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Loneliness in Adolescence:
Developmental Course, Antecedents, and Consequences

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Doctor in de Psychologie en Doctor in de Sociale Wetenschappen door

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Janne Vanhalst, Loneliness in Adolescence: Developmental Course, Antecedents, and Consequences.

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Loneliness is an unpleasant feeling that arises due to a discrepancy between the desired and achieved quality of one's social network (Peplau & Perlman, 1982), and has a deleterious effect on various aspects of psychological well-being (Heinrich & Gullone, 2006). Loneliness is particularly relevant to investigate in adolescence because one's social network changes substantially during this period (e.g., increased need for intimate peer relations; Parkhurst & Hopmeyer, 1999). To date, however, there is a dearth of longitudinal studies on loneliness in adolescence and the transition to adulthood. Therefore, the present dissertation examined the course of loneliness trough mid- and late adolescence, its developmental antecedents, psychological consequences, and the mechanisms underlying these associations. Eight studies, summarized in six empirical chapters, have been conducted to address this general aim. Peer- and self-reported questionnaire data from four longitudinal datasets were used. These six empirical chapters are preceded by a general introduction and followed by a general discussion

An in-depth investigation of the longitudinal associations between loneliness and two of its strongest correlates – depressive symptoms and self-esteem – was conducted. Regarding the association between loneliness and depressive symptoms, cross-lagged results pointed to a transactional model with predominant influences from loneliness to depressive symptoms. This predominant path was partly mediated by passive coping strategies in general, and uncontrollable ruminative thoughts in particular. Active coping strategies, however, could not prevent lonely adolescents from developing depressive symptoms. Moreover, moderation by the personality trait neuroticism was found, indicating that adolescents high in neuroticism were particularly at risk to get stuck in the vicious circle between loneliness and depressive symptoms. Regarding the association between loneliness and self-esteem, a transactional model was uncovered in which low self-esteem and loneliness reciprocally affected one another across time. Moreover, perceived (i.e., self-reported) social acceptance was a partial mediator in this process, whereas actual (i.e., peer-reported) social acceptance was not. As these results on the association between loneliness and psychological well-being evidenced important inter-personal and intra-personal correlates of loneliness, we further examined the joint effects of both types of correlates as predictors of adolescent loneliness. Specifically, additive, mediating, and moderating effects between several inter- and intra-personal predictors of loneliness were examined. The four investigated inter-personal factors (i.e., actual social acceptance, victimization, friendship quantity, and friendship quality) and two intra-personal factors (i.e., shyness and self-esteem) were found to be unique predictors of loneliness. Moreover, important interplay between inter- and intra-personal factors in predicting loneliness was revealed. Finally, the developmental course of loneliness through mid- and late adolescence was investigated, both at the group level and at the level of subgroups. A general decreasing trend in loneliness was evidenced. However, substantial individual differences were observed, as we identified five loneliness trajectories (i.e., stable low, low increasing, moderate decreasing, high decreasing, and chronically high). These five trajectory classes were differentially predicted by personality traits (i.e., extraversion, agreeableness, and emotional stability) and had different psychosocial outcomes (i.e., depressive symptoms, self-esteem, anxiety, and perceived stress), providing evidence for the validity of the different loneliness trajectories.

In sum, the present dissertation identified important antecedents, consequences, and underlying mechanisms in the development of loneliness across mid- and late adolescence, and therefore, addressed an important gap in the loneliness literature. Moreover, the results of the present dissertation raise new questions that stimulate future research and, hence, contribute to the continuing development of loneliness research and theory.

Janne Vanhalst, Eenzaamheid in de adolescentie: Ontwikkelingsverloop, antecedenten, en gevolgen.

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Eenzaamheid is een onaangenaam gevoel dat ontstaat ten gevolge van een discrepantie tussen het ideale en actuele sociale netwerk dat men ervaart (Peplau & Perlman, 1982), en heeft een schadelijk effect op verschillende aspecten van het psychisch welbevinden (Heinrich & Gullone, 2006). Eenzaamheidsonderzoek in de adolescentie is bijzonder relevant omdat het sociale netwerk substantieel verandert tijdens deze periode (er is bijvoorbeeld een verhoogde behoefte aan intieme relaties met leeftijdgenoten; Parkhurst & Hopmeyer, 1999). Tot op heden is er echter een gebrek aan longitudinale studies over eenzaamheid in de adolescentie en de overgang naar de volwassenheid. Daarom onderzochten we in dit doctoraat de ontwikkeling van eenzaamheid doorheen de adolescentie, in combinatie met de antecedenten, psychische gevolgen, en de mechanismen die hieraan ten grondslag liggen. Acht studies, samengevat in zes empirische hoofdstukken, zijn uitgevoerd om deze algemene doelstelling te verwezenlijken, voorafgegaan door een algemene inleiding en gevolgd door een algemene discussie. Vier longitudinale vragenlijstenonderzoeken werden hiervoor gehanteerd, met data verzameld bij adolescenten en hun klasgenoten.

Een grondig onderzoek werd uitgevoerd naar het longitudinale verband tussen eenzaamheid enerzijds en depressieve symptomen en zelfwaardering anderzijds. Met betrekking tot het verband tussen eenzaamheid en depressieve symptomen wezen onze cross-lagged resultaten op wederzijdse invloeden, met een overheersende invloed van eenzaamheid op depressieve symptomen. Dit overheersende verband werd gedeeltelijk gemedieerd door passieve coping strategieën in het algemeen en ruminatie in het bijzonder. Actieve coping strategieën konden eenzame jongeren echter niet beschermen tegen depressieve symptomen. Bovendien vonden we dat vooral jongeren die hoog scoren op de persoonlijkheidstrek neuroticisme meer risico liepen om verstrikt te raken in de vicieuze cirkel tussen eenzaamheid en depressieve symptomen. Met betrekking tot het verband tussen eenzaamheid en zelfwaardering vonden we dat beide elkaar wederzijds beïnvloeden, met een sterker verband van lage zelfwaardering naar eenzaamheid. Bovendien vonden we dat gepercipieerde sociale acceptatie een partiële mediator was in dit proces, terwijl feitelijke sociale acceptatie (zoals gerapporteerd door de klasgenoten) geen mediator was. Aangezien deze resultaten over het verband tussen eenzaamheid en psychisch welbevinden belangrijke inter- en intra- persoonlijke factoren van eenzaamheid onthulden, onderzochten we de gezamenlijke effecten van beide factoren als voorspellers van eenzaamheid bij jongeren. Meer bepaald werden additieve, mediërende en modererende effecten onderzocht tussen de verschillende inter- en intra-persoonlijke factoren van eenzaamheid. De vier onderzochte inter-persoonlijke factoren (d.w.z., sociale acceptatie, gepest worden, vriendschapskwaliteit en vriendschapskwantiteit) en twee intra-persoonlijke factoren (d.w.z., verlegenheid en lage zelfwaardering) bleken unieke voorspellers van eenzaamheid te zijn. Bovendien onthulden we een belangrijke wisselwerking tussen inter- en intra-persoonlijke factoren in het voorspellen van eenzaamheid. Tot slot werd het ontwikkelingsverloop van eenzaamheid doorheen de adolescentie onderzocht, zowel op groepsniveau als op het niveau van subgroepen. Een algemene dalende trend in eenzaamheid werd waargenomen. Er werden echter grote individuele verschillen waargenomen. We vonden met name vijf eenzaamheidstrajecten (d.w.z., stabiel laag, laag stijgend, gemiddeld dalend, hoog dalend, en chronisch hoog). Deze vijf trajecten werden verschillend voorspeld door persoonlijkheidskenmerken (d.w.z., extraversie, vriendelijkheid en emotionele stabiliteit) en hadden verschillende psychosociale gevolgen (d.w.z., depressieve symptomen, gevoel van eigenwaarde, angst, en stress).

Kortom, dit doctoraat identificeerde belangrijke antecedenten, gevolgen en onderliggende mechanismen in de ontwikkeling van de eenzaamheid in de adolescentie, en vult daarom een belangrijk hiaat in de eenzaamheidsliteratuur op. Bovendien roepen onze resultaten nieuwe onderzoeksvragen op, die toekomstig onderzoek stimuleren en daarmee bijdragen aan de verdere ontwikkeling van eenzaamheidsonderzoek en -theorie.

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The Present Dissertation in the Context of Loneliness Research

The need to belong is a universal and fundamental human need, representing a deep-rooted desire for connectedness to other people (Baumeister & Leary, 1995). A fulfilled need to belong contributes to well-being, whereas a thwarted need to belong can result in a variety of harmful outcomes. The present dissertation focuses on one such harmful outcome, that is, loneliness, and its developmental origins and consequences during adolescence and the transition to adulthood.

Whereas transient feelings of loneliness do not necessarily pose substantial problems, chronic feelings of loneliness are a serious cause for concern. Indeed, enduring loneliness is implicated in numerous clinically relevant problems (Heinrich & Gullone, 2006). Prior research has shown that loneliness in adolescence is related to various psychological problems, including lowered self-esteem and increased feelings of depression and anxiety (Ernst & Cacioppo, 1999; Heinrich & Gullone, 2006). Furthermore, loneliness has been related to physical health problems, such as cardiovascular diseases and sleep disturbances (e.g., Caspi, Harrington, Moffitt, Milne, & Poulton, 2006; Hawkley, Burleson, Berntson, & Cacioppo, 2003). Hence, in order to inform clinical prevention and intervention, it is important to examine the exact associations between loneliness and psychological adjustment over time and to ascertain how these associations come about. To date, however, there is a dearth of longitudinal studies on loneliness in mid- to late adolescence and the transition to adulthood. Therefore, the main goal of the present dissertation is to fill this gap in the literature. Specifically, the present dissertation focuses on the course of loneliness through adolescence, its developmental antecedents, and psychological consequences. Moreover, special attention is given to underlying mechanisms.

Before proceeding to the empirical chapters of this dissertation, we describe what the construct of loneliness signifies. Specifically, we provide its definition, describe the current theoretical frameworks on loneliness, introduce several ways of measuring loneliness, and stress the importance of investigating loneliness in adolescence. Next, we elaborate on previously identified psychological, intra-personal and inter-personal correlates of loneliness. Subsequently, we discuss four specific gaps in the current literature, and move on to describe how the present dissertation tries to remedy these gaps. Finally, we describe the study design and methodology used in the six empirical chapters of this dissertation.

1. What is loneliness?

1.1 Definition

Although different research traditions have offered different definitions of loneliness, three features of loneliness are universal across all definitions (Peplau & Perlman, 1982). Specifically, loneliness (a) is thought to result from perceived deficiencies in one's social life; (b) is a subjective rather than objective condition; and (c) is, by definition, a negative, painful and severely distressing experience. The present dissertation relied on the commonly used definition by Perlman and Peplau (1982), defining loneliness as *the negative emotional response to a discrepancy between the desired and achieved quality of one's social network.* This definition assumes that loneliness results from a discrepancy between the desired and actual level of one's relationships.

We chose this particular definition because it captures both the affective and the cognitive facets that are essential to being lonely. The emotionally distressing aspect stresses the affective component, whereas the perception that one's social network does not live up to one's expectation stresses the cognitive component. In addition, this definition clearly distinguishes loneliness from solitude or aloneness. First, whereas loneliness is a subjective experience, aloneness is an objective state. Second, whereas loneliness is, by definition, a painful experience, solitude can be a positive and restorative experience (e.g., Goosens, 2006; Goossens & Marcoen, 1999; Larson, 1990, 1999). Indeed, time spent alone can lead to self-reflection and self-regulation, increased creativity, and greater insight (e.g., Long & Averill, 2003; Suedfeld, 1982). Hence, it is possible to feel lonely in a crowd, or to feel socially connected when alone. This important distinction between loneliness and solitude is not new, as Tillich (1959) already stated that solitude expresses the glory of being alone, whereas loneliness expresses the pain of feeling alone.

1.2 Perspectives on loneliness

Various theoretical traditions discussed the occurrence, antecedents, and consequences of loneliness across the life span. Rather than providing an extensive literature review of the different theoretical perspectives on loneliness, we will briefly discuss the most frequently used perspectives on loneliness. (For more extensive reviews, we refer to Heinrich & Gullone, 2006; Marangoni & Ickes, 1989; Weeks, 2010; Weeks & Asher, 2012).

First, the *social needs perspective* states that loneliness arises when important social needs are not being met. Sullivan (1953) was the first to argue that a direct relationship may exist between objective social deficits and subjective feelings of loneliness, and that loneliness could also be evoked by deficits in relationships other than caregiver-child relationships. Bowlby's (1969/1982) attachment theory can be viewed as a precursor of social needs theory as well, as this theory recognizes that early insecure attachment may be responsible for loneliness later on in life. The social needs perspective on loneliness was first articulated when Weiss (1973, 1974) distinguished between six types of provisions that are offered by social relationships (i.e., attachment, social integration, nurturance, reassurance of worth, reliable alliance, and guidance). Weiss further argued that different types of relationships offer different provisions. Specifically, he distinguished between two types of loneliness, resulting from deficits in two types of relationships. Social loneliness results from the lack of social integration into an engaging social network, whereas emotional loneliness results from the lack of emotional attachment in an intimate dyadic relationship. Later revisions of the social needs perspective extended the list of relational provisions (e.g., Parkhurst & Hopmeyer, 1999) and stressed the fact that different types of relationships (i.e., groups and dyads) could provide the same provisions as well (Shaver & Buhrmester, 1983). In sum, the social needs perspective stresses the importance of the relational context in which a person is embedded, and the lack of provisions that may arise from these relationships in explaining the emergence of loneliness.

Second, the *cognitive discrepancy model* stresses the importance of subjective appraisals in the experience of loneliness. This model assumes that deficits in one's social network do not directly influence loneliness, but that the subjective evaluation of one's social network is particularly relevant. Specifically, the discrepancy between the desired and actual social network is hypothesized to be crucial in the experience of loneliness (de Jong-Gierveld, 1987; Kupersmidt, Sigda, Sedikides, & Voegler, 1999; Peplau & Perlman, 1982). The cognitive discrepancy model implies that there can be two causes for this perceived discrepancy which can apply simultaneously: (a) the actual relationships of lonely individuals may be lower in quantity or quality compared to the relationships of non-lonely individuals; or (b) desired relationship standards may be unrealistically high for lonely people. Therefore, individuals with similar levels of 'objective' social contact may differ in their 'subjective' level of loneliness. Indeed, an important merit of the cognitive discrepancy model is that it stresses the difference between loneliness and aloneness.

Third, the *evolutionary theory of loneliness* builds on the idea that the need to belong has evolutionary origins (Baumeister & Leary, 1995). Forming and maintaining social bonds is central to being human because it was a key mechanism in the survival of our ancestors. Ancestral groups were vital in coordinating hunting and gathering, sharing food, providing protection, and meeting a mate with whom to reproduce. Therefore, in addition to a physical pain system, human beings have developed a social pain system that signals them when their connectedness to others is threatened by evoking painful affect (MacDonald & Leary, 2005). The evolutionary theory of loneliness hypothesizes that the social pain of loneliness and the social reward of connectedness motivates individuals to repair and maintain social connections (Cacioppo & Hawkley, 2003; Cacioppo, Hawkley et al., 2006). Loneliness further activates a survival mechanism that sets off hypervigilance for additional social threats, such as rejection by the peer group. This hypervigilance, in turn, is accompanied by a host of negative feelings, including low self-esteem, anger, and anxiety (Cacioppo, Hawkley et al., 2006; Hawkley & Cacioppo, 2010).

These three different perspectives on loneliness have stimulated empirical work on the antecedents of loneliness in different ways. For example, empirical work grounded in the social needs perspective typically has examined deficits in different types of relationships, relationship provisions, or social skills (e.g., Asher & McDonald, 2009; Dirks, Treat, & Weersing, 2007; Parker & Asher, 1993; Riggio, Watring, & Throckmorton, 1993; Williams & Solano, 1983). Empirical work grounded in the cognitive discrepancy model has mainly focused on cognitive appraisals of social relationships and attribution styles (e.g., Anderson, Horowitz, & French, 1983; Hymel, Franke, & Freigang, 1985; D. W. Russell, Cutrona, McRae, & Gomez, 2012). Finally, the evolutionary theory of loneliness has inspired empirical work on the genetic contribution to loneliness (e.g., Boomsma, Willemsen, Dolan, Hawkley, & Cacioppo, 2005; van Roekel, Scholte, Verhagen, Goossens, & Engels, 2010) and on physical and health outcomes related to loneliness (e.g., Hawkley et al., 2003; Hawkley, Masi, Berry, & Cacioppo, 2006; Qualter et al., 2012).

The main focus of the present dissertation is on the cognitive discrepancy model, which is also reflected in the definition guiding our research. Nevertheless, the empirical chapters of the present dissertation partly build on all three perspectives. For example, in line with the social needs perspective, several peer experiences are examined as contributors to loneliness (e.g., Chapter 5). In line with the cognitive discrepancy model, the importance of the discrepancy between perceived and actual social acceptance is stressed (e.g., Chapter 6),

as well as the role of cognitive coping and rumination (e.g., Chapter 1 and 2). In line with the evolutionary theory of loneliness, finally, the long-term associations between loneliness and several psychological health outcomes such as depressive symptoms and anxiety are considered (e.g., Chapter 4 and 7).

1.3 Measures of loneliness

As loneliness is a subjective emotional experience, self-report assessments rather than observational methods are most appropriate to measure loneliness. Different self-report assessments have been developed over the years, depending on whether a unidimensional versus multidimensional approach on loneliness is adopted. Unidimensional approaches assume that loneliness is a global phenomenon that mainly varies in intensity. This approach claims that there are common themes in the experience of loneliness across different situations and relationships. Multidimensional approaches, by contrast, assume that loneliness is a complex phenomenon that takes on different forms in different situations and relationships. Such approaches distinguish, for example, between peer-related and parent-related loneliness (Marcoen, Goossens, & Caes, 1987), or between social, family, and romantic loneliness (DiTommaso & Spinner, 1993). Because several measures – both unidimensional and multidimensional – have been reviewed elsewhere (Cramer & Barry, 1999; Goossens & Beyers, 2002; Goossens et al., 2009; Marangoni & Ickes, 1989; D. Russell, 1982; Shaver & Brennan, 1991; Weeks & Asher, 2012), we focus on describing the most commonly used instruments from both traditions that are applied in research in adolescence. In addition, we discuss some recent directions within the literature on the assessment of loneliness.

Regarding *unidimensional* measures of loneliness, the UCLA (University of California, Los Angeles) loneliness scale (D. Russell, Peplau, & Cutrona, 1980; D. Russell, Peplau, & Ferguson, 1978) is the most commonly used assessment of loneliness in adolescence. To avoid socially desirable responses resulting from the stigma that is associated with loneliness, none of the items in this scale refers directly to feeling lonely. The items rather focus on participants' evaluations of different features of their social networks (e.g., "I lack companionship"). However, some authors question the content validity of loneliness instruments such as the UCLA loneliness scale and other scales that assess loneliness indirectly (e.g., the Rasch type loneliness scale; de Jong-Gierveld & Kamphuis, 1985). Indeed, recent work stresses the importance of distinguishing between the 'pure' emotional

experience of loneliness and the hypothesized causes of loneliness (Weeks & Asher, 2012). Weeks and Asher argue that hypothesized causes (such as the evaluation of one's social network) should be excluded from loneliness assessments and that loneliness should be assessed in a direct manner. This resulted, for instance, in the development of the Loneliness in Context questionnaire (Weeks & Asher, 2012), in which adolescents are asked directly whether they are lonely or feel sad and alone in different school or college contexts.

