79**	(1, 540)	.012			
Age	14.80 (0.74)	14.84 (0.89)	0.35	(1, 540)	.001			
Gender						10.67**	1	0.14
Sample 2								
Loneliness T1	1.53 (0.54)	1.59 (0.65)	1.40	(1, 760)	.002			
Social anxiety symptoms T1	2.39 (0.77)	2.37 (0.86)	0.11	(1, 760)	< .001			
Depressive symptoms T1	0.49 (0.43)	0.71 (0.58)	27.22***	(1, 760)	.035			
Age	13.37 (0.65)	13.42 (0.81)	0.78	(1, 760)	.001			
Gender						0.83	1	0.03
Sample 3								
Loneliness T1	1.63 (0.59)	1.71 (0.63)	4.61*	(1, 1079)	.004			
Social anxiety symptoms T1	2.57 (0.77)	2.52 (0.84)	0.93	(1, 1079)	.001			
Depressive symptoms T1	0.30 (0.23)	0.38 (0.27)	23.52***	(1, 1079)	.021			
Age	13.13 (0.62)	13.29 (0.74)	1.17***	(1, 1079)	.013			
Gender						3.44	1	0.06

Note. T1 = Time 1.

** $p < .01$. *** $p < .001$.

CO-DEVELOPMENT OF INTERNALIZING PROBLEMS

Table 2
Means and Standard Deviations of Main Study Variables at Wave 1 and Intercorrelations Among the Main Study Variables Across Waves

Variable	Wave 1		Wave 2		Wave 3		Across Waves		
	Mean	SD	Mean	SD	Mean	SD	Loneliness	Social anxiety symptoms	Depressive symptoms
Sample 1									
1. Loneliness	1.54	0.46	1.59	0.48	1.61	0.50	.60 – .65		
2. Social anxiety symptoms	2.43	0.64	2.44	0.62	2.41	0.63	.61 – .66	.65 – .71	
3. Depressive symptoms	0.86	0.49	0.83	0.50	0.82	0.48	.36 – .48	.44 – .50	.52 – .60
Sample 2									
1. Loneliness	1.54	0.56	1.56	0.54	1.57	0.54	.52 – .59		
2. Social anxiety symptoms	2.39	0.62	2.53	0.82	2.50	0.79	.51 – .56	.60 – .67	
3. Depressive symptoms	0.54	0.47	0.56	0.49	0.56	0.51	.45 – .49	.44 – .45	.46 – .62
Sample 3									
1. Loneliness	1.66	0.60	1.63	0.59	1.82	0.49	.56 – .58		
2. Social anxiety symptoms	2.56	0.79	2.58	0.77	2.62	0.74	.53 – .60	.65 – .68	
3. Depressive symptoms	0.33	0.25	0.32	0.25	0.32	0.25	.48 – .50	.50 – .52	.71 – .75

Note. All correlations were significant at $p < .001$.

CO-DEVELOPMENT OF INTERNALIZING PROBLEMS

Table 3

Fit Indices for the Different Latent Growth Curve Models in all Three Samples and Unstandardized Means and Variances of Intercepts and Slopes

Variable	S-B χ^2	df	RMSEA	90% CI RMSEA	SRMR	CFI	Intercept Mean	95% CI	Variance	Slope Mean	95% CI	Variance
Sample 1												
Loneliness	0.673	1	< .001	.000 - .105	.008	1.000	1.541***	1.503 – 1.579	0.133***	0.039***	0.018 – 0.061	0.015
Social anxiety	0.631	1	< .001	.000 - .104	.008	1.000	2.439***	2.387 – 2.491	0.278***	-0.014	-0.042 – 0.014	0.042**
Depressive symptoms	0.029	1	< .001	.000 - .061	.002	1.000	0.862***	0.821 – 0.902	0.152***	-0.014	-0.038 – 0.010	0.031**
Sample 2												
Loneliness	0.022	1	< .001	.000 - .046	.001	1.000	1.539***	1.502 – 1.576	0.185***	0.019	-0.003 – 0.041	0.035**
Social anxiety	12.541***	1	.120	.067 - .184	.030	.975	2.406***	2.351 – 2.460	0.404***	0.059***	0.030 – 0.087	0.050*
Depressive symptoms	0.085	1	< .001	.000 - .062	.002	1.000	0.544***	0.513 -0.575	0.098***	0.020*	0.001 – 0.040	0.016
Sample 3												
Loneliness	32.996***	1	.171	.124-.224	.039	.922	1.644***	1.608-1.680	0.274***	0.083***	0.064 – 0.102	0.051***
Social anxiety	0.379	1	.000	.000 - .068	.004	1.000	2.557***	2.511 – 2.603	0.487***	0.023	-0.002 – 0.048	0.084***
Depressive symptoms	0.011	1	.000	.000-.031	.001	1.000	0.330***	0.316 – 0.345	0.051***	0.006	-0.001 – 0.014	0.007***

Note. S-B χ^2 = Satorra-Bentler scaled chi-square test statistic; CFI = Comparative fit index; RMSEA = Root mean square error of approximation; SRMR = Standardized root mean squared residual.

* $p < .05$. ** $p < .01$. *** $p < .001$.