Regarding the *multidimensional* approach, Weiss' (1973) distinction between emotional and social loneliness inspired the development of several multidimensional measures of loneliness. For example, the Social and Emotional Loneliness Scale for Adults (SELSA; DiTommaso & Spinner, 1993) distinguishes between family, romantic, and social loneliness. Some multidimensional measures also place feelings of loneliness in a somewhat broader perspective, for example by including the attitude that individuals hold towards being alone. Specifically, the Loneliness and Aloneness Scale for Children and Adolescents (LACA; Marcoen et al., 1987) measures the affinity for and aversion to being alone, in addition to two types of loneliness that emerge in two different relationships, that is, peer- and parent-related loneliness.

Questions may arise about how uni- and multidimensional measures of loneliness relate to one another. Previous studies examining the overlap and distinctiveness of several loneliness measures in adolescence indicated that unidimensional measures of loneliness typically load on the peer-related loneliness factor (Cramer & Barry, 1999; Goossens et al., 2009). A similar conclusion can be drawn based on correlational patterns. For example, the peer-related loneliness scale of the LACA correlated highly with the UCLA loneliness scale (r = .76; Goossens et al., 2009) and the Loneliness in Context questionnaire (r = .73[1]). Several possible explanations for this finding may be offered. First, many of the items of unidimensional assessments refer to the peer context, directly or indirectly. For example, the items in the Loneliness in Context questionnaire are all limited to the school or college context, in which peers take on a central role. Second, if items refer to the generalized other (as is the case in the UCLA), adolescents may instantly think about their peers rather than their parents, as they typically spend more time with peers during adolescence, and hence, peers constitute their main social network (Steinberg & Morris, 2001). Third, peer-related

[1] This correlation was calculated based on recently collected data that are not included in the present dissertation, nor published elsewhere. Specifically, 266 Belgian high school students from Grades 11 and 12 filled out both questionnaires. Explanatory factor analyses indicated that all items of the Loneliness in Context questionnaire loaded on the peer-related loneliness scale of the LACA.

loneliness may capture the essence of general loneliness, that is, most individuals associate loneliness with qualitatively insufficient peer relationships rather than qualitatively insufficient parent relationships. On a related note, whereas most individuals experience peer-related loneliness at some point in their life (Rokach, 2012), this may not be the case for parent-related loneliness.

Therefore, although the present dissertation embraces the multidimensional approach outlined by Marcoen and colleagues (1987), the main focus is on peer-related loneliness rather than parent-related loneliness, due to the abovementioned reasons. Moreover, we chose not to examine adolescents' attitudes towards aloneness because the focus of the present dissertation is on the subjective experience of loneliness. Specifically, the peer-related loneliness scale of the LACA was used in all empirical chapters (Marcoen et al., 1987). The UCLA loneliness scale (D. Russell et al., 1980) and the parent-related loneliness scale of the LACA were used as additional measures of loneliness in Chapters 2 and 3, respectively.

1.4 Loneliness in adolescence

Although (peer-related) loneliness is a problem that affects people of all ages, we argue that it is particularly relevant to investigate loneliness during adolescence. Adolescence is characterized by many changes in social expectations, roles, relationships, and identities, which may increase the likelihood to experience loneliness (Parkhurst & Hopmeyer, 1999; Rubin, Bukowski, Parker, & Bowker, 2008). Moreover, loneliness is expected to peak during early adolescence (Heinrich & Gullone, 2006), when peer groups such as cliques and crowds become increasingly important and represent important sources of belonging and identity. In addition, a preoccupation with social status, dominance, and prestige among peers comes to the fore in early adolescence (Parkhurst & Hopmeyer, 1999). During mid- and late adolescence, there is a shift towards dyadic relationships in which intimacy is increasingly valued (Buhrmester, 1990; Parkhurst & Hopmeyer, 1999). Indeed, mid- and late adolescents develop greater expectations about the intimacy, loyalty, and support in their relationships, and they increasingly exchange beliefs, values, and ideologies with their friends (Heinrich & Gullone, 2006; Rubin et al., 2008).

A specific transition during late adolescence – although only relevant for a subgroup of late adolescents – is the transition to college. This transition is particularly challenging in terms of maintaining a satisfying social network, creating new relationships, and reshaping

existing ones (Cutrona, 1982). Most students have left the parental home to attend college, and their high school friends often move to different universities. Therefore, they can no longer rely on their existing social network of friends and family and have to deal with many life changes and choices, which may cause feelings of loneliness (Kenny & Sirin, 2006; Montgomery & Côté, 2003; Oswald & Clark, 2003; Stroebe, van Vliet, Hewstone, & Willis, 2002).

Hence, the focus of the present dissertation is on the developmental period from mid-adolescence through the transition to young adulthood. Specifically, all empirical chapters in the present dissertation focus on the age range between 15 and 21, with some variations in the specific sample under study. Whereas Chapters 2 and 3 focus on college students, Chapters 5 and 6 focus on high school students. Chapters 4 and 7, finally, bridge these two developmental periods and focus on adolescents transitioning from high school to young adulthood.

2. Correlates of loneliness

Most perspectives on loneliness have in common that loneliness is viewed as an unpleasant, distressing experience that is embedded in one's personality and social experiences (Rokach, 2012). Hence, over the years, various empirical studies have investigated the correlates of loneliness pertaining to these areas. First, these studies were aimed to specify which unpleasant or distressing conditions are brought about by loneliness or, put differently, which types of psychological problems are related to loneliness. Second, earlier work examined how loneliness is embedded in one's personality and social experiences, and aimed to identify which intra- and inter-personal factors are associated with feeling lonely. In this section, we summarize the main findings regarding the association between loneliness, on the one hand, and psychological adjustment, intra-personal factors, and inter-personal factors, on the other hand. In addition, we briefly review gender differences in loneliness. For more extended overviews on these topics, we refer to previous literature reviews and meta-analyses (e.g., Asher & Paquette, 2003; Ernst & Cacioppo, 1999; Goossens, 2006; Heinrich & Gullone, 2006; Mahon, Yarcheski, Yarcheski, Cannella, & Hanks, 2006; Weeks, 2010).

2.1 Psychological adjustment

Loneliness in adolescence is related to a broad range of indicators of psychological health. A meta-analysis on the correlates of adolescent loneliness indicated that the correlations with depressive symptoms and self-esteem were considered large effects, the correlation with social anxiety was considered a medium effect, and the correlation with stress was considered a small effect (Mahon et al., 2006). All four types of psychological adjustment (i.e., depressive symptoms, self-esteem, anxiety, and perceived stress) are examined in the empirical chapters of the present dissertation, with a strong emphasis on the two strongest correlates of loneliness, that is, depressive symptoms and self-esteem.

Regarding *depressive symptoms*, the association with loneliness has long been emphasized by both researchers and clinicians (e.g., Cacioppo, Hughes, Waite, Hawkley, & Thisted, 2006; Lasgaard, Goossens, & Elklit, 2011; Shaver & Brennan, 1991). Furthermore, because of this strong association, loneliness is sometimes perceived of as a symptom of depression, as evidenced in several widely used depression questionnaires which include an item tapping into loneliness (e.g., the Center for Epidemiologic Studies Depression Scale; CES-D, Radloff, 1977). However, previous studies indicated that both constructs are clearly distinct from one another. Specifically, confirmatory factor analyses pointed to two separate constructs (e.g., Cacioppo, Hawkley et al., 2006; Weeks, Michela, Peplau, & Bragg, 1980) and both were differentially related to a number of external variables (e.g., blood pressure; Hawkley et al., 2006). In addition, the sharp increase in depressive symptoms in adolescence for girls (as they become about twice as depressed as boys; Nolen-Hoeksema & Girgus, 1994) is not accompanied by similar increases and gender differences in loneliness (Koenig & Abrams, 1999). This remarkable finding further illustrates the distinction between loneliness and depressive symptoms.

Regarding *self-esteem*, research in childhood (e.g., Fordham & Stevenson-Hinde, 1999; Rubin & Mills, 1988), adolescence (e.g., Larson, 1999; Olmstead, Guy, O'Malley, & Bentler, 1991; Prinstein & La Greca, 2002), and adulthood (e.g., Jones, 1982; Nurmi, Toivonen, Salmela-Aro, & Eronen, 1997) has shown a consistent relationship with loneliness. Particularly in adolescence, one’s perception of one’s social relationships is of crucial importance to one’s self-esteem (Peplau, Miceli, & Morasch, 1982). Indeed, adolescents tend to define themselves in terms of social relationships and are increasingly aware of and

concerned about their social status (Parkhurst & Hopmeyer, 1999). Hence, being lonely in adolescence may also imply the feeling of having failed a critical social task (Larson, 1999).

2.2 Intra-personal factors

Only a minority of studies on correlates of loneliness focused on intra-personal factors, such as one's *personality*. Three possible explanations have been outlined to explain how one's personality may affect the experience of loneliness (Peplau & Perlman, 1982). Specifically, certain personality traits may (a) reduce social attractiveness, (b) influence one's interactional behavior, and (c) affect reactions to changes in social relations. Together, these three hypotheses assume that personality affects the formation and maintenance of satisfying relationships, which, in turn, affect loneliness. Yet, an alternative explanation of the link between personality and loneliness is that certain personality traits might function as vulnerability factors for loneliness due to their inherent association with a pessimistic cognitive bias and negative affect. For example, as introversion is related to low levels of positive affect and neuroticism to high levels of negative affect (Larsen & Ketelaar, 1991), it is not surprising that previous empirical work found that lonely individuals typically are characterized by a more introverted and neurotic personality profile (Asendorpf & van Aken, 2003; Cacioppo, Hawkley et al., 2006; Hojat, 1983; Stokes, 1985).

Although broad personality traits received little empirical attention in the loneliness literature, *shyness*, which is considered a specific aspect of one's personality, has repeatedly been identified as a predictor of loneliness (e.g., Boivin, Poulin, & Vitaro, 1994; Fitts, Sebby, & Zlokovich, 2009; Parkhurst & Asher, 1992). Indeed, a meta-analysis indicated that the correlation between loneliness and shyness represents a large effect (Mahon et al., 2006). In line with the theoretical assumptions on the link between loneliness and broad personality traits, shy individuals may be perceived by their peers as less interesting interaction partners, resulting in lower social acceptance or even victimization by the peer group, which, in turn, could explain their higher level of loneliness (Boivin, Hymel, & Bukowski, 1995). Similarly, shy individuals are less talkative and exhibit a lack of interaction with peers (Kingery, Erdley, Marshall, Whitaker, & Reuter, 2010), which may explain their increased vulnerability for experiencing loneliness.

Another intra-personal factor that has been related to the experience of loneliness is *coping* (i.e., the use of cognitive and behavioral strategies for dealing with pressures,

demands, and emotions in response to distress; Lazarus & Folkman, 1984). Whereas the previous two intra-personal factors (i.e., shyness and personality) have typically been examined as predictors of loneliness, coping has typically been examined as an outcome of loneliness (for an exception, see Findlay, Coplan, & Bowker, 2009). Previous research on coping with loneliness generally described specific ways in which children (e.g., Besevegis & Galanaki, 2010), adolescents (e.g., Moore & Schultz, 1983; Rokach & Neto, 2000), and adults (e.g., Rubenstein & Shaver, 1982) cope with being lonely. A consistent conclusion drawn from these studies is that individuals of all ages tend to use maladaptive strategies in coping with loneliness. Specifically, these individuals typically dealt with their feelings of loneliness in a passive rather than an active manner. This could be due to, for example, the perceptions that lonely people typically hold, as they tend to believe that they are powerless to change their situation (Heinrich & Gullone, 2006).

The three intra-personal factors discussed above (i.e., shyness, personality, and coping) are all included in the empirical chapters of the present dissertation. In addition, Chapter 3 examined the link between loneliness and *rumination*, an intra-personal factor that has never been investigated in response to loneliness before. Rumination is defined as repetitively and passively focusing on symptoms of distress (such as feelings of loneliness) and on the possible causes and consequences of these symptoms (Nolen-Hoeksema, 1991). Rumination has often been investigated in the context of depressive symptoms (Nolen-Hoeksema, Stice, Wade, & Bohon, 2007), and an emerging body of literature demonstrated associations with anger (e.g., Peled & Moretti, 2007), anxiety (e.g., Nolen-Hoeksema, 2000), self-injury (e.g., Hilt, Cha, & Nolen-Hoeksema, 2008), and substance abuse (Willem, Bijttebier, Claes, Vanhalst, & Raes, 2012). The present dissertation adds to this growing literature by investigating the association between loneliness and rumination.

2.3 Inter-personal factors

A rich body of research focused on the association between inter-personal factors and loneliness, often inspired by the social needs perspective. For example, previous work indicated that insecurely attached children and adolescents have a higher risk for experiencing loneliness (e.g., Berlin, Cassidy, & Belsky, 1995; Kerns, Klepac, & Cole, 1996; Rotenberg, 1999). Similarly, children and adolescents with low responsive and high psychologically controlling parents are more likely to feel lonely (e.g., Jackson, Soderlind, & Weiss, 2000; Soenens, Vansteenkiste, Goossens, Duriez, & Niemiec, 2008; Wiseman, Mayseless, &

Sharabany, 2006). In addition, lacking a romantic partner also places one at risk for experiencing loneliness (Woodhouse, Dykas, & Cassidy, 2012). However, the majority of studies on inter-personal factors in the prediction of loneliness focused on the peer context. In particular, several types of peer relationships have been related to loneliness in previous work: from the macro-context of social networks (e.g., Cacioppo, Fowler, & Christakis, 2009) to the micro-context of dyadic friendships (e.g., Parker & Asher, 1993).

First, *social acceptance*, or how much the group as a whole likes or dislikes an individual, is probably the most widely studied peer experience in relation to childhood loneliness. Previous work indicated that rejected children experience higher levels of loneliness compared to their well-accepted peers (e.g., Boivin et al., 1995; Cassidy & Asher, 1992). However, not all rejected children suffer from loneliness. Children who were rejected because they were submissive were more likely to experience loneliness than children who were rejected because they were aggressive (Parkhurst & Asher, 1992). In addition, rejected children who had at least one friend were protected against loneliness (Parker & Asher, 1993). This latter finding shows the importance of studying different peer experiences simultaneously.

Related to peer rejection, *victimization* is also a well-established predictor of loneliness in childhood and adolescence (e.g., Boivin et al., 1995; Eslea et al., 2004; Hawker & Boulton, 2000; Kochenderfer-Ladd & Wardrop, 2001). Victimization is defined as being a victim of intentional harmful behavior that is repeated over time by one or more individuals with a stronger power position (Olweus, 1991). Being victimized is a very stressful and intrusive experience that relates directly to various forms of maladjustment, including loneliness (Hawker & Boulton, 2000). Victimization may also influence loneliness indirectly, through social isolation. Specifically, a previous study in adolescent boys indicated that adolescents tended to distance themselves from their victimized peers, because they feared to be targeted as well (Merton, 1996). Victimization can take on different forms such as physical, verbal, or relational victimization, and the more types of peer victimization one is exposed to, the more likely one is to experience loneliness (Prinstein, Boergers, & Vernberg, 2001).

Finally, given the shift towards dyadic relationships in mid- and late adolescence (Buhrmester, 1990; Parkhurst & Hopmeyer, 1999), *dyadic friendships* are important to consider when investigating loneliness in that period of life. Several studies demonstrated that

different friendship features can act as buffers against loneliness in childhood and adolescence. Conversely, lonely individuals have fewer friends and fewer close friends, their friendships are lower in quality and stability, and they see their friends as not very similar to themselves (Bell, 1993; Berndt, 2002; Kingery, Erdley, & Marshall, 2011; Nangle, Erdley, Newman, Mason, & Carpenter, 2003; Parker & Asher, 1993; Renshaw & Brown, 1993; Sanderson & Siegal, 1995). Researchers have stressed the importance of investigating the quality of friendships in addition to the quantity of friendships as buffers against loneliness (Parker & Asher, 1993). Indeed, having reciprocal friendships protects adolescents against feeling lonely, especially when the experienced friendship quality is high (Vanhalst, Luyckx, Giletta, Goossens, & Scholte, 2011).

In sum, although a rich body of literature indicated strong connections between loneliness and peer functioning, the majority of these studies focused on childhood and early adolescence. Given the dearth of studies focusing on the peer context in mid- and late adolescence, and given the central role of peers in this developmental stage, the present dissertation focuses on several types of peer experiences in mid- and late adolescence. Specifically, we focus on social acceptance, victimization, and the quantity and quality of dyadic friendships, which are among the closest and probably most important peer experiences for adolescents.

2.4 Gender differences

Although there have been several reviews on gender differences in loneliness (Borys & Perlman, 1985; Koenig & Abrams, 1999; Mahon et al., 2006), it remains unclear whether gender differences in loneliness exist, and if this is the case, whether girls or boys are more lonely (Weeks & Asher, 2012). Notably, the measure that is used to capture loneliness may influence whether gender differences are found and in which direction. When items ask directly about loneliness, girls typically report more loneliness. By contrast, when items do not ask directly about loneliness, boys tend to report more loneliness (Borys & Perlman, 1985; Koenig & Abrams, 1999). However, the majority of research on loneliness found no gender differences, regardless of the measurement used (Weeks & Asher, 2012).

3. Gaps in current literature and rationale for the present dissertation

Although our literature review clearly indicates that loneliness has been extensively investigated, several questions regarding the developmental course, origins, and consequences

of adolescent loneliness remain unanswered to date. In this section, we summarize these questions under four main headings.

3.1 Loneliness and psychological adjustment: Direction of effects?

Despite numerous studies indicating cross-sectional and longitudinal associations between loneliness and several aspects of psychological adjustment, few empirical studies focused on temporal sequences and directionality of effects. For example, it remains unknown whether the experience of loneliness is a vulnerability factor for other types of psychological problems (e.g., depressive symptoms or low self-esteem), or whether these types of psychological problems set the stage for experiencing loneliness. Alternatively, loneliness and psychological problems may reinforce one another across time, in a transactional way. Answering such questions about the direction of effects may advance clinical work in several ways. For example, identifying antecedents and consequences of loneliness may improve loneliness intervention programs. Indeed, in addition to working on reducing loneliness, clinicians should help the lonely individual to acquire certain skills that prevent the development of other types of psychological problems. Similarly, if research on the direction of effects would uncover a transactional or reinforcing process between loneliness and psychological problems, clinicians should aim to break this vicious circle before it escalates. Given that research on the direction of effects between loneliness and psychological problems remains scarce, the present dissertation aimed to fill this gap with respect to the two main correlates of loneliness, that is, depressive symptoms and self-esteem.

Regarding depressive symptoms, theoretical work stressed the importance of both directions. First, the importance of loneliness in the etiology of depressive symptoms has frequently been acknowledged. Suboptimal social relationships, social rejection, or a lack of social competence – all being germane to the experience of loneliness – may result in increases in depressive symptoms, as recognized by several leading depression theorists (Blatt, 1990; Cole, Martin, & Powers, 1997; Lewinsohn, 1974). Put differently, severe dissatisfaction with one's social life may evolve into dissatisfaction with multiple domains in life and lead to an overall despondency. Second, other theories stress that depressive symptoms may give rise to feelings of loneliness as well. For example, Coyne's (1976) interpersonal theory of depression assumes that depressive episodes produce an array of interpersonal problems and cause damage to close relationships. Similarly, Hammen's (1991) stress-generation theory suggests that depressed individuals create stress and conflict in their

relationships. Such damaged and conflictual relationships, in turn, are likely to induce loneliness. Surprisingly few empirical studies have tested the prospective effects of loneliness and depressive symptoms, and they have shown mixed results (i.e., Cacioppo, Hawkley, & Thisted, 2010; Lasgaard et al., 2011; Weeks et al., 1980). In sum, the lack of knowledge about the direction of effects between loneliness and depressive symptoms is an important gap in the literature.

Regarding self-esteem, theoretical assumptions in both directions have been forwarded. First, loneliness may lower a person's self-esteem, particularly when loneliness is chronically experienced and when loneliness is attributed to personal characteristics or defects (Peplau et al., 1982). Indeed, lonely individuals typically attribute their social failures to internal and stable causes, or, put differently, they blame themselves for their experienced loneliness (Anderson et al., 1983; Renshaw & Brown, 1993). Second, low self-esteem may put people at risk for later loneliness. Peplau and colleagues (1982) suggested that individuals with low self-esteem engage in certain behaviors and cognitive processes that impede satisfying social relationships, and, consequently, likely increase their feeling of loneliness. That is, individuals with low self-esteem are more likely to behave in ways that evoke rejection by their peers (e.g., reassurance seeking; Joiner, Katz, & Lew, 1999) and to interpret others' reactions as rejecting (Murray, Rose, Bellavia, Holmes, & Kusche, 2002). To date, only one study has tested the prospective relation between loneliness and self-esteem, but there were only two measurement points in this study that were separated by a 4-year interval (Olmstead et al., 1991). Therefore, there is a clear need for longitudinal studies in which loneliness and self-esteem are measured multiple times at regular intervals.

3.2 Loneliness and psychological adjustment: Underlying mechanisms?

In addition to a lack of knowledge on *how* loneliness and psychological adjustment are related, very little is known about *why* they are related to one another. For example, which factors place lonely individuals at risk to develop depression? Or, which factors can protect against an escalation of the vicious circle between loneliness and low self-esteem? Identifying mediators ("why"?) and moderators ("for whom?") in the association between loneliness and psychological adjustment is of critical importance, not only for advancing our understanding of the relation between loneliness and psychological adjustment, but also for improving clinical prevention and intervention programs. For example, if certain inter- or intra-personal factors could be identified as risk factors (e.g., moderators) in the cumulative association

between loneliness and low self-esteem, clinical work could pay special attention to these factors, aiming to avoid these factors or to deal with them adequately. Conversely, if certain inter- or intra-personal factors could be identified that protect lonely individuals from developing depression, such buffering factors could be reinforced in clinical work. However, to date, knowledge about mediators and moderators in the association between loneliness, on the one hand, and depressive symptoms and self-esteem, on the other hand, remains very limited.

3.3 Interplay between different inter- and intra-personal correlates of loneliness

Several inter-individual and intra-individual factors have been identified as correlates of loneliness in previous work, with a strong emphasis on inter-individual factors in the peer context. However, less is known about the interplay between inter- and intra-individual factors in the prediction of loneliness, possibly due to the different frameworks that have been used in guiding previous empirical work. Indeed, the research lines on inter- versus intra-individual predictors of loneliness have developed rather independently (for an exception, see Ladd & Troop-Gordon, 2003). Yet, previous theorizing highlighted the value of employing a child-by-environment model of emotional adjustment (Ladd & Troop-Gordon, 2003; Magnusson & Stattin, 2006). This model emphasizes that particularly the *combination* of environmental factors (e.g., inter-individual factors in the peer context) and individual characteristics (e.g., intra-individual factors such as shyness) contributes to emotional well-being. More insight in the interplay (i.e., mediation or moderation) between intra- and inter-personal factors may again advance clinical work. For example, the effect of certain intra-personal factors such as shyness may be explained due to their effect on certain inter-personal factors such as social acceptance or friendship formation. Clinical work or school-based prevention or intervention programs would benefit from more knowledge on which specific problems shy individuals are confronted with in the peer context, in order to better target intervention. The exact mechanisms through which inter- and intra-personal factors work together in predicting loneliness, therefore, remain to be investigated.

3.4 Developmental course across adolescence

Loneliness is hypothesized to reach its peak in early adolescence, decrease between young adulthood and middle age, and then rise slightly in the elderly (Heinrich & Gullone, 2006). Longitudinal studies on the development of loneliness are rather scarce, but generally

seem to support this hypothesis. Indeed, loneliness was found to be low but stable from the beginning of kindergarten through the end of third grade (Kochenderfer-Ladd & Wardrop, 2001; Ladd & Burgess, 1999) and from age 7 to 12 (Bartels, Cacioppo, Hudziak, & Boomsma, 2008). Loneliness was further found to slowly decrease from early to mid adolescence (van Roekel et al., 2010), to be stable during adulthood, and to increase late in the elderly (Pinquart & Sorensen, 2001). The only period on which longitudinal research is lacking, however, is the period covering late adolescence and young adulthood. Although this period is characterized by many social changes and challenges, acquiring intimate peer relationships is viewed as a normative developmental trend throughout this period of life (Buhrmester, 1990; Steinberg & Morris, 2001). Therefore, individuals are generally expected to become less lonely during the course of adolescence, after the peak in early adolescence. Longitudinal research is needed to examine this hypothesis.

Detecting general increases or decreases in loneliness can provide crucial information about the normative development of loneliness in mid to late adolescence. However, such a variable-centered approach focuses on development at the group-level, and assumes that there is a single underlying trajectory that can adequately approximate an entire population of adolescents (Goossens & Luyckx, 2007). Nevertheless, adolescents may and often do not all develop in the same direction (Lerner, Lerner, De Stefanis, & Apfel, 2001; Magnusson & Stattin, 2006) and, therefore, different developmental subgroups may be distinguished for loneliness. For example, in contrast to the expected general decreasing trend, there may be a subgroup of adolescents showing chronically high levels of loneliness throughout adolescence. Identifying such subgroups would be particularly interesting from a clinical point of view. Indeed, possible subgroups at risk could be identified, and interventions could be tailored to each subgroup. Until now, only two recent studies focused on identifying loneliness trajectories in adolescence, but both studies focused on early and mid- adolescence (Benner, 2011; Jobe-Shields, Cohen, & Parra, 2011). Hence, it remains unclear to date whether several loneliness trajectories emerge in mid- and late adolescence.

Related to the previous shortcomings, it remains unclear whether the previously identified inter- and intra-personal correlates of loneliness also relate to the course of loneliness through adolescence, and whether they can distinguish between different loneliness trajectory classes. Indeed, identifying predictors of risk trajectories could significantly improve clinical work. Although a previous study indicated that adolescents following a maladaptive loneliness course showed poorer peer functioning compared to adolescents

following an adaptive loneliness trajectory (Jobe-Shields et al., 2011), our knowledge on intra-personal factors and psychological adjustment in relation to loneliness trajectories remains limited.

4. The present dissertation

4.1 Overall goal

The present dissertation aims to investigate the developmental course, origins, and consequences of loneliness in adolescence. Specifically, the four previously identified gaps in the literature will be addressed. To this aim, eight studies, summarized in six empirical chapters, were conducted. Before detailing which specific questions were addressed in each chapter, an integrative model of the present dissertation is presented in Figure 1.1. This integrative model merely serves as an overarching framework to introduce the different empirical chapters of the current dissertation, and has by no means the intention to offer an exhaustive overview. Indeed, the concluding chapter of the present dissertation will discuss how this framework could be extended in future research.

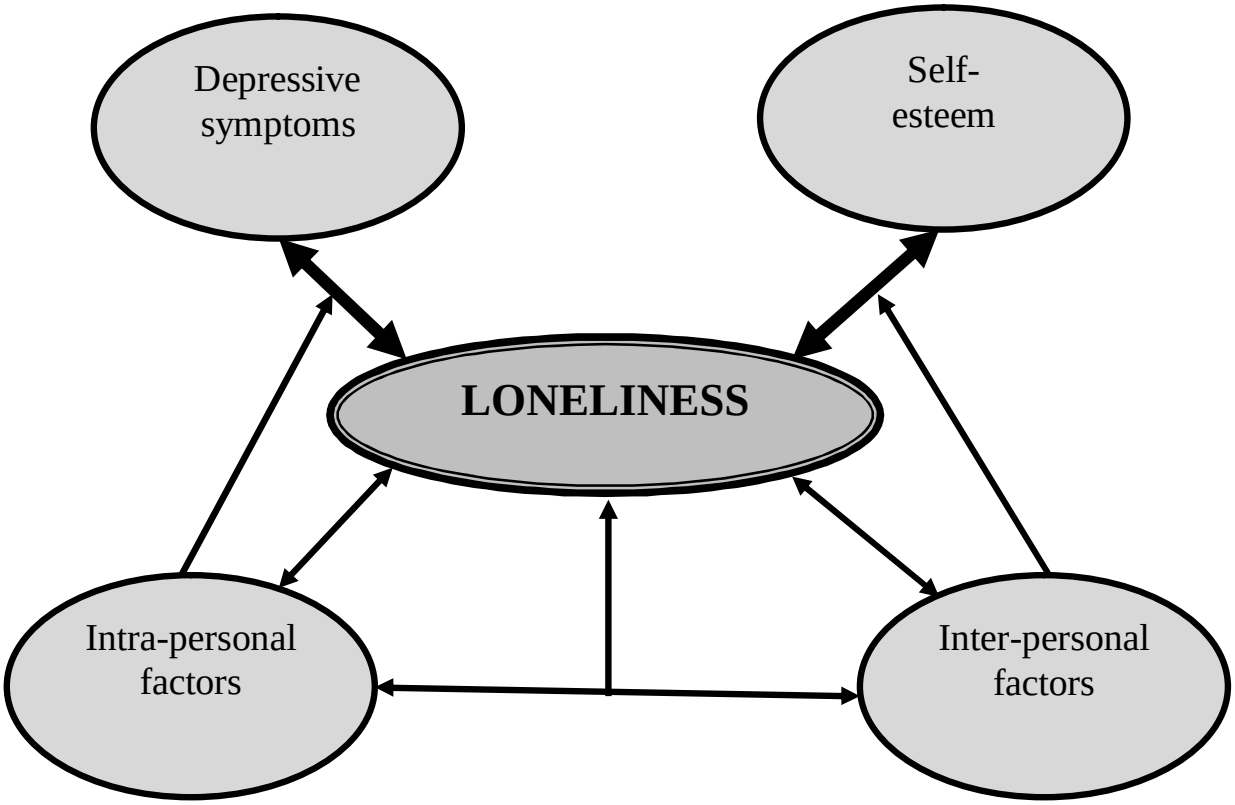


Figure 1.1. Integrative model of the present dissertation.

4.2. Specific goals of the empirical chapters

Chapter 2 focuses on the left side of Figure 1.1, that is, on the relation between loneliness and depressive symptoms, and on the intervening role of intra-personal factors. Specifically, the direction of effects between loneliness and depressive symptoms is investigated in two independent samples of college students using cross-lagged path analyses. The underlying intra-personal factor of interest in Chapter 2 is coping. Specifically, Chapter 2 investigates whether active versus passive coping strategies act as a mediator or moderator in the longitudinal association between loneliness and depressive symptoms. Mediation would imply, for instance, that loneliness sets the stage for maladaptive coping strategies, which, in turn, predict increases in depressive symptoms. Moderation would imply that loneliness is related to depressive symptoms, only under high or low levels of specific coping strategies.

Chapter 3 also focuses on the left side of Figure 1.1, and aims to zoom in on the results of Chapter 2. Specifically, the mediating and moderating role of one specific passive coping strategy in the link between loneliness and depressive symptoms is examined, that is, rumination. As rumination has never been linked to loneliness, a general rumination questionnaire (i.e., the Leuven Adaptation of the Rumination on Sadness Scale; LARSS; Raes, Hermans, Williams, Bijttebier, & Eelen, 2008) was transformed into a specific questionnaire measuring rumination on loneliness. In addition, the focus of Chapter 3 is on both peer- and parent-related loneliness. Differences in the associations between both types of loneliness, on the one hand, and depressive symptoms and rumination, on the other hand, are examined.

Chapter 4 focuses on the left side of Figure 1.1 as well, but substantially extends Chapters 2 and 3. Sample limitations of Chapters 2 and 3 included an unequal gender balance (i.e., more than 80% was female), a high educational level (i.e., all participants were college students), and a rather high socio-economic status (SES). These limitations may raise questions concerning the generalizability of our findings. Chapter 3, therefore, sampled adolescents from different educational levels and SES, with an equal gender distribution (i.e., 47% female). A five-wave longitudinal study design with annual measurement waves was used to investigate the direction of effects between loneliness and depressive symptoms in an adolescent sample. The intra-personal factors of interest in Chapter 3 are the Big Five personality traits (i.e., extraversion, conscientiousness, agreeableness, neuroticism, and openness). Specifically, the explanatory and moderating role of personality traits in the

prospective effects between loneliness and depressive symptoms were investigated. In sum, this chapter aims to zoom out on the results of the previous two chapters because (a) it examines the relation between loneliness and depressive symptoms in a broader sample and over a longer time frame, and (b) it investigates the robustness of the relation between loneliness and depressive symptoms by taking into account personality traits.

In contrast to the previous chapters, Chapter 5 focuses on the right side of Figure 1.1. Chapter 5 examines the direction of effects between loneliness and self-esteem in two long-term independent samples, that is, a five-wave study sampling Dutch adolescents and a three-wave study sampling Belgian adolescents. In addition, the mediating role of social acceptance in the association between self-esteem and loneliness was investigated in the latter sample. Specifically, a distinction was made between actual and perceived social acceptance. Actual social acceptance refers to the overall extent to which one is liked versus disliked by the peer group (Sandstrom & Cillessen, 2006), and is best assessed using peer nomination techniques. Perceived social acceptance, by contrast, is defined as the degree to which one feels easy to like and accepted by peers (Harter, 1988), and, as such, is assessed by means of self-report. Not all adolescents have an accurate perception of their social acceptance (Cillessen & Bellmore, 1999), suggesting that actual and perceived social acceptance may differ, and thus may also differentially explain the association between self-esteem and loneliness.

Chapter 6 focuses on the bottom part of Figure 1.1 and examines how several inter-personal factors (i.e., actual social acceptance, victimization, friendship quantity and friendship quality) and intra-personal factors (i.e., shyness and self-esteem) predict loneliness in adolescence, using both peer- and self-reported measures. Special attention is given to the interplay among intra- and inter-personal characteristics. Specifically, three types of child-by-environment models are tested, that is, (a) an additive model (i.e., inter- and intra-personal factors each contribute uniquely to the experience of loneliness), (b) a mediator model (i.e., the effect of certain intra-personal factors on loneliness may be partly due to the effect they have on certain inter-personal factors), and (c) a moderator model (i.e., the effect of certain intra-personal factors on loneliness may be only significant in combination with certain inter-personal factors).

Chapter 7, the last empirical chapter, focuses on all components of Figure 1.1, except for inter-personal factors. The course of loneliness through mid- and late adolescence is examined at the group level (using latent growth curve modeling) and at the level of

subgroups (using latent class growth analysis). In addition, the trajectory classes obtained are validated by means of intra-personal factors as predictors (i.e., personality traits), and several measures of psychological maladjustment as outcomes (i.e., depressive symptoms, self-esteem, anxiety, and perceived stress).

Collectively, the six empirical chapters in the present dissertation address the previously identified shortcomings in previous research by investigating the developmental course, antecedents, and consequences of loneliness in adolescence. Specifically, regarding the link between loneliness and psychological adjustment, the direction of effects is examined in Chapters 2 and 4 for depressive symptoms, and in Chapter 5 for self-esteem. Regarding the role of underlying mechanisms in the link between loneliness and psychological adjustment, Chapters 2, 3, and 4 examine the role of intra-personal factors in the link with depressive symptoms, and Chapter 5 examines the role of an inter-personal factor in the link with self-esteem. Regarding the interplay between inter- and intra-personal factors, Chapter 6 examines three models of interplay in the prediction of loneliness (additive, mediation, and moderation models). Finally, regarding the developmental course of loneliness across adolescence, Chapter 5 provided preliminary analyses of the development of loneliness at the group level, whereas Chapter 7 focuses in-depth on the development of loneliness, that is, both at the group level and the level of subgroups.

5. Study design and methodology

The eight studies in the present dissertation made use of four longitudinal datasets, each with their own unique features. Two of these datasets were collected at a previous point in time, that is, the 'Leuven Trajectories of Identity Development Study' (L-TIDES; Luyckx, Schwartz, Goossens, Soenens, & Beyers, 2008) and the 'Family and Health project' (Harakeh, Scholte, de Vries, & Engels, 2005; van der Vorst, Engels, Meeus, Dekovic, & Van Leeuwe, 2005). The two other datasets were specifically collected for this dissertation: the 'Loneliness in College project' and 'Loneliness: a Multi-informant study involving Adolescents, Parents, and Sociometrics' (LONE-MAPS). Below, a general description of each dataset is provided, as summarized in Table 1.1. More detailed information on each of the datasets is provided in the empirical chapters of the present dissertation.

Table 1.1

Overview of Data Used for the Different Empirical Chapters

Chapter	Dataset	Waves	*N*
2 – Study 1	L-TIDES	3, 5, 7	514
2 – Study 2	Loneliness in College	1-2	437
3	Loneliness in College	1	370
4	Family & Health	1-5	428
5 – Study 1	Family & Health	1-5	428
5 – Study 2	LONE-MAPS	1-3	862
6	LONE-MAPS	1	884
7	Family & Health	1-5	389

5.1 L-TIDES

The L-TIDES is a 7-wave longitudinal study with six-month intervals that was initiated at the end of 2002. The main focus of this study is on the development of identity, personality, and psychological adjustment. Participants were college students from the department of Psychology and Educational Sciences from the KU Leuven – University of Leuven, a large university in Belgium that mainly attracts Caucasian students from middle-class backgrounds. Data were collected using paper-and-pencil questionnaires. At the first measurement wave, 565 college students (85.3% female; *M*age T1 = 18.63 years, *SD* = 0.61) participated. In the present dissertation (Chapter 2), only Waves 3, 5, and 7 were used, because these were the only waves in which a loneliness measure was administered.

5.2 Loneliness in College Project

The Loneliness in College project is a two-wave longitudinal dataset with a six-month interval initiated in October 2008. The main focus of this project is on intra-personal correlates of peer- and parent-related loneliness, including several measures of coping and rumination. Participants were freshmen students from the department of Psychology from the

K.U. Leuven, who received course credits for their participation. Data were collected using paper-and-pencil questionnaires. At Time 1 and 2, 370 and 385 students, respectively, participated (83.5% female*;* M_{age} T1 = 18.22 years, *SD* = 1.21). A total of 321 students participated in both waves. Chapter 2 made use of both waves of this project, whereas Chapter 3 only focused on the first measurement wave.

5.3 Family and Health Project

The Family and Health project is a six-wave longitudinal study with annual measurement waves, initiated in 2002. The main aim of this project is to examine different socialization processes related to various health behaviors in adolescents and their families, including alcohol use, smoking, and psychological adjustment. In addition, genetic information was collected. Therefore, families with two parents and at least two children aged 13-16 years (no twins, nor mentally or physically disabled) from the registers of 22 municipalities (both rural and urban) in The Netherlands were invited to participate in this study. Eventually, 428 families were selected, and drop-out during the course of the study was very low. Trained interviewers visited the participants at home, asking all four family members to complete an extensive questionnaire individually. Each family received € 30 (about 45 US dollar) if all four family members completed the questionnaire. Additionally, after completion of three waves, five travel cheques of € 1,000 (about 1,500 US dollar) were raffled among the participating families. As the focus of the present dissertation is on (late) adolescence, only data obtained from the oldest child in the family were used (47% female; *M*age T1 = 15.22 years, *SD* = 0.60). At the time data were analyzed, the sixth measurement wave of this dataset was not available yet, and therefore, only data from the first five measurement waves were used in the present dissertation (Chapters 5 and 7).