CO-DEVELOPMENT OF INTERNALIZING PROBLEMS

Table 4

Fit Indices for the two Linear Growth Models in Each Sample

Sample	S-B χ^2	df	RMSEA	90% CI RMSEA	SRMR	CFI	AIC	BIC
Multiple Indicator Latent Growth Model								
Sample 1	419.178***	34	.144	.132 - .156	.089	.752	4942.969	5029.131
Sample 2	555.666***	34	.138	.128 - .148	.078	.724	9307.782	9401.748
Sample 3	1133.095***	35	.169	.160 - .177	.109	.666	7952.767	8047.843
Parallel Process Linear Growth Model								
Sample 1	25.172*	15	.035	.004 - .058	.029	0.993	4546.350	4714.366
Sample 2	34.028**	15	.040	.022 - .057	.022	.990	8750.901	8934.133
Sample 3	65.400***	15	.055	.042 - .069	.018	.985	6802.049	6997.204

*** $p < .001$.

CO-DEVELOPMENT OF INTERNALIZING PROBLEMS

Table 5
Correlations Among Growth Factors in a Parallel Process Linear Growth Model with Three Growth Models

Variable	Intercept loneliness	Intercept social anxiety symptoms	Intercept depressive symptoms	Slope loneliness	Slope social anxiety symptoms	Slope depressive symptoms
Sample 1						
1. Intercept loneliness	-					
2. Intercept social anxiety symptoms	.81***	-				
3. Intercept depressive symptoms	.48***	.51***	-			
4. Slope loneliness	.02	-.10	.09	-		
5. Slope social anxiety symptoms	-.20	-.28**	-.13	.85**	-	
6. Slope depressive symptoms	-.13	-.09	-.22	.57	.35	-
Sample 2						
1. Intercept loneliness	-					
2. Intercept social anxiety symptoms	.65***	-				
3. Intercept depressive symptoms	.58***	.59***	-			
4. Slope loneliness	-.38***	-.01	-.04	-		
5. Slope social anxiety symptoms	-.19	-.14	.03	.54**	-	
6. Slope depressive symptoms	-.02	.05	.26	.34	.40	-
Sample 3						
1. Intercept loneliness	-					
2. Intercept social anxiety symptoms	.63***	-				
3. Intercept depressive symptoms	.56***	.56***	-			
4. Slope loneliness	-.55***	-.24***	-.21**	-		
5. Slope social anxiety symptoms	-.11	-.39***	-.10	.33**	-	
6. Slope depressive symptoms	-.10	-.11	-.19*	.29*	.36***	-

* $p < .05$. ** $p < .01$. *** $p < .001$.

CO-DEVELOPMENT OF INTERNALIZING PROBLEMS

Table 6

Fit Indices for the Multigroup Parallel Process Linear Growth Models with Fixed and Free Growth Parameters in Samples 2 and 3

Model	S-B χ^2	df	RMSEA	Δ RMSEA	90% CI RMSEA	SRMR	Δ SRMR	CFI	Δ CFI
Sample 2									
Fully Constrained	94.733***	39	.059		.044 - .075	.061		.970	
Intercepts Free	64.876***	36	.044	.015	.026 - .062	.050	.011	.985	.015
Slopes Free	70.716***	36	.049	.010	.032 - .065	.051	.010	.982	.012
Covariances Free	/	/	/	/	/	/	/	/	/
Sample 3									
Fully Constrained	147.907***	39	.071		.059 - .084	.069		.967	
Intercepts Free	86.501***	36	.050	.021	.037 - .064	.068	.001	.985	.018
Slopes Free	140.265***	36	.073	.002	.060 - .085	.067	.002	.968	.001
Covariances Free	132.949***	24	.091	.020	.076 - .106	.069	<.001	.967	<.001

*** $p < .001$

CO-DEVELOPMENT OF INTERNALIZING PROBLEMS

Table 7

Multiple Group Latent Growth Curve Models: Parameter Estimates for Mean Intercepts and Results of Equality Constraint Tests in Samples 2 and 3

Variable/Gender	Mean	95% CI	Variance	Wald test (df)
Sample 2				
Loneliness				
Girls	1.57***	1.51 – 1.62	0.18***	
Boys	1.51***	1.46 – 1.55	0.20***	3.47 (1)
Social anxiety symptoms				
Girls	2.52***	2.43 – 2.60	0.39***	
Boys	2.31***	2.24 – 2.38	0.39***	15.88*** (1)
Depressive symptoms				
Girls	0.62***	0.57 – 0.67	0.11***	
Boys	0.48***	0.44 – 0.51	0.08***	23.506*** (1)
Sample 3				
Loneliness				
Girls	1.68***	1.63 – 1.72	0.28***	
Boys	1.61***	1.56 – 1.65	0.26***	6.20* (1)
Social anxiety symptoms				
Girls	2.69***	2.63 – 2.76	0.47***	
Boys	2.42***	2.36 – 2.49	0.47***	44.00*** (1)
Depressive symptoms				
Girls	0.38***	0.36 – 0.40	0.06***	
Boys	0.29***	0.27 – 0.30	0.04***	46.57*** (1)

* $p < .01$. *** $p < .001$