5.4 LONE-MAPS

The LONE-MAPS is a four-year study with annual measurement waves, initiated in February 2009. The focus of this study is on inter- and intra-personal antecedents and consequences of loneliness throughout adolescence. All students in Grade 9 to 12 from three secondary schools in Belgium were invited to participate. Two schools offered the academic track, and one school offered the artistic track. Adolescents were asked to fill out a paper-and-pencil questionnaire packet within their classroom, together with a multi-item peer nomination procedure. At Times 2-4, only adolescents who stayed in the same school were

asked to repeat this peer nomination procedure. When students graduated or attended other schools over time, they were sent a questionnaire packet at home, and they received a cinema ticket when returning the completed questionnaire packet. Both parents were asked to fill out a questionnaire packet at Time 1 and 3. At Time 1, a total of 968 adolescents participated (66% female; *M*age T1 = 15.8, *SD* = 0.47). Data from the first measurement wave of LONE-MAPS were employed in Chapter 6, whereas data from Waves 1 to 3 were employed for Chapter 5. Note, however, that in the latter study, only the first two cohorts were used (i.e., students that were in Grade 9 or 10 at T1) in order to have peer nomination data at all three time points.

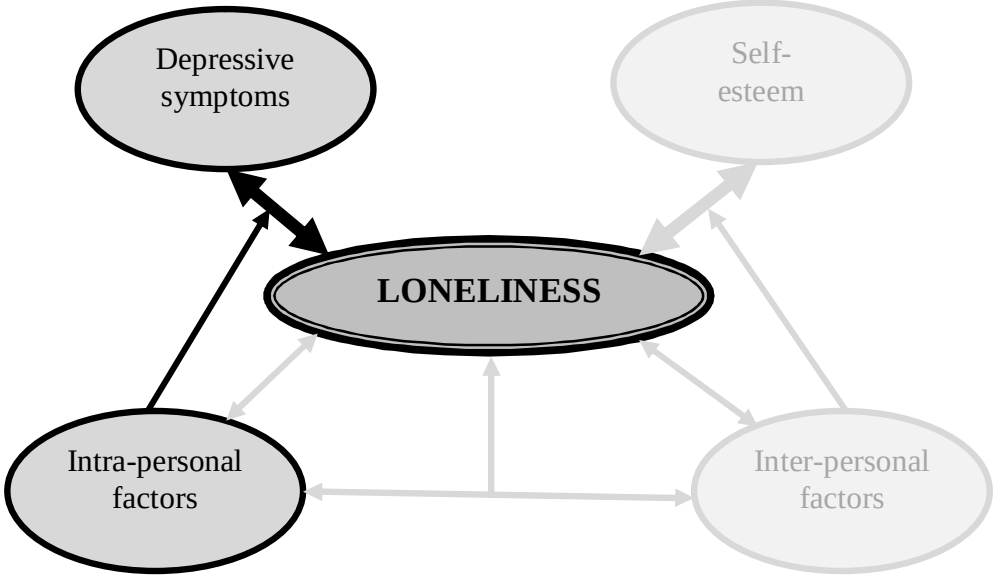
6. Concluding remarks

With this introductory chapter, we hope we have argued and clarified the overall and specific goals of the present dissertation. The following six chapters are empirical investigations of the research questions raised in this introduction chapter. We end the present dissertation with a concluding chapter, in which we discuss how the results obtained in the empirical chapters relate to contemporary research on loneliness, and how our results may stimulate future research on loneliness.

2

Loneliness and depressive symptoms:

Prospective effects and the role of coping



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Abstract

Loneliness and depressive symptoms are closely related constructs. However, mixed evidence exists on their prospective associations and only very few studies to date focused on intervening mechanisms. The present manuscript examined the direction of effects between loneliness and depressive symptoms in two longitudinal studies sampling college students (N = 514 and N = 437, respectively), using cross-lagged path analysis. Furthermore, the mediating and moderating role of active and passive coping strategies was examined. Results indicated that, although bi-directional effects tended to emerge, loneliness was a more consistent predictor of depressive symptoms across both studies than vice versa. Moreover, results indicated that this association was mediated, but not moderated, by coping strategies. Loneliness was related to an increased use of passive coping strategies, which, in turn, was a risk factor for later depressive symptoms. Implications of these findings and suggestions for future research are outlined.

1. General introduction

Both researchers and practitioners agree that feelings of loneliness and depressive symptoms tend to go hand in hand (e.g., Cacioppo, Hughes, Waite, Hawkley, & Thisted, 2006). Indeed, a meta-analysis conducted on 33 adolescent samples found a high average correlation between loneliness and depressive symptoms (r = .61−.62; Mahon, Yarcheski, Yarcheski, Cannella, & Hanks, 2006). Because of this high correlation, loneliness is sometimes viewed as a symptom of depression and several widely used depression questionnaires include an item tapping into loneliness (e.g., the Center for Epidemiologic Studies Depression Scale; Radloff, 1977). However, previous studies indicated that both constructs are clearly distinct from one another. Specifically, confirmatory factor analysis pointed to two separate constructs (e.g., Cacioppo, Hawkley, et al., 2006; Weeks, Michela, Peplau, & Bragg, 1980). Additionally, loneliness and depressive symptoms were shown to be differentially related to a number of external variables, such as suicidal ideation (Lasgaard, Goossens, & Elklit, 2011) and personality traits (Vanhalst et al., 2012). Hence, loneliness and depressive symptoms are interrelated, but distinct constructs.

Despite the current knowledge on the association between loneliness and depressive symptoms, mixed evidence exists on how loneliness and depressive symptoms influence one another across time. Do subjective feelings of loneliness give rise to relative increases in depressive symptoms (e.g., Cacioppo, Hawkley, & Thisted, 2010)? Or, conversely, does the presence of depressive symptoms make people feel more lonely (e.g., Lasgaard et al., 2011)? Or, as a third option, are both related in bidirectional fashion (e.g., Vanhalst et al., 2012)? Furthermore, information about possible intervening variables in the link between loneliness and depressive symptoms is scarce. Consequently, the present studies tried to fill these gaps in current research by examining the direction of effects between loneliness and depressive symptoms (Studies 1 and 2), and by investigating whether coping strategies act as an underlying mechanism in this association (Study 2).

2. Study 1

2.1 Introduction

In general, loneliness is thought to be an antecedent, rather than a consequence of depressive symptoms (Rudolph, Flynn, & Abaied, 2008). However, both directions of influence are emphasized in different theories. Several leading theorists highlighted the

importance of loneliness in the etiology of depressive symptoms. Specifically, suboptimal social relationships, social rejection, or a lack of social competence – all being germane to the experience of loneliness – are assumed to result in depressive symptoms (e.g., Blatt, 1990; Cole, Martin, & Powers, 1997; Lewinsohn, 1974). Other theories, conversely, suggest that depressive symptoms lead to greater loneliness. For example, the interpersonal theory of depression (Coyne, 1976) posits a deleterious feedback loop between depressive symptoms and relational experiences. Depressive episodes may produce an array of interpersonal problems and cause damage in close relationships (e.g., by excessive reassurance seeking; Joiner, Alfano, & Metalsky, 1992), which, in turn, may give rise to loneliness. Similarly, Hammen's (1991) stress-generation theory suggests that depressed individuals create stress and conflict in their relationships.

Several empirical studies were set up to test both theoretical directions (e.g., Cacioppo, Hughes, et al., 2006; Heikkinen & Kauppinen, 2004). However, only a handful of studies controlled for the association between depressive symptoms and loneliness at each point in time and for the stability in both constructs, which is crucial when investigating the direction of effects. Cross-lagged path analysis, a structural equation modeling approach which includes these controls, was only applied in four studies investigating loneliness and depressive symptoms. Two of these four studies used a two-wave longitudinal design, and showed mixed results. Whereas a first study in college students found no evidence for any prospective associations (Weeks et al., 1980), a second study in adolescents found that depressive symptoms predicted subsequent feelings of loneliness, but not vice versa (Lasgaard et al., 2011). The two other studies used a more extensive design including five annual waves and showed similar but not identical results. A first study in an older adult sample revealed that only the cross-lagged paths from loneliness to depressive symptoms (but not vice versa) reached significance (Cacioppo et al., 2010). A second study covering mid- and late adolescence indicated bidirectional effects between loneliness and depressive symptoms, with the strongest path from loneliness to depressive symptoms (Vanhalst et al., 2012).

In sum, theoretical assumptions suggest transactional associations between loneliness and depressive symptoms, but most theories focused on loneliness as an antecedent, rather than a consequence, of depressive symptoms. Previous short-term longitudinal studies showed mixed results, whereas long-term longitudinal studies suggested stronger paths from loneliness to depressive symptoms than vice versa. Therefore, we tentatively hypothesized

that loneliness might be a stronger or more consistent predictor of depressive symptoms than vice versa.

This hypothesis was investigated in a sample of college students. Loneliness and depressive symptoms are hypothesized to be particularly relevant in that period of life, given the many changes in the social context of college students. Going to college generally implies leaving the parental home, which involves the challenge to create new relationships and to reshape existing ones (Shaver, Furman, & Buhrmester, 1985). Specifically, college students can no longer rely on their social network of friends and family and have to deal with many life changes and choices. This turbulent period may bring about the experience of loneliness and depression (Montgomery & Côté, 2003; Oswald & Clark, 2003).

2.2 Method

2.2.1 Participants and procedure

Participants were psychology students from a large university in Flanders, Belgium. This university mainly attracts Caucasian students from middle-class backgrounds. These participants took part in an intensive longitudinal study, that is, the Leuven Trajectories of Identity Development Study (L-TIDES; Luyckx, Schwartz, Goossens, Soenens, & Beyers, 2008). Longitudinal assessments took place on a semi-annual basis for 3 years, with 7 measurement waves in all. In the present study, data from the 3th, 5th, and 7th measurement wave were used, because these were the only waves in which both measures of depressive feelings and loneliness were administered (from now on referred to as Time 1, Time 2, and Time 3, respectively).

At Time 1, a total of 514 college students (M_{age} = 19.62 years, *SD* = .60) participated. At Times 2 and 3, 444 (86%) and 361 (70%) students participated, respectively. Participants with and without complete data were compared using Little's (1988) Missing Completely At Random (MCAR) test. This comparison yielded a non-significant chi-square value (χ^2 (48) = 5.84, *ns*), suggesting that missing values could be reliably estimated. The full-information maximum likelihood (FIML) estimation procedure was used to account for missing data, as this procedure is considered to be one of the best methods currently available (Jelicic, Phelps, & Lerner, 2009). The sample was predominantly female (89.1%), which reflects the gender ratio among psychology students in Flanders (Goossens & Luyckx, 2006). Participation was

voluntary, anonymity was guaranteed, and all participants signed a standard consent form before participating in the first wave of data collection.

2.2.2. Measures

Loneliness. Loneliness was measured using the 8-item short version (Roberts, Lewinsohn, & Seeley, 1993) of the revised UCLA Loneliness Scale (R-ULS; Russell, Peplau, & Cutrona, 1980). This short version was translated in earlier work from English into Dutch following the procedures outlined by the International Test Commission (Hambleton, 1994). A 5-point Likert scale was used with values ranging from 1 (*does not apply to me at all*) to 5 (*applies to me very well*). A sample item reads "I lack companionship". In this study, Cronbach's alpha was .85, .87, and .88 at Times 1, 2, and 3, respectively.

Depressive symptoms. Depressive symptoms were measured using a brief 12-item version (Roberts & Sobhan, 1992) of the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977). This questionnaire taps into cognitive, somatic, and psychological symptoms of depression and was translated into Dutch by Hooge, Decaluwé, and Goossens (2000). Each item asks participants to indicate how often they had experienced symptoms of depression during the week prior to assessment, by using a 4-point Likert-type rating scale ranging from 0 (*seldom*) to 3 (*most of the time or always*). A sample item reads "During the last week, I felt depressed". Cronbach's alpha at Times 1, 2, and 3 was .87, .88, and .88, respectively.

2.3. Results and brief discussion

2.3.1 Preliminary analyses

As can be seen in Table 2.1, stability coefficients (i.e., the correlation between a variable assessed at subsequent time points) were high for both loneliness and depressive symptoms. Furthermore, there was a high within-time (i.e., synchronous) correlation between loneliness and depressive symptoms at the three time points. In addition, we examined whether mean levels of loneliness and depressive symptoms changed systematically over time. Analyses of variance with repeated measures (RANOVA) indicated no mean-level change effect for depressive symptoms (Wilks' $\lambda = 1.00$; F (2, 334) = .64, *ns*) or loneliness (Wilks' $\lambda = .99$; F (2, 334) = 1.46, *ns*).

Table 2.1

Means, Standard Deviations, Range, and Correlations Among Study Variables (Study 1)

Variable	*M*	*SD*	Range	2	3	4	5	6
1. Loneliness T1	1.89	.60	1.00 - 4.50	.52***	.64***	.35***	.62***	.40***
2. Depressive symptoms T1	0.73	.51	0.00 – 2.92	_	.46***	.50***	.39***	.51***
3. Loneliness T2	1.88	.60	1.00 - 4.50		_	.49***	.72***	.36***
4. Depressive symptoms T2	0.72	.51	0.00 – 2.83			_	.38***	.38***
5. Loneliness T3	1.83	.63	1.00 - 4.88				_	.51***
6. Depressive symptoms T3	0.69	.51	0.00 – 2.67					_

Note. T = Time; * $p < .05$. ** $p < .01$. *** $p < .001$.

2.3.2 Direction of effects

A cross-lagged design is uniquely suited to establish the temporal sequence linking loneliness to depressive symptoms. This design implies that two or more variables are measured at two or more points in time, yielding estimates of synchronous relations, autoregressive or stability coefficients, and cross-lagged effects. The former two of these effects refer to the association between the different variables at each point in time, and the prediction of a variable by its level at previous time points, respectively. The latter effect refers to the prediction of a variable by other variables that have been measured before, controlling for the baseline level of the predicted variable. This design remedies one of the major shortcomings of a mere cross-lagged correlation (Rogosa, 1980), which cannot be interpreted as an influence of one variable on another variable because the association between variables at Time 1 can be carried forward by stability (Asendorpf & van Aken, 2003).

Cross-lagged path analyses were performed in Mplus (Version 4; Muthén & Muthén, 2000). Overall model fit was determined by means of standard model fit indices (Kline, 2005). The χ^2 index should be as small as possible, the Comparative Fit Index (CFI) should exceed .90 for a reasonable fit and .95 for a good fit to the data, and the Root Mean Square Error of Approximation (RMSEA) should be less than .05 for a close approximate fit, or

between .05 and .08 for a reasonable fit to the data. Given that previous research suggested possible gender differences in depression (e.g., Hyde, Mezulis, & Abramson, 2008) and loneliness (e.g., Mahon et al., 2006), we controlled for gender by allowing paths from gender to depressive symptoms and loneliness at each time point (Bollen, 1989).

Our basic model included all within-time associations, autoregressive paths (i.e., stability coefficients), and reciprocal cross-lagged paths, which resulted in an excellent fit to the data (χ^2 (2) = 4.88 (*ns*); CFI = 1.00; RMSEA = .05). Next, we checked whether we could constrain the following three parameters to equality: (1) correlated changes between loneliness and depressive symptoms (i.e., correlations between the residuals of loneliness and depressive symptoms at T2-T3, which control for all the preceding paths; Asendorpf & van Aken, 2003), (2) cross-paths from loneliness to depressive symptoms, and (3) cross-paths from depressive symptoms to loneliness. The hypothesis of invariance would be rejected if the difference in the χ^2 index of both models is significant at $p < .05$ (Steiger, Shapiro, & Browne, 1985).

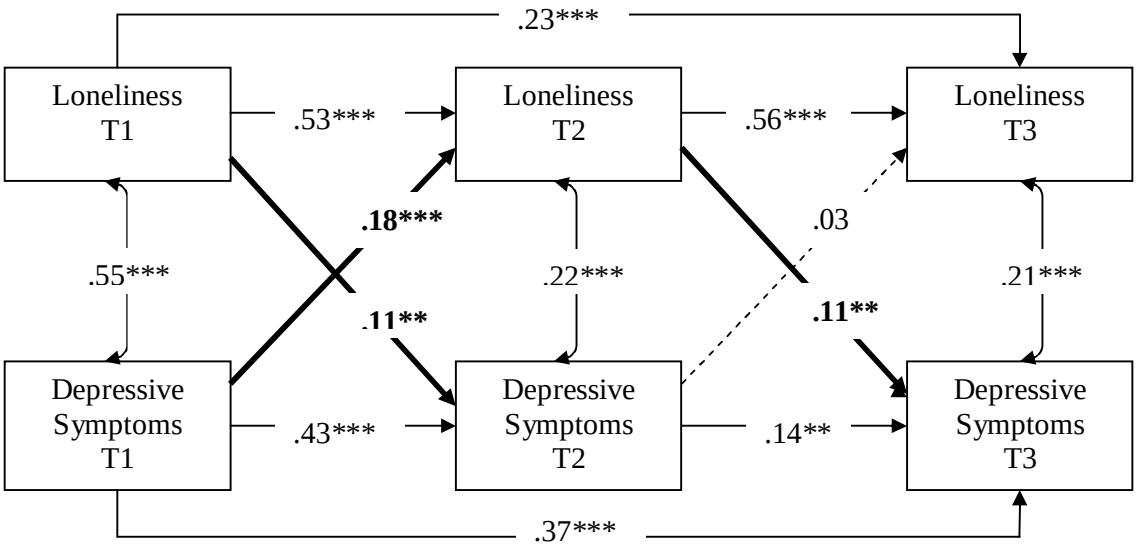


Figure 2.1. Cross-lagged model with standardized path coefficients. Dashed lines represent the non-significant paths. Gender effects are not presented for reasons of clarity (Study 1). T = Time; * $p < .05$. ** $p < .01$. *** $p < .001$.

Comparing these three constrained models with the comparison model indicated that correlated changes ($\Delta\chi^2$ (1) = 0.66, *ns*) and the cross-paths from loneliness to depressive symptoms ($\Delta\chi^2$ (1) = 0.02, *ns*) could be considered equal across time. However, the equality constraints for the cross-paths from depressive symptoms to loneliness were not allowed ($\Delta\chi^2$ (1) = 5.14, $p < .05$). Specifically, depressive symptoms predicted loneliness between T1 and T2, but this was not replicated between T2 and T3. This final model, with equality constraints for correlated changes and cross-path from loneliness to depressive symptoms had an excellent fit to the data (χ^2 (4) = 5.57 (*ns*); CFI = 1.00; RMSEA = .03) and is represented in Figure 2.1. Thus, although loneliness predicted later depressive symptoms across both time intervals, the opposite path was less consistent, which confirmed our hypothesis. Finally, the same model was run for female participants only (χ^2 (4) = 5.32 (*ns*); CFI = 1.00; RMSEA = .03), which indicated that all paths were virtually identical to the paths obtained in the full sample.

3. Study 2

3.1 Introduction

Study 1 revealed that loneliness and depressive symptoms influenced one another over time, with loneliness being a more consistent predictor of depressive symptoms than vice versa. In Study 2, we tried to replicate this result in an independent two-wave longitudinal study, again sampling college students. In an attempt to further understand the dominant path from loneliness to depressive symptoms, we investigated the mediating and moderating role of (mal)adaptive coping strategies in the association between loneliness and depressive symptoms.

Coping is defined as the use of cognitive and behavioral strategies for dealing with pressures, demands, and emotions in response to distress (Lazarus & Folkman, 1984). An active coping style, which involves that people confront the problem, is often distinguished from a passive coping style, which involves that people do not deal with the problem, in an attempt to reduce the tension associated with it (Holahan, Moos, & Bonin, 1999). Whereas active coping strategies are generally seen as a buffer against the potential negative influence of distress on psychological functioning, passive coping strategies are associated with a broad range of maladaptive psychological and behavioral outcomes. (For a review, see Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001).

Two research lines on coping are relevant for the present study, that is, coping with loneliness and the effects of coping on depressive symptoms. The first line of research generally aimed to describe the different ways in which people cope with loneliness (e.g., Rokach & Neto, 2000) without investigating the effects of these coping styles on psychological adjustment. A literature review concluded that lonely people typically cope with loneliness in a passive way (Heinrich & Gullone, 2006). Previous studies indeed indicated that loneliness evokes behavioral disengagement (Cacioppo et al., 2000) and sad passivity (Rubenstein & Shaver, 1982; Van Buskirk & Duke, 1991), possibly due to the perceptions that lonely people typically hold. Specifically, lonely people tend to believe that they are powerless to change their situation and that their interpersonal failures are due to personal and unchangeable factors. (For a review, see Heinrich & Gullone, 2006).

The second line of research examined the effects of maladaptive forms of coping, such as passive coping, on depressive symptoms. Numerous cross-sectional studies indicated that maladaptive coping strategies are related to more depressive symptoms, whereas adaptive coping strategies are related to fewer depressive symptoms (Compas et al., 2001; Rohde, Lewinsohn, Tilson, & Seeley, 1990). Longitudinal studies on the effects of maladaptive coping on depressive symptoms are scarce, however, and show mixed results. Some studies found that the associations between coping and depressive symptoms no longer held when investigated longitudinally (e.g., Swindle, Cronkite, & Moos, 1989). Yet, other longitudinal studies confirmed the associations between (mal)adaptive coping strategies and subsequent depressive symptoms (e.g., Auerbach, Abela, Zhu, & Yao, 2010; Herman-Stahl, Stemmler, & Petersen, 1995).

To date, only one study combined both research lines, that is, coping with loneliness and the effects of coping on depressive symptoms. In that study, ruminating about one's loneliness (i.e., a specific form of passive coping) was associated with more depressive symptoms (Vanhalst, Luyckx, Raes, & Goossens, 2012). Specifically, rumination acted as a mediator between peer-related loneliness and depressive symptoms, and as a moderator between parent-related loneliness and depressive symptoms. However, this previous study had a cross-sectional design. Study 2, therefore, aims to investigate whether active and passive coping strategies mediate or moderate the relationship between loneliness and depressive symptoms using a longitudinal design.

Mediation implies that loneliness gives rise to depressive symptoms *because* the former is generally associated with certain coping strategies. Specifically, the experience of loneliness may lead to the selection of maladaptive coping strategies, which, in turn, increases the risk for depressive symptoms. The selection of passive coping styles rather than active coping styles when feeling lonely may be driven by the perception of being unable to change the situation, which characterizes lonely individuals (Heinrich & Gullone, 2006). Moderation, conversely, implies that loneliness gives rise to depressive symptoms *only or especially when* it is accompanied by certain coping strategies. Specifically, the association between loneliness and depressive symptoms may be stronger in combination with high passive coping or low active coping strategies, as compared to low passive coping or high active coping strategies, respectively.

In sum, we hypothesized that (a) loneliness is a stronger predictor of changes in depressive symptoms over time than vice versa, and that (b) coping is an underlying mechanism in the association between loneliness and depressive symptoms, as a mediator or moderator.

3.2 Method

3.2.1 Participants and procedure

Participants were freshmen psychology students of the same university as the participants of Study 1. Again, the sample was predominantly female (83.5% female), and virtually all students were Caucasian. Students participated during group sessions and received course credit for their participation. Anonymity was guaranteed and all participants signed a standard consent form. Longitudinal assessments took place twice in their freshman year (Time 1 in October, Time 2 in March), and were supervised by the first author. A total of 437 students participated in one of both waves, with 321 students (73%) participating in both waves (M_{age} T1 = 18.22 years, *SD* = 1.21). As in Study 1, Little's (1988) MCAR test yielded a non-significant chi-square value (χ^2 (42) = 7.89, *ns*), and FIML was used to account for missing data.

3.2.2. Measures

Loneliness. The subscale peer-related loneliness of the Loneliness and Aloneness Scale for Children and Adolescents (LACA; Marcoen, Goossens, & Caes, 1987), an

instrument developed for use with Dutch-speaking participants, was used to capture loneliness. This subscale contains 12 items answered on a 4-point Likert-type scale ranging from 1 (*never*) to 4 (*often*). A sample items reads "I think I have fewer friends than others have". Because the questionnaire was developed for use with school-aged children and adolescents, some of the items were adapted to make them more appropriate for a college population (e.g., "I feel left out by my classmates" was changed to read "I feel left out by my fellow students"). Cronbach's alphas were .88 at Time 1 and .90 at Time 2.

Depressive symptoms. Depressive symptoms were measured using the 20-item version of the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977). To avoid item overlap with the loneliness measures, the item "During the last week, I felt lonely" was dropped and we proceeded with a 19-item version. The response scale, the translation method used, and a sample item are described in the Method section of Study 1. Cronbach's alphas for the 19-item version were .88 at Time 1 and .91 at Time 2.

Coping. The subscales active (i.e., adaptive) and passive (i.e., maladaptive) coping of the Utrecht Coping Questionnaire (UCL; Schreurs, van de Willige, Tellegen, & Brosschot, 1988) were used to measure coping strategies. We transformed the general instruction of this questionnaire into a specific loneliness instruction, that is, we asked our participants how they behaved or what they thought when feeling "left out, lonely, or not supported". Both subscales contained 7 items answered on a 4-point Likert-type scale ranging from 1 (*almost never*) to 4 (*almost always*), and the instrument was developed in Dutch. Sample items read "[When I feel left out, lonely, or not supported] I consider several ways to solve the problem" (active coping) and "[When I feel left out, lonely, or not supported] I don't feel able to do anything" (passive coping). Cronbach's alphas for Time 1 and 2 were .81 and .85 for active coping, and .71 and .78 for passive coping. Confirmatory factor analysis (CFA) indicated that a two-factor model fitted the data adequately (χ^2 (34) = 58.15; $p < .01$, CFI = .98, RMSEA = .04).

3.3 Results and brief discussion

3.3.1 Preliminary analyses

Table 2.2 presents descriptive statistics and correlations among the study variables at both time points. As expected, and similar to Study 1, stability coefficients were high for all variables, and a high correlation was found between loneliness and depressive symptoms at

Table 2.2

Means, Standard Deviations, Range, and Correlations Among Study Variables (Study 2)

Variable	*M*	*SD*	Range	2	3	4	5	6	7	8
1. Loneliness T1	1.71	.50	1.00 – 3.92	.60***	-.20***	.43***	.76***	.37***	-.21***	.39***
2. Depressive symptoms T1	0.60	.42	0.00 – 2.70	_	-.29***	.51***	.46***	.51***	-.27***	.43***
3. Active coping T1	2.47	.57	1.00 - 4.00		_	-.24***	-.17**	-.12*	.65***	-.20***
4. Passive coping T1	1.95	.54	1.00 – 3.86			_	.38***	.38***	-.31***	.68***
5. Loneliness T2	1.71	.53	1.00 – 3.92				_	.40***	-.17**	.38***
6. Depressive symptoms T2	0.61	.49	0.00 – 2.37					_	-.16**	.54***
7. Active coping T2	2.46	.61	1.00 - 4.00						_	-.29***
8. Passive coping T2	2.03	.60	1.00 - 4.00							_

Note. T = Time; * $p < .05$. ** $p < .01$. *** $p < .001$.

both time points. Furthermore, active and passive coping strategies were negatively related to one another.

3.3.2 Direction of effects

To replicate the results from Study 1, cross-lagged path analysis was performed. As in Study 1, we controlled for gender by allowing paths from gender to depressive symptoms and loneliness at each time point (Bollen, 1989), and the model included all within-time associations, autoregressive paths, and reciprocal cross-lagged paths. This model was saturated (i.e., it had zero degrees of freedom), and, by definition, provided a perfect fit to the data. This final model showed moderate to high stability in loneliness ($\beta = .77$, $p < .001$) and depressive symptoms ($\beta = .43$, $p < .001$). The cross-lagged path from loneliness to depressive symptoms was significant ($\beta = .12$, $p < .05$), whereas the cross-lagged path from depressive symptoms to loneliness was not significant ($\beta = -.01$, *ns*). In sum, cross-lagged results indicated that loneliness predicted relative changes in depressive symptoms over time, but not vice versa. As in Study 1, the same model was run for female participants only, which produced virtually identical results as the full sample model.

3.3.3. Mediation analyses

Because mediation aims to capture a causal process, a fundamental requirement is temporal separation (Little, Preacher, Selig, & Card, 2007). Therefore, we used the two-wave panel model for testing mediation as recommended by Little and colleagues (2007) and Cole and Maxwell (2003). This conservative method includes all correlations at T1, all stability coefficients, paths from the independent variable (i.e., loneliness) at T1 to the hypothesized mediators (i.e., active and passive coping) at T2, and paths from the hypothesized mediators at T1 to the dependent variable (i.e., depressive symptoms) at T2. We controlled for gender in each step, and, in line with Study 1, allowed the residuals of loneliness T2 and depressive symptoms T2 to correlate. This model, represented in Figure 2.2, resulted in a good fit to the data (χ^2 (7) = 16.37 ($p < .05$); CFI = .99; RMSEA = .06).

To examine mediation, a non-parametric resampling method (i.e., bootstrapping; Preacher & Hayes, 2008) with 5,000 resamples was applied. Results indicated a significant total indirect effect of coping (point estimate = .045, S.E. = .017, 95% CI [0.004, 0.097]). Specifically, passive coping (point estimate = .048, S.E. = .018, 95% CI [0.008, 0.102]) was a

significant mediator, whereas active coping (point estimate = -.003, S.E. = .004, 95% CI [-0.019, 0.004]) was not. Finally, the mediation analyses were run again for female participants only. All paths were virtually identical, with two exceptions. Specifically, the path from loneliness T1 to active coping T2 (β = -.05, *ns*) was weaker than in the original model, and the path from passive coping T1 to depressive symptoms T2 (β = .16, $p < .01$) was stronger than in the original model. However, the overall conclusion remained the same, that is, passive coping strategies – but not active coping strategies – significantly mediated the longitudinal relation between loneliness and depressive symptoms.

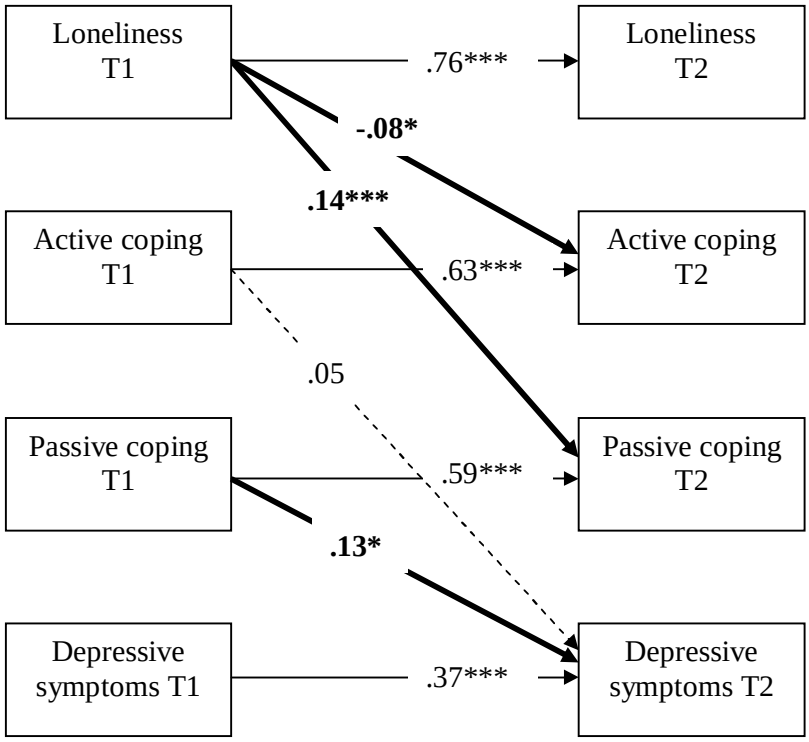


Figure 2.2. Mediation model with significant standardized path coefficients. Dashed lines represent the non-significant paths. Gender effects and within-time correlations are not presented for reasons of clarity (Study 2).

T = Time; * $p < .05$. ** $p < .01$. *** $p < .001$.

3.3.4 Moderation analyses

To investigate the moderating effects of coping, groups of participants with high versus low levels of active and passive coping strategies were determined through a median split procedure. Next, the parameters of the cross-lagged model were compared in both groups by means of a multigroup comparison. This approach compares a constrained model (e.g., a model in which the estimated cross-lagged parameters are set equal for the group with high versus low levels of active coping) with an unconstrained model (e.g., a model in which these parameters are allowed to vary). The hypothesis of invariance would be rejected if the difference in the χ^2 index of both models was significant at $p < .05$. Results indicated that the model fitted equally well for participants with high versus low levels of active coping strategies ($\Delta\chi^2$ (4) = 5.12, *ns*), and participants with high versus low levels of passive coping strategies ($\Delta\chi^2$ (4) = 6.28, *ns*). Thus, coping strategies did not seem to moderate the cross-lagged associations between loneliness and depressive symptoms. Finally, the moderation analyses were run for female participants only, which again produced virtually identical results as in the full sample model.

4. General discussion

The present longitudinal studies add to the literature in two important ways. First, regarding prospective effects, loneliness was found to be a more consistent predictor of depressive symptoms in college students than vice versa. Second, regarding the role of coping, no evidence for moderation was found in the present study. Nevertheless, passive but not active coping strategies were found to mediate the association between loneliness and depressive symptoms. Specifically, lonely college students tended to use more passive and less active coping strategies to deal with their loneliness, and passive coping strategies, in turn, predicted relative increases in depressive symptoms over time. Both issues are discussed in more detail below, and suggestions for future research are outlined.

4.1 Prospective associations between loneliness and depressive symptoms

The present cross-lagged studies contribute to the literature on the direction of effects between loneliness and depressive symptoms, in that results clearly indicate that loneliness predicts later depressive symptoms. However, no firm conclusions can be drawn about the reverse path, that is, whether depressive symptoms predict subsequent feelings of loneliness

or not, as this path was only found between Time 1 and Time 2 in Study 1. Although the combined results of our two studies seem to demonstrate that depressive symptoms, in general, do not represent a consistent predictor of subsequent levels of loneliness, the results of the study by Lasgaard et al. (2011) suggested the opposite. Demographic differences between the samples might explain the different results. Specifically, whereas the study of Lasgaard et al. (2011) sampled high school students with varying social backgrounds, the present studies sampled college students, mainly from a middle-class background. Hence, the different developmental stages and associated social contexts of the participants might partly explain the different results.

For example, the transition from high school to college typically involves leaving the parental home. Therefore, college students may no longer interact with their family members on a daily basis, and turn less to their parents when they encounter problems in, for example, their peer relationships (Uruk & Demir, 2003). Previous studies indeed indicated that parental support acts as a buffer between problems in peer relationships, such as peer victimization, and maladjustment in adolescence (Stadler, Feifel, Rohrmann, Vermeiren, & Poustka, 2010). Thus, the buffering effect of family support may diminish, and, therefore, peer-related problems and loneliness may be a stronger predictors of depressive symptoms in college students than in high school students. However, family support was not measured in the present studies, so future research should investigate this hypothesis.

It is important to realize that studies with only two measurement waves (such as Study 2 in the present article or the study by Lasgaard et al., 2011), may only show a snapshot of an underlying long-term process, that may be unidirectional, bidirectional, or transactional in nature. Longitudinal studies with multiple measurement waves may provide more consistent support for a unidirectional or bidirectional process that links loneliness and depressive symptoms. For example, a recent five-wave longitudinal study including data from both high school and college found support for a bidirectional model, with a slightly stronger path from loneliness to depressive symptoms (Vanhalst et al., 2012). Additional long-term research is needed to explain the current inconsistency of findings across studies, with specific attention to changing developmental contexts.

4.2 Intervening role of passive versus active coping strategies

In line with previous research (e.g., Cacioppo et al., 2000), the results of Study 2 indicated that individuals cope with their feelings of loneliness in a passive rather than an active way. This study adds to previous research, by showing that the experience of loneliness also results in *relative changes* in coping behavior over time. Specifically, loneliness is related to increases in passive coping strategies and, somewhat less pronounced, to decreases in active coping strategies over time. Passive coping strategies, in turn, were related to relative increases in depressive symptoms. Therefore, passive coping strategies were found to be a mediator in the relation between loneliness and depressive symptoms. No moderation occurred in the present study.

There are several possible explanations for why loneliness evokes maladaptive coping strategies. First, as noted, lonely people typically perceive themselves as powerless in changing their situation (for a review, see Heinrich & Gullone, 2006). Contrary to non-lonely people, lonely people tend to attribute their interpersonal failures to personal and unchangeable characteristics (e.g., shyness or low ability), and their interpersonal successes to luck or other external factors. This dysfunctional attribution style may set the stage for more passive coping strategies and less active coping strategies. Second, lonely people may feel like they have no one to turn to for social support, an important source of adaptive coping (Aldwin, 2007). Indeed, previous research indicated that individuals with more social support from their family and friends relied more on adaptive coping strategies, and less on maladaptive coping strategies when dealing with stress in general (Ebata & Moos, 1994).

Previous longitudinal research indicated that maladaptive coping strategies were related to more depressive symptoms over time, whereas adaptive coping strategies were related to fewer depressive symptoms (e.g., Auerbach et al., 2010; Herman-Stahl et al., 1995). Note, however, that these studies involved general coping, whereas the present study examined coping with loneliness in particular. Study 2 replicated the negative effect of passive coping strategies on depressive symptoms, but could not replicate the positive effect of active coping strategies. One possible explanation might be the conservative method of analysis that was used to determine mediation, involving controls for stability and within-time correlations (Cole & Maxwell, 2003; Little et al., 2007). Yet, a recent meta-analysis on general emotion regulation similarly concluded that the effect sizes of the maladaptive strategies (e.g., rumination) predicting depressive symptoms were larger than the effect sizes

of the adaptive strategies (e.g., reappraisal; Aldao, Nolen-Hoeksema, & Schweizer, 2009). We strongly suggest future research to further examine whether or not active coping strategies protect lonely people from developing depressive symptoms. Such research can have important implications for clinical practice, given that several intervention and prevention programs for depressive symptoms (e.g., Frydenberg, 2008) teach participants to cope adequately with stressors such as loneliness.

4.3 Directions for future research

First, it is important to realize that coping strategies may not be the only intervening mechanism that links loneliness to depressive symptoms. For example, recent research indicated that loneliness and depressive symptoms share a common biological basis. Specifically, genes that have been associated with depressive symptoms, including genes related to the neurotransmitters serotonin and dopamine, have shown to be related to loneliness as well, in conjunction with environmental factors (such as parental support; van Roekel, Goossens, Scholte, Engels, & Verhagen, 2011; van Roekel, Scholte, Verhagen, Goossens, & Engels, 2010). Future research should further examine this common biological core of loneliness and depressive symptoms.

Second, although this study, as well as other longitudinal studies using a cross-lagged design (e.g., Cacioppo et al., 2010; Lasgaard et al., 2011; Vanhalst et al., 2012), took into account previous levels of loneliness and depressive symptoms, it would be interesting to integrate information about lifetime depression or loneliness. Indeed, previous work showed that a history of depressive symptoms may have a cumulative effect on maladjustment (Wickrama & Wickrama, 2010), suggesting that the prospective associations between loneliness and depressive symptoms could be stronger for people with an enduring history of depression. Furthermore, certain depression theories propose interpersonal stress (related to loneliness) as underlying mechanisms in the continuity of depression (e.g., interpersonal stress generation; Rudolph, Flynn, Abaied, Groot, & Thompson, 2009). Likewise, certain loneliness theories suggest depressotypic characteristics as underlying mechanisms in the continuity of loneliness (e.g., lowered reward response to positive events; Cacioppo & Hawkley, 2009). Together, these theories not only assume a strong association between loneliness and depressive symptoms, but they also suggest that both internalizing problems reinforce one another, and may even have an exacerbating effect over time.

Finally, future research should integrate the findings obtained within a broader view, by focusing on personality and micro-contextual processes affecting psychosocial functioning. First, attachment representations would be an interesting pathway for future research, as they have been shown to relate to the three variables of interest in the present study (i.e., loneliness, depressive symptoms, and coping; see Mikulincer & Shaver, 2007; Seiffge-Krenke, 2011; Zimmermann, 2004). For example, securely attached individuals were found to confront stress with a sense of mastery and cope more actively with a variety of relationship stressors (Creasey, Kershaw, & Boston, 1999). Second, as previous research indicated that neuroticism moderated the prospective associations between loneliness and depressive symptoms (Vanhalst et al., 2012), future research should do well to combine measures of coping and personality. Given that neuroticism was found to predict maladaptive coping strategies such as passive withdrawal (Connor-Smith & Flachsbart, 2007), such integrative research could distinguish between shared and unique effects of coping and personality as intervening variables in the association between loneliness and depressive symptoms, which would advance clinical practice as well.

4.4 Limitations and conclusion

The present study was not without its limitations. First, participants from the present studies were mainly female, which reflects the gender ratio among students in Psychology and Educational Sciences in Flanders (Goossens & Luyckx, 2006). Given that previous studies indicated that the prospective associations between loneliness and depressive symptoms were similar for males and females (Cacioppo et al., 2010; Vanhalst et al., 2012), we do not expect that the gender distribution in the present sample influenced our cross-lagged results. However, slight differences in the mediation model for coping were found in the present study, suggesting that replication of the mediation model in a more balanced sample in terms of gender is recommended. Similarly, a more balanced sample in terms of educational level and ethnic background would yield results that generalize more easily to the broader population.

Second, on a related note, average levels of loneliness and depressive symptoms were rather mild in the present sample. For most participants, the magnitude of depressive symptoms did not reach the threshold for clinical depression. The fact that the scores for loneliness and depressive symptoms represented rather normal variants does not downgrade the importance of our findings. Indeed, our findings show that also internalizing symptoms

outside the clinical range have the potential to affect one another and third variables such as coping strategies. Furthermore, such subclinical levels make adolescents more vulnerable for developing psychopathology later in life (Petersen, Compas, Brooks-Gunn, Stemmler, & Grant, 1993). However, replication of our results in a sample of individuals with clinical levels of depression could provide additional information.

Third, our study relied exclusively on self-report measures. This approach can cause shared method variance, which in turn might account in part for the effects obtained. However, cross-lagged analyses reduce the effects of shared method variance by controlling for within-time correlations (Asendorpf & van Aken, 2003). Additionally, alternatives for self-reports are not readily available, as depressive symptoms and loneliness are internal and subjective experiences, which are investigated most appropriately by self-report measures.

Fourth, the time lag between two subsequent waves in Study 1 was one year, whereas the time lag in Study 2 was only a half year. However, given that the stability coefficients of loneliness and depressive symptoms and the over-time correlations were comparable in both studies, we believe that the different time lag between the subsequent waves did not substantially affect the study findings.

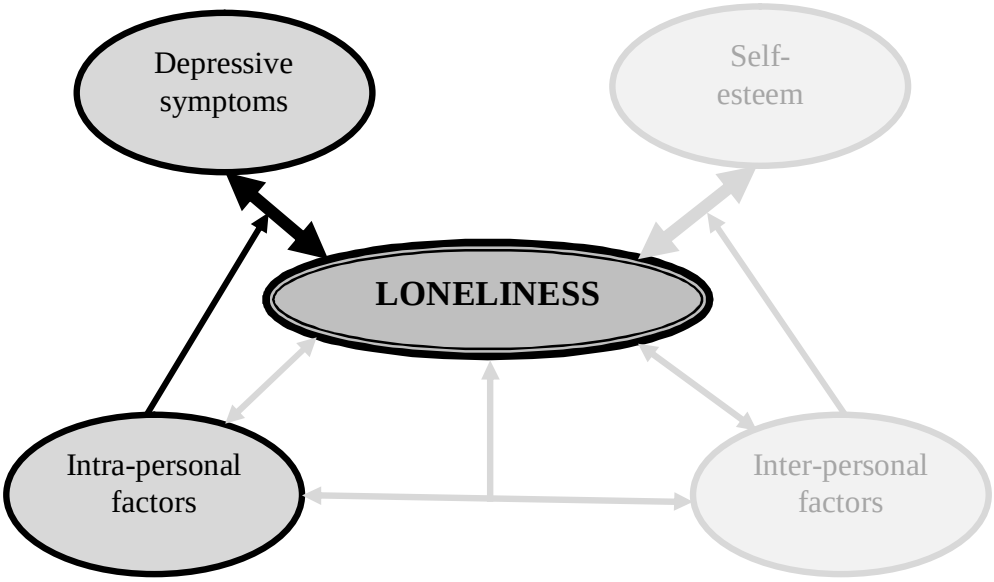
Finally, because we adapted a general “coping with stress” instrument to a specific “coping with loneliness” measure, we were unable to investigate coping as an underlying mechanism in the reverse direction, that is, coping as a mediator or moderator between depressive symptoms and loneliness. Yet, we are convinced that this might be an interesting pathway for future research.

These limitations notwithstanding, the present article was the first to demonstrate that the experience of loneliness predicts later depressive symptoms in college students, and that passive coping strategies mediate this relation. Further research is necessary to generalize these findings to the broader population.

3

Zooming in on loneliness and depressive symptoms:

The role of rumination



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Abstract

Although feelings of loneliness often are accompanied by depressive symptoms, little is known about underlying mechanisms in this association. The present study sampled 370 college freshmen and investigated whether rumination (and its components of uncontrollability, causal analysis, and understanding) functioned as a mediator or moderator in the relationship between two types of loneliness (as experienced in the relationship with parents and with peers, respectively) and depressive symptoms. Results indicated that rumination partially mediated the relationship between peer-related loneliness and depressive symptoms, and moderated the relationship between parent-related loneliness and depressive symptoms. In addition, the uncontrollable nature, rather than the content of these ruminative thoughts about parent- and peer-related loneliness, was particularly harmful in the development of depressive symptoms. Implications and suggestions for future research are discussed.

1. Introduction

Experiencing loneliness (i.e., the negative emotional response to a discrepancy between the desired and achieved quality of one's social network; Peplau & Perlman, 1982) is strongly associated with depressive symptoms (i.e., cognitive, somatic, and psychological markers of depression; Radloff, 1977) in adolescence (for a review, see Mahon, Yarcheski, Yarcheski, Cannella, & Hanks, 2006). However, only few studies focused on explaining this relationship. An exception is the study by Vanhalst, Luyckx, and Goossens (2009) which demonstrated that loneliness predicted depressive symptoms over time and that this relationship was mediated by maladaptive emotion regulation strategies. Emerging adults experiencing loneliness seemed to rely on maladaptive ways to cope with these feelings (e.g., by blaming themselves), which, in turn, made them more vulnerable for depressive symptoms.

The present study tried to expand on this finding in three important ways. First, the present study focused on a more specific aspect of maladaptive cognitive coping (i.e., rumination and its subcomponents) crucial for the development of depressive symptoms (Aldao, Nolen-Hoeksema, & Schweizer, 2009). Second, we not only examined mediation in the relationship between loneliness and depressive symptoms, but also moderation. More specifically, mediation implies that loneliness gives rise to depressive symptoms *because* the former is generally associated with rumination, whereas moderation implies that loneliness gives rise to depressive symptoms *only or especially when* it is accompanied by rumination. Third, we investigated whether these underlying processes occurred for different aspects of loneliness, because loneliness may have a different meaning in different relationships. So far, most studies used general measures of loneliness (which have been shown to capture peer-related loneliness; Goossens et al., 2009), or specific measures of peer-related loneliness when linking loneliness to depressive symptoms. In the present study, both peer-related and parent-related loneliness are considered.

It is particularly relevant to investigate the interplay between loneliness, rumination, and depressive symptoms during the transition to college because this is a turbulent period in terms of maintaining the quality of social relationships and subsequent social and emotional adjustment (Montgomery & Côté, 2003; Shaver, Furman, & Buhrmester, 1985). Freshmen not only have to adapt to a new academic environment, most of them also have to adapt to a new living situation. Most freshmen can no longer rely on their social network of friends and

family and have to deal with many life changes and choices, which may cause feelings of loneliness and depression (Kenny & Sirin, 2006; Oswald & Clark, 2003; Stroebe, van Vliet, Hewstone, & Willis, 2002). Furthermore, the transition to college might also be a risk period for increased ruminative thoughts. Specifically, substantial changes in the lives of adolescents (such as transitioning to college) are often accompanied by a struggle of finding a balance between striving for autonomy and safeguarding feelings of connectedness to peers and parents, which was expected to induce rumination (Peled & Moretti, 2007).

1.1 Peer- and parent-related loneliness

Loneliness has a different meaning in parent versus peer relationships (Goossens et al., 2009), suggesting that there are different consequences of both types of loneliness for well-being. We hypothesized that, in college students, peer-related loneliness would be more strongly associated with depressive symptoms than parent-related loneliness, mainly for two reasons. First, emerging adults devote more time outside and less time inside the family and increasingly turn to peers (Nelis & Rae, 2009). In that way, peer-related loneliness may be more stressful than parent-related loneliness, and, as such, may be more strongly related to the development of depressive feelings. Second, the close relationship theory (Laursen & Bukowski, 1997) states that parent relationships are permanent, whereas peer relationships are potentially impermanent. In permanent relationships, the ties that bind individuals together are largely unrelated to interaction outcomes. In impermanent relationships, partners tend to participate as long as interactions remain mutually advantageous, so the threat of relationship dissolution is omnipresent. Hence, loneliness may be more threatening in a possibly impermanent peer relationship than in a permanent parent relationship.

1.2 Rumination and its subcomponents

A growing literature shows the existence of both adaptive and maladaptive forms of self-focused attention in general (e.g., Trapnell & Campbell, 1999) and of rumination as a specific type of self-focused attention, in particular (e.g., Treynor, Gonzalez, & Nolen-Hoeksema, 2003). Rumination is defined here as repetitively and passively focusing on symptoms of distress (such as feelings of loneliness) and on the possible causes and consequences of these symptoms (Nolen-Hoeksema, 1991). Recently, researchers have started to emphasize the importance of distinguishing different forms or subcomponents of rumination. For example, Treynor et al. (2003) distinguished a brooding and a reflective form

of rumination. Several studies have shown that the brooding facet of rumination, compared to the reflection subcomponent, represents the more maladaptive form of rumination (e.g., Raes & Hermans, 2008; Treynor et al., 2003). This maladaptive form, referred to as brooding, is a passive comparison of one's actual situation to one's ideal situation and is motivated by perceived threats, losses, or injustices. Specifically, several studies showed that brooding is a stronger within-time and over-time predictor of depressive symptoms than reflection is (Armey et al., 2009; Grassia & Gibb, 2008).

More recently, Raes, Hermans, Williams, Bijttebier, and Eelen (2008) distinguished three components of rumination, including not only different aspects of rumination itself, but also different beliefs or appraisals about the process of rumination. First, Causal analysis refers to the process of figuring out what may be the causes of one's distress, and is viewed as the component most closely related to reflection. The second component, Uncontrollability, concerns the experience (i.e., its repetitive nature) rather than the content of rumination and refers to the experience that ruminative thinking processes are difficult to stop. This component appears to be the most maladaptive form of rumination, as demonstrated by its high association with depressive symptoms and with the cognitive risk factor of thought suppression (Raes et al., 2008). Third, Understanding refers to the process of trying to understand oneself and the meaning of one's distress, and lies somewhat in between the other two rumination components. Hence, in the present study, we hypothesized that the subcomponent Uncontrollability is a particularly important mechanism in the link between loneliness and depressive symptoms, more so than Causal Analysis or Understanding are.

1.3 Loneliness and depressive symptoms: Rumination as modulating variable

Forming and maintaining social relationships are important sources of life satisfaction, and numerous studies have indicated that loneliness is related to symptoms of poor mental health such as depression (Heinrich & Gullone, 2006). Specifically, the relation between loneliness and depressive symptoms is in the range of a large effect size (r = .61−.62), as revealed by a meta-analysis conducted on 33 adolescent samples (Mahon et al., 2006). Loneliness was found to predict depressive symptoms both within time (e.g., Hagerty & Williams, 1999) and across time (e.g., Heikkinen & Kauppinen, 2004). In addition, the importance of feelings of loneliness as a key role in the etiology of depressive symptoms has frequently been acknowledged by leading theories. For instance, attachment theory states that insecurely attached individuals are more susceptible to depression because of their negative

views of themselves and their relationships with others (Bowlby, 1973). Cognitive theories put forth that some individuals define their self-worth by means of their relationships, which makes them more vulnerable to depression in response to interpersonal difficulties (Blatt, 1990). Behavioral theories posit that certain individuals are vulnerable to depression because they have poor social skills, making it difficult for them to elicit positive reinforcement from others and deal with relationship stressors (Lewinsohn, 1974). These theoretical assumptions are confirmed by empirical research showing an association between loneliness and depressive symptoms, both within (Mahon et al., 2006) and across time (Joiner, 1997).

We consider rumination as a prime candidate to mediate or moderate this strong relationship between loneliness and depressive symptoms, because rumination causes people to remain fixated on their negative experiences (such as loneliness), and impairs problem solving (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). We anticipate that rumination is likely to occur when feeling lonely, because loneliness has been found to affect cognitive thinking (Heinrich & Gullone, 2006). Lonely people tend to have maladaptive attributional styles (Anderson, 1999) and inflexible friendship beliefs (Lavallee & Parker, 2009), both of which are related to rumination. Also, ruminative thinking is a discrepancy-based processing style, as people often start ruminating when they are confronted with a painful discrepancy between a current and a desired situation (e.g., Martin & Tesser, 1996; Schoofs, Hermans, & Raes, 2010). Recall that loneliness can be seen as the result of such an instance of a painful discrepancy, namely between the current and desired quality of one's social network (Peplau & Perlman, 1982). Furthermore, previous research suggests that rumination plays a key role in maintaining negative mood following interpersonal harm (Wade, Vogel, Liao, & Goldman, 2008). Particularly in the first weeks of college, freshmen might be increasingly aware and concerned about being accepted and their self-presentation. Therefore, feeling lonely is likely to evoke ruminative thinking in these individuals. For example, research about homesickness among freshman college students suggested that students who missed their friends and family were found to ruminate about loneliness, which was associated with depressive symptoms (Stroebe et al., 2002).

Whereas the link between loneliness and ruminative thoughts is rather unexplored, a vast amount of research demonstrated the association between rumination and depressive symptoms (for reviews, see Nolen-Hoeksema et al., 2008; Smith & Alloy, 2009). Specifically, prospective longitudinal studies showed that adolescents engaging in rumination when distressed were more likely to develop depressive disorders (e.g., Nolen-Hoeksema, Stice,

Wade, & Bohon, 2007), and that rumination played an important role in the maintenance of depression (e.g., Grassia & Gibb, 2008).

In sum, the present study examined whether rumination (and, more specifically, its subcomponents Causal analysis, Understanding, and Uncontrollability) mediates or moderates the relationship between (peer- and parent-related) loneliness and depressive symptoms. We tentatively hypothesized that mediation would mainly occur in the relationship between peer-related loneliness and depressive symptoms, and moderation would mainly occur in the relationship between parent-related loneliness and depressive symptoms, based on the titration hypothesis in the vulnerability-stress model discussed in hopelessness theory (Abramson, Alloy, & Hogan, 1997). This hypothesis states that the less negative a person's cognitive style (or, applied to our study, the less one ruminates), the more negative an event must be to interact with ruminative thoughts and give rise to depressive symptoms. Recall that loneliness is expected to be more stressful in the relationship with peers than in the relationship with parents (Laursen & Bukowski, 1997; Nelis & Rae, 2009). Altogether, at lower levels of stress (i.e., parent-related loneliness) only cognitively vulnerable individuals may ruminate and become depressed, whereas at high levels of stress (i.e., peer-related loneliness) both cognitively vulnerable and non-vulnerable individuals may start ruminating and become depressed. Furthermore, we expected the rumination subcomponent Uncontrollability to be a stronger mediator or moderator in the association between loneliness and depressive symptoms, more so than Causal Analysis or Understanding.

2. Method

2.1 Participants and procedure

Participants were psychology students from a large university in Belgium, attending college for just one month. This university mainly attracts Caucasian students from middle-class backgrounds. A total of 370 students (M_{age} = 18.22, *SD* = 1.21) participated (83.5% female). Of these, 26% lived with their parents, and 74% lived mainly on their own (typically in a student facility). Students participated during group sessions and received course credit for their participation. All participants signed an informed consent form.

2.2 Measures

Depressive symptoms. Depressive symptoms were measured using the well-known Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977), that was translated into Dutch by Hooge, Decaluwé, and Goossens (2000). To avoid item overlap with the loneliness measures, the item "During the last week, I felt lonely" was dropped and we proceeded with a 19-item version. Each item asks participants to indicate how often they experienced symptoms of depression during the week prior to assessment, by using a 4-point Likert-type rating scale ranging from 0 (*seldom*) to 3 (*most of the time or always*). Cronbach's alpha for the 19-item version was .88.

Loneliness. Two subscales – parent-related loneliness and peer-related loneliness – of the Loneliness and Aloneness Scale for Children and Adolescents (LACA; Marcoen, Goossens, & Caes, 1987) were used to capture loneliness. Both subscales contain 12 items answered on a 4-point Likert-type scale ranging from 1 (*never*) to 4 (*often*). Because the questionnaire was developed for school-aged children and adolescents, some of the items were adapted to make them more appropriate for a college population (e.g., "I feel left out by my classmates" was changed to read "I feel left out by my fellow students"). Sample items are "I have the feeling that I belong to my parents" (parent-related loneliness, reverse coded), and "I think I have fewer friends than others have" (peer-related loneliness). Cronbach's alphas were .92 and .88, respectively. Confirmatory factor analysis (CFA) indicated that a two-factor model fitted the data adequately: SBS-χ^2 (251) = 617.211 ($p < .001$), CFI = .96, RMSEA = .06. Standardized pattern coefficients ranged from .53 to .82 (ps < .001).

Rumination. Rumination was measured using the Leuven Adaptation of the Rumination on Sadness Scale (LARSS; Raes et al., 2008), capturing three rumination components: Causal analysis (5 items), Understanding (6 items), and Uncontrollability (6 items). These three subscales can be summed to yield a composite measure of rumination. In the original version of the LARSS, participants are asked to indicate what they think when feeling sad (i.e., rumination on sadness). We adapted this instruction to what they think when feeling "left outside, lonely, or not supported by peers, fellow students, or family" (i.e., rumination on loneliness), using a 5-point Likert-type scale ranging from 1 (*almost never*) to 5 (*almost always*). Sample items read "I keep asking myself what could have contributed to this feeling" (Causal Analysis), "I repeatedly think about what might be the meaning of my feelings" (Understanding), and "I have difficulty getting myself to stop thinking about how

lonely I am" (Uncontrollability). Cronbach's alphas were .95 for the total measure, and .88, .88, and .93 for Causal analysis, Understanding, and Uncontrollability, respectively. CFA confirmed the three-dimensional structure: SBS-χ^2 (116) = 439.084 (p < .001), CFI = .97, RMSEA = .09. Standardized pattern coefficients ranged from .54 to .89 (ps < .001).

To further strengthen the validity of the LARSS, we correlated the LARSS with the well-validated Rumination and Reflection Questionnaire (RRQ; Trapnell & Campbell, 1999), tapping into an adaptive and maladaptive form of self-attentiveness, that is, rumination and reflection. Sample items are "I always seem to be rehashing in my mind recent things I've said or done" and "I love exploring my inner self", respectively. Both subscales contain 8 items answered on a 5-point Likert-type scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Cronbach's alpha in our sample was .87 for the subscale rumination and .85 for reflection. The subscales rumination and reflection of the RRQ correlated .65 and .44, respectively, with our total LARSS-score, and their difference was significant (t (367) = 11.07; p < .001). Partial correlations of both RRQ scales with the LARSS scale (i.e., correlations with reflection controlled for rumination, and vice versa) yielded similar results, that is, r = .65 for rumination and r = .43 for reflection. Hence, the total LARSS scale is more indicative of maladaptive rumination than it is of adaptive reflection. With respect to partial correlations of both RRQ subscales with the three LARSS subscales, Uncontrollability is more strongly correlated with rumination (r = .71; p < .001) than with reflection (r = .13; p < .05; t (367) = 12.13; p < .001). The same results, although to a lesser extent, hold for Causal analysis (r = .51; p < .001; and r = .41; p < .001; t (367) = 7.54; p < .001). The subscale Understanding, on the contrary, has more in common with reflection (r = .54; p < .001) than with rumination (r = .44; p < .001; t (367) = 6.51; p < .001), although the difference is rather small. Because the RRQ was merely used to validate the LARSS, this measure was dropped from all subsequent analyses.

3. Results

3.1 Preliminary analyses

To investigate multivariate effects of participants' age, gender, and living arrangement, a MANCOVA was performed, with age as covariate, gender and living arrangement as fixed factors, and all study variables as dependent variables. This yielded a significant multivariate effect of gender (Wilks' λ = .92; F (7,342) = 3.99, p < .001), but no

overall age effects (Wilks' λ = .98; *F* (7,342) = .89, *ns*) or effects of living arrangement (Wilks' λ = .99; *F* (7,342) = .34, *ns*). Follow-up analyses indicated that women scored higher than men on depressive symptoms and all rumination measures (except for the subscale Understanding) (see Table 3.1).

Table 3.2 presents correlations among loneliness, depressive symptoms, and rumination components. As expected, we found a high correlation between peer-related loneliness and depressive symptoms ($r = .58$, $p < .001$), and a lower (t (367) = 8.53, $p < .001$), but still significant correlation between parent-related loneliness and depressive symptoms ($r = .23$, $p < .001$). In addition, peer-related loneliness had a significant positive correlation with all rumination subscales, whereas parent-related loneliness was unrelated to these rumination subscales. Furthermore, the three rumination subscales were highly associated with each other and with the total rumination score. Lastly, peer-related loneliness and depressive symptoms were more strongly associated with Uncontrollability than with Causal analysis (for peer-related loneliness: t (367) = 9.77, $p < .001$; for depressive symptoms: t (367) = 6.99; $p < .001$) and with Understanding (for peer-related loneliness: t (367) = 5.92, $p < .001$; for depressive symptoms: t (367) = 3.28; $p < .001$).

Table 3.1

Mean Differences as a Function of Gender

Scale	Full sample Mean (SD)	Men Mean (SD)	Women Mean (SD)	*F* (1,353)
Parent-related loneliness	1.55 (0.51)	1.65 (0.49)	1.53 (0.51)	3.20
Peer-related loneliness	1.71 (0.49)	1.63 (0.51)	1.73 (0.49)	1.87
Depressive symptoms	0.60 (0.42)	0.45 (0.34)	0.63 (0.43)	9.43**
Rumination (Total)	2.70 (0.87)	2.42 (0.64)	2.76 (0.89)	7.39**
Rumination (Causal analysis)	2.99 (0.90)	2.72 (0.69)	3.04 (0.93)	6.17*
Rumination (Understanding)	2.45 (0.92)	2.42 (0.70)	2.46 (0.96)	0.07
Rumination (Uncontrollability)	2.72 (1.06)	2.16 (0.81)	2.82 (1.07)	19.15***

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

Table 3.2

Intercorrelations Among Loneliness, Depressive Symptoms, and Rumination

Variable	2	3	4	5	6	7
1. Parent-related loneliness	.13*	.23***	.06	.02	.09	.05
2. Peer-related loneliness		.58***	.26***	.19***	.17**	.32***
3. Depressive symptoms			.37***	.26***	.24***	.47***
4. Rumination (Total)				.93***	.89***	.89***
5. Rumination (Causal Analysis)					.80***	.74***
6. Rumination (Understanding)						.62***
7. Rumination (Uncontrollability)						

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

3.2 Mediation analyses

The intervening role of rumination in the relationship between loneliness and depressive feelings was examined by means of path analysis using LISREL 8.54 (Jöreskog & Sörbom, 1993). Gender was controlled for by allowing paths from gender to all other variables in the model. Three models were estimated and compared: (a) a direct effects model including the direct effects of loneliness on depressive symptoms; (b) a full mediation model in which loneliness is only indirectly related to depressive symptoms through the hypothesized mediator (i.e., rumination); and (c) a partial mediation model including direct paths from loneliness to depressive symptoms and indirect paths through rumination.

The direct effects model (a) was saturated (i.e., it had zero degrees of freedom), and, by definition, provided a perfect fit to the data. In this model, peer-related loneliness ($\beta = .54$; $p < .001$) was a stronger predictor of depressive symptoms than parent-related loneliness ($\beta = .16$; $p < .01$). Next, we tested the full mediation model (b) by including paths from parent- and peer-related loneliness to rumination and from rumination to depressive feelings. This model showed an insufficient fit to the data (SBS-χ^2 (2) = 37.90 ($p < .001$); CFI = .42; RMSEA = .23). Subsequently, the partial mediation model (c) was tested, by adding paths from parent- and peer-related loneliness to depressive feelings. Allowing these direct paths resulted again

in a saturated model with perfect fit. However, the path from parent-related loneliness to rumination did not reach significance, and, subsequently, was trimmed from the model. This final model, represented in Figure 3.1a, had a near-perfect fit to the data (SBS-χ^2 (1) = 0.38 (*n.s.*); CFI = 1.00; RMSEA < .01). To assess the significance of the indirect effect of peer-related loneliness over rumination on depressive feelings, the Sobel (1982) test was performed, which resulted in a significant value (z = 3.30; p < .001). In sum, the strong association between peer-related loneliness (but not parent-related loneliness) and depressive symptoms was partially explained by rumination.

To investigate which rumination subscale (i.e., Causal analysis, Understanding, or Uncontrollability) acted as the strongest mediator in the relationship between loneliness and depressive feelings, we repeated the mediation analysis with the separate rumination subscales as mediators. The full mediation model showed a less than optimal fit to the data (SBS-χ^2 (2) = 40.14 (p < .001); CFI = .87; RMSEA = .23), and the partial mediation model resulted in a saturated model. Inspection of the individual paths in the partial mediation model showed that only peer-related loneliness (and not parent-related loneliness) predicted all three rumination components significantly. However, only the subscale Uncontrollability showed a significant path towards depressive symptoms. The non-significant paths were trimmed from the model, resulting in the more parsimonious model as shown in Figure 3.1b (SBS-χ^2 (5) = 8.16 (*n.s.*); CFI = 1.00; RMSEA = .04). The Sobel (1982) test indicated that the indirect effect of peer-related loneliness over Uncontrollability on depressive feelings was significant (z = 3.93; p < .001). In sum, the rumination subscale Uncontrollability (and not Causal analysis or Understanding) was found to be a partial mediator in the relationship between loneliness and depressive symptoms.

Because directionality cannot be empirically tested in a cross-sectional design, we tested an alternative model in which ruminative thoughts predicted depressive symptoms, which, in turn, predicted parent- and peer-related loneliness. This alternative model was compared to our final model, using the Akaike information criterion (AIC; Keith, 2006), where a smaller AIC value indicates a better fit. Based on Raftery's (1995) criterion, suggesting that an AIC difference of 10 points or more is strong, we rejected the alternative model in favor of our final model (ΔAIC = 24.58).

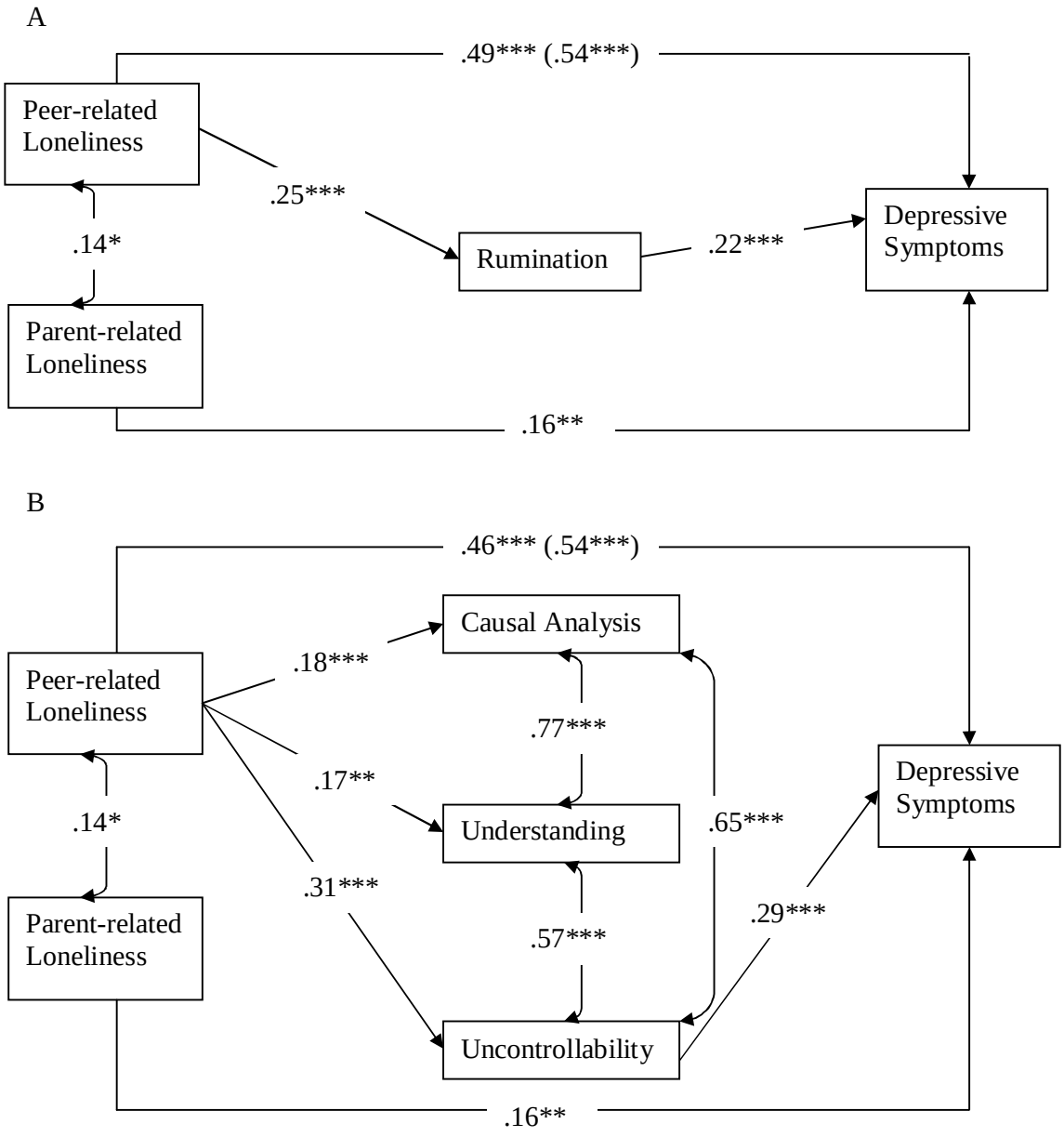


Figure 3.1. Trimmed partial mediation model with total rumination scale (panel A) and three rumination subscales (panel B) as mediator.

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

3.3 Moderation analyses

We conducted hierarchical regression analyses with two-way interaction terms to investigate whether rumination could act as a moderator between feelings of loneliness and depressive symptoms. Loneliness and rumination scores were centered, and interaction terms were computed by multiplying the centered means (Aiken, West, & Reno, 1991).

In a first step, gender was entered as a control variable, which resulted in a significant prediction of depressive symptoms ($\beta = .16$; $p < .01$). In a second step, main effects of parent- and peer-related loneliness on depressive symptoms were examined. Both main effects explained an additional significant portion of the variance in depressive symptoms, with peer-related loneliness ($\beta = .54$; $p < .001$) acting as a stronger predictor than parent-related loneliness ($\beta = .17$; $p < .001$). In a third step, the moderator variable (i.e., rumination) was included, which also added significantly to the prediction of depressive symptoms ($\beta = .22$; $p < .001$). In a last step, both interaction terms (that involved rumination and parent- and peer-related loneliness, respectively) were entered. Only the interaction term with parent-related loneliness ($\beta = .09$; $p < .05$) reached significance. Thus, rumination interacted with parent-related loneliness, but not with peer-related loneliness, in the prediction of depressive symptoms.

To interpret this interaction, simple slopes of parent-related loneliness predicting depressive symptoms were examined at low (1 *SD* below the mean) and high (1 *SD* above the mean) levels of the moderator (i.e., rumination). Whereas parent-related loneliness did not significantly predict depressive symptoms at low levels of rumination (simple slope = 0.08; $t = 1.30$; *n.s.*), parent-related loneliness did significantly predict depressive symptoms at high levels of rumination (simple slope = .24; $t = 4.00$; $p < .001$). In other words, loneliness in the relationship with parents is associated with depressive feelings only when accompanied by a high amount of ruminative thinking about these feelings of loneliness. Figure 3.2 gives a graphical representation of these simple slopes.

In an ancillary set of analyses, we explored which of the three rumination subscales (i.e., Causal analysis, Understanding, and Uncontrollability) acted specifically as a moderator in the relationship between parent-related loneliness and depressive feelings. Therefore, we performed a set of three moderator analyses (i.e., one for each rumination subscale), following the same four steps as described above. Including the three subscales as a moderator in Step 3

added significantly to the prediction of depressive symptoms in each analysis, with, as expected, Uncontrollability (β = .44; $p < .001$) being a stronger predictor than Causal analysis (β = .23; $p < .001$) and Understanding (β = .22; $p < .001$). Interaction terms of parent-related loneliness with each rumination subscale were entered at Step 4. The interaction terms with Causal analysis (β = .11; $p < .05$) and Uncontrollability (β = .13; $p < .01$) reached significance, whereas the interaction term with Understanding (β = .07; *n.s.*) did not. Simple slopes analyses showed that parent-related loneliness only predicted depressive symptoms at high levels of Causal analysis (simple slope = 0.27; $t = 4.43$; $p < .001$) and Uncontrollability (simple slope = 0.26; $t = 5.60$; $p < .001$), and not at low levels of Causal analysis (simple slope = 0.08; $t = 1.29$; $p < .001$) or Uncontrollability (simple slope = .05; $t = .10$; *n.s.*). Therefore, we conclude that two out of the three subscales moderated the relationship between parent-related loneliness and depressive symptoms.

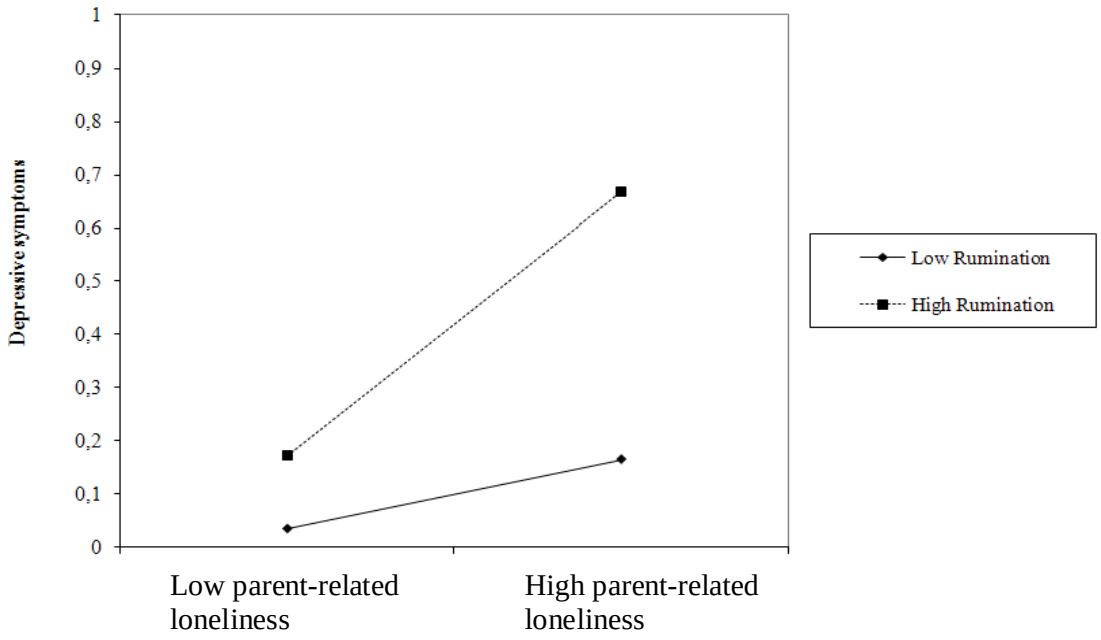


Figure 3.2. Simple slopes of parent-related loneliness predicting depressive symptoms at low (1 SD below the mean) and high (1 SD above the mean) levels of ruminative thinking.

4. Discussion

This study was the first to explore whether rumination acted as a mediator or moderator in the relationship between loneliness and depressive symptoms, measuring both loneliness and rumination in multidimensional fashion. More specifically, we examined loneliness in the relationship with both peers and parents (Goossens et al., 2009) and we investigated the separate role of three components of rumination: Causal analysis, Understanding, and Uncontrollability (Raes et al., 2008). Our results indicated that rumination partially mediated the relationship between peer-related loneliness and depressive symptoms, and moderated the relationship between parent-related loneliness and depressive feelings. In addition, our results revealed that the most harmful component of rumination was Uncontrollability, suggesting that the process of rumination itself is more important than the actual content of one's ruminative thoughts. As expected, we found that both types of loneliness were experienced differently, with peer-related loneliness having a greater negative impact on students' well-being than parent-related loneliness.

4.1 Rumination as a mediator and moderator between loneliness and depressive symptoms

Our mediation analyses indicated that when college students felt lonely in their relationship with peers, they tended to ruminate about it, which was associated with depressive symptoms. In addition, this was especially the case when these ruminative thoughts were perceived as uncontrollable. Our moderation analyses showed that when college students felt lonely in the relationship with their parents and when, on top of that, they could not help but ruminating about the causes of these feelings, they were more vulnerable to depressive symptoms. Taken together, our results suggest that ruminative thoughts about loneliness may be an important element in understanding what makes lonely adolescents vulnerable for depressive symptoms.

The differences we found between the three components of rumination demonstrated the need to consider rumination as a multifaceted construct. The fact that we found the uncontrollability – rather than the content – of ruminative thoughts about parent- and peer loneliness to be particularly harmful, is in line with previous research (e.g., Raes et al., 2008), and supports the idea that this component is most closely related to the maladaptive aspects of rumination. This finding is also in line with the notion that beliefs that ruminators hold about their own thinking style (i.e., meta-rumination) can play an important role in determining the

outcomes of rumination (Papageorgiou & Wells, 2003). More specifically, individuals can initially engage in rumination because they believe in the benefits of rumination (e.g., to find the causes of one's loneliness). However, this engagement can result in harmful consequences of ruminating and the experience that this ruminative thinking is beyond their own control. The meta-rumination theory states that especially these negative beliefs about rumination will in turn increase depressive feelings (Papageorgiou & Wells, 2003). Trying to understand oneself and one's loneliness, on the contrary, was more related to adaptive reflection than to maladaptive rumination, which could explain why Understanding did not function as a mediator or moderator between loneliness and depression in the present study. Indeed, previous research investigating rumination and reflection as a mediator between childhood emotional abuse and depressed mood showed that only rumination, and not reflection, functioned as a mediator (Raes & Hermans, 2008). Further research is needed to replicate these findings.

4.2 Differences between parent- and peer-related loneliness

Our results clearly indicated that parent-related and peer-related loneliness need to be distinguished in emerging adulthood. As expected, depressive symptoms were more strongly associated with peer-related loneliness than with parent-related loneliness. In addition, all rumination subcomponents were significantly associated with peer-related loneliness, whereas there were no associations with parent-related loneliness. This finding is in line with the assumption that peer-related loneliness is a more stressful problem than parent-related loneliness because of the typical relationship shifts in this age period (Oswald & Clark, 2003; Stroebe et al., 2002). This result is also consistent with the close relationship theory (Laursen & Bukowski, 1997), which argues that loneliness may be more threatening in a possibly impermanent peer relationship than in a permanent parent relationship.

The fact that mediation (and not moderation) occurred in the relation between peer-related loneliness and depression and moderation (and not mediation) in the relation between parent-related loneliness and depression, can be explained both theoretically and statistically. Theoretically, our results are in line with the titration hypothesis forwarded in the vulnerability-stress model (Abramson et al., 1997), as discussed in the Introduction. Statistically, and closely related to the previous explanation, mediation is most suitable in the case of a strong relationship, whereas moderation is most suitable in the case of a weak relation between the predictor and criterion variable (Baron & Kenny, 1986). Indeed, in our

study, we found rumination to mediate the strong direct relationship between peer-related loneliness and depression, and we found rumination to moderate the weaker relationship between parent-related loneliness and depressive symptoms.

4.3 Clinical implications

Provided that the present findings are replicated in independent samples, the present study can have implications for clinical prevention and intervention programs. Our results stressed the importance of ruminative thoughts about one's loneliness for the development of depressive symptoms, especially when these ruminative thoughts are perceived as beyond one's control. More specifically, uncontrollable ruminative thoughts can partly explain why peer-related loneliness gives rise to more depressive symptoms, and they are a condition under which parent-related loneliness brings about depressive symptoms. Therefore, reducing uncontrollable ruminative thoughts about loneliness, or changing people's perceptions about the control over their ruminative thoughts, should be an important goal in intervention programs of loneliness, or in prevention programs of depression. Reducing uncontrollable ruminative thoughts about loneliness (or sadness) might end the vicious circle that results in continued feelings of loneliness or sadness. Given the fact that the transition to college life is a risk period in terms of experiencing loneliness and depressive symptoms (Kenny & Sirin, 2006; Stroebe et al., 2002), more attention should be given to students' emotional support and counseling.

4.4 Limitations and suggestions for future research

Although the present paper revealed several interesting findings, some limitations need to be mentioned. First, participants were mainly Caucasian female college students. A more balanced sample in terms of gender, educational level, and ethnic background would be more appropriate to generalize our findings to the broader population of emerging adulthood. Also, our research questions would be interesting to investigate in a clinical population. Second, our study relied exclusively on self-report measures. Such an approach can cause shared method variance, which, in turn, might partially account for the effects obtained. However, the variables of interest in this paper are internal and subjective processes, which are most appropriate to be investigated by use of self-report measures. Third, other mediators or moderators that modulate the relationship between loneliness and depressive symptoms should be investigated, given the fact that rumination only explains a small part of the

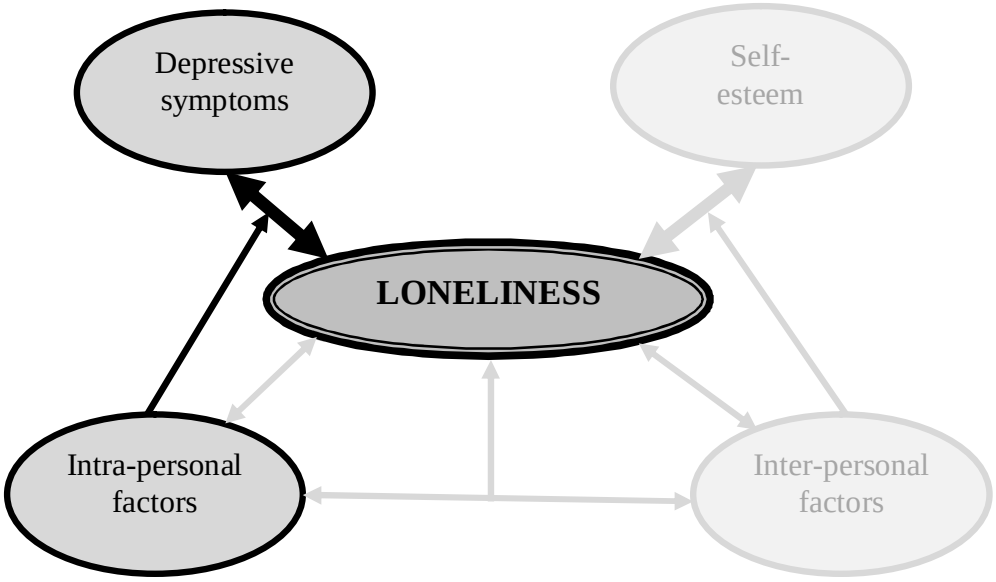
association between loneliness and depressive symptoms. Fourth, the instructions of our rumination on loneliness measure could be further improved in future research, as they may emphasize the role of peers in one's sense of loneliness, relative to family members. Lastly, a cross-sectional design was used, making it impossible to make statements about the direction of effects. In this study, loneliness is assumed to be an antecedent of depressive symptoms, in accordance with the dominant path described in the literature, that goes from social vulnerability and loneliness to depressive symptoms. Nevertheless, other theories recognize the importance of the opposite path, which states that depressive episodes produce an array of interpersonal problems and cause damage in close relationships, which might give rise to loneliness (Joiner, 2000). Empirical evidence on the dynamics between loneliness and depressive symptoms is scarce and shows mixed results (e.g., Cacioppo, Hawkley, & Thisted, 2010; Cacioppo, Hughes, Waite, Hawkley, & Thisted, 2006; Lasgaard, Goossens, & Elklit, 2011; Weeks, Michela, Peplau, & Bragg, 1980). Hence, longitudinal research on this topic is needed.

Despite these limitations, the present study indicated that rumination acted as an underlying mechanism in the association between loneliness and depressive symptoms in first-year college students. Specifically, rumination partially mediated the relationship between peer-related loneliness and depressive symptoms, and moderated the relationship between parent-related loneliness and depressive symptoms. Uncontrollability was found to be the most harmful subcomponent of rumination, suggesting that lonely adolescents are particularly vulnerable to depressive symptoms when they experience their ruminative thoughts about loneliness as beyond their control.

4

Zooming out on loneliness and depressive symptoms:

The role of personality



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Abstract

Based on current theories of depression, reciprocal links between loneliness and depressive symptoms are expected to occur. However, longitudinal studies on adolescent samples are scarce and have yielded conflicting results. The present five-wave longitudinal study from mid- to late adolescence (N = 428, M age at T1 = 15.22 years; 47% female) examined the direction of effect between loneliness and depressive symptoms, using cross-lagged path analysis. In addition, the robustness of these prospective associations was tested by examining the role of the Big Five personality traits (i.e., extraversion, conscientiousness, agreeableness, neuroticism, and openness) as explaining factors and moderators. Results indicated that loneliness and depressive symptoms influenced one another reciprocally, and these reciprocal associations were not attributable to their mutual overlap with personality traits. In addition, neuroticism was found to be a moderator, in that the bidirectional effects between loneliness and depressive symptoms were only found in adolescents high in neuroticism. Practical implications are discussed, and suggestions for future research are outlined.

1. Introduction

During the transition to adulthood, adolescents are faced with multiple developmental challenges, such as the formation of a personalized sense of identity and the establishment of stable peer relationships (Erikson, 1968). Although most adolescents succeed in addressing these challenging tasks, others might experience considerable difficulties in doing so. Possibly due to the multiple changes occurring in social networks, loneliness and depressive symptoms are relatively common and interrelated problems in that period of life (Heinrich & Gullone, 2006). Specifically, adolescents spend increasingly more time with peers, and less time with parents (Larson & Richards, 1991). The ability to establish close peer relationships becomes increasingly important during adolescence. Previous research found, for example, that a lack of friendship intimacy is more strongly related to socio-emotional maladjustment (e.g., depression) in adolescence as compared to preadolescence (Buhrmester, 1990). Therefore, adolescence is considered to be a critical period to study the occurrence of loneliness and depressive symptoms, and to examine how both constructs relate to one another and, possibly, even reinforce one another over time.

Although reciprocal links between loneliness and depressive symptoms are theoretically expected (e.g., Joiner, 2000), empirical studies regarding cross-temporal associations between these two constructs in adolescence are scarce and are mostly limited to two measurement waves. Possibly as a consequence, these studies have yielded mixed findings (e.g., Lasgaard, Goossens, & Elklit, 2011; Weeks, Michela, Peplau, & Bragg, 1980). Because greater insight in the prospective associations between loneliness and depressive symptoms could inform intervention and prevention programs, additional research is needed. The present study represents the first empirical effort to examine reciprocal links between the two constructs across a longer time span (i.e., five annual measurement waves), covering the developmental period from mid- to late adolescence.

In light of the strong associations between personality traits and both loneliness and depressive symptoms (Asendorpf & van Aken, 2003; Kotov, Gamez, Schmidt, & Watson, 2010), the present study investigated the role of the Big Five personality traits (i.e., extraversion, conscientiousness, agreeableness, neuroticism, and openness; McCrae & Costa, 1987) in the prospective associations between loneliness and depressive symptoms. By examining both the explaining and moderating role of personality traits, the present study provides a particularly conservative test of the longitudinal associations between both

phenomena. Finally, because the prospective associations between loneliness and depressive symptoms might be somewhat different for boys and girls, the role of gender as a moderator of the prospective links between loneliness and depressive symptoms was also explored.

1.1 Reciprocal links between loneliness and depressive symptoms

Theories of depression suggest strong and bi-directional links between loneliness and depressive symptoms. Suboptimal social relationships, social rejection, or a lack of social competence – all being germane to the experience of loneliness – may result in increases in depressive symptoms, as recognized by several leading depression theorists (Blatt, 1990; Cole, Martin, & Powers, 1997; Lewinsohn, 1974). Thus, dissatisfaction with one's social life (as evidenced in feelings of loneliness) may set the stage for dissatisfaction with multiple domains in life, and eventually for depressive symptoms. Conversely, depressive symptoms may give rise to feelings of loneliness as well. For example, Coyne's (1976) interpersonal theory of depression presumes that depressive episodes produce an array of interpersonal problems and cause damage to close relationships. Specifically, depressed persons may elicit rejection by those with whom they interact (e.g., by excessive reassurance seeking; Joiner, Alfano, & Metalsky, 1992), which increases the risk for experiencing loneliness. Collectively, these theories emphasize that reciprocal links between loneliness and depressive symptoms might emerge.

Using cross-sectional assessments, numerous empirical studies confirmed the theoretically expected association between loneliness and depressive symptoms (for reviews, see Heinrich & Gullone, 2006; Mahon, Yarcheski, Yarcheski, Cannella, & Hanks, 2006). However, longitudinal data are needed to infer the temporal sequence between loneliness and depressive symptoms. Unfortunately, only a handful of studies employed such data in adolescence, and these studies produced conflicting results. A first study on college students found no evidence for any prospective relationship between loneliness and depressive symptoms, possibly due to the very brief interval (i.e., five weeks) between the two measurement waves (Weeks et al., 1980). Another two-wave study on high school students, which used a one-year time lag, indicated that depressive symptoms predicted subsequent feelings of loneliness, but not vice versa (Lasgaard et al., 2011). A third and final study, conducted on two independent samples of college students, indicated that loneliness was a consistent predictor of later depressive symptoms, whereas the reverse path was present but less consistent (Vanhalst, Goossens, & Luyckx, 2010). The mixed results of these short-term

longitudinal studies indicate the need for a more extensive study in this developmental phase, as the true nature of cross-temporal links between loneliness and depressive symptoms can only be revealed fully through long-term studies. The present study, with five measurement waves, aims to meet this need.

1.2 Loneliness and depressive symptoms: Concurrent links with personality traits

Previous research on underlying mechanisms in the cross-temporal associations between loneliness and depressive symptoms are scarce. To address this need, the present study examined the role of personality traits in this matter, both as explanatory factors and moderators. Five major personality traits are typically distinguished, collectively referred to as the Big Five. These dimensions are extraversion (i.e., the tendency to engage in social behaviors, and experience frequent positive moods), agreeableness (i.e., an individual's sociability, empathy, and cooperativeness), conscientiousness (i.e., organizational and motivational aspects of a person's behavior), neuroticism (i.e., the inability to deal with negative emotions, also referred to as the opposite of emotional stability), and openness (i.e., the way an individual seeks for and deals with new information) (Caspi, Roberts, & Shiner, 2005; Klimstra, Hale, Raaijmakers, Branje, & Meeus, 2009; McCrae & Costa, 1987). The present study focuses on all five personality traits as underlying mechanisms in the relationship between loneliness and depressive symptoms.

Numerous studies have documented associations between these personality traits and depressive symptoms, indicating that extraversion, neuroticism, and conscientiousness are the most consistent correlates of depressive symptoms (for reviews, see Klimstra, Akse, Hale, Raaijmakers, & Meeus, 2010; Kotov et al., 2010). Fewer studies focused on the associations between the Big Five personality traits and loneliness, and they all indicated that neuroticism and extraversion are important correlates of loneliness (e.g., Asendorpf & van Aken, 2003; Cacioppo et al., 2006a; Stokes, 1985). In sum, extraverted individuals were less likely to experience depressive symptoms and loneliness, whereas neurotic individuals were more likely to experience both types of internalizing problems.

These findings are not surprising given the widely replicated finding that extraversion is related to positive affect, whereas neuroticism is related to negative affect (for a review, see Larsen & Ketelaar, 1991). Indeed, extraversion is considered to represent susceptibility to positive affect due to a strong sensitivity to reward, whereas neuroticism is considered to

represent susceptibility to negative affect due to a strong sensitivity to signals of punishment (Eysenck, 1987; Gray, 1981). This increased susceptibility of neurotic individuals to experience negative affect, for instance, suggests that neuroticism might affect the prospective associations between loneliness and depressive symptoms. In the present study, we will focus on two possible ways in which personality traits may have an impact on the prospective associations between loneliness and depressive symptoms, that is, as explanatory variables or as a moderators.

1.3 Prospective links between loneliness and depressive symptoms: Personality traits as explaining factors

Personality traits may be the common factors that explain the occurrence of and associations between loneliness and depressive symptoms. Put differently, these associations might be spurious, due to their mutual overlap with an underlying vulnerability (i.e., certain personality traits) to both depression and loneliness. This type of links is implied in the spectrum model (Tackett, 2006). The spectrum model posits that personality and psychopathology lie on a single continuum, with problem behavior being an extreme manifestation of certain personality traits. According to this model, personality traits such as neuroticism refer to a broader, more normative set of behaviors, whereas loneliness and depressive symptoms refer to a specific, more extreme set of behaviors. The spectrum model has previously been applied when studying the explanatory role of neuroticism in the co-morbidity between depressive symptoms and anxiety (e.g., Clark, Watson, & Mineka, 1994; Lamers et al., 2011). However, the only longitudinal study that examined whether personality traits explain the associations between loneliness and depressive symptoms was conducted in the elderly and was limited to neuroticism. Results of this particular study indicated that neuroticism did not explain the prospective associations between loneliness and depressive symptoms (Cacioppo, Hawkley, & Thisted, 2010). The present study checked the robustness of the prospective associations between loneliness and depressive symptoms in a much more demanding way, by including all Big Five personality traits as potential explanatory variables in the analysis.

1.4 Prospective links between loneliness and depressive symptoms: Personality traits as a moderator

Personality traits also may moderate the associations between loneliness and depressive symptoms. This would imply that these associations would be more pronounced for those adolescents with high or low scores on each of the Big Five personality traits. It could be, for example, that the prospective associations between loneliness and depressive symptoms are stronger among adolescents high in neuroticism compared to adolescents low in neuroticism. One specific model that might bear relevance in this context is the differential exposure-reactivity model (Bolger & Zuckerman, 1995), as used in stress research. This model states that personality may influence not only the exposure to stress (e.g., the experience of loneliness) but also the responses to stress. These responses, in turn, may impact the association with, for example, depressive symptoms. Although personality traits were previously investigated as moderators in prospective associations in other domains (e.g., van der Vorst, Engels, Dekovic, Meeus, & Vermulst, 2007), they have never been examined as a moderator in the relationship between loneliness and depressive symptoms. The present study systematically examines the moderating effects of all Big Five personality traits on the prospective associations between loneliness and depressive symptoms.

1.5 Gender differences

Overall, gender differences start to emerge on a wide number of behavioral and emotional problems during adolescence (Rose & Rudolph, 2006). This is particularly true for depressive symptoms (Hankin et al., 1998; Nolen-Hoeksema & Girgus, 1994), whereas mixed results are found for loneliness (for reviews, see Borys & Perlman, 1985; Mahon et al., 2005). As female adolescents usually report higher depressive symptoms (Hankin et al., 1998; Nolen-Hoeksema & Girgus, 1994), the prospective association between loneliness and depressive symptoms could be stronger for females. However, only few studies examined gender differences in the association between loneliness and depressive symptoms in adolescence. In general, these studies showed that the association between loneliness and depressive symptoms is comparably strong in male and female adolescents (e.g., Koenig, Isaacs, & Schwartz, 1994; Lasgaard et al., 2011). Studies in adulthood, however, show mixed results, with some studies indicating no gender differences (e.g., Cacioppo et al., 2010), and other studies indicating that the association between loneliness and depressive symptoms is stronger for men than for women (e.g., Cacioppo, Hughes, Waite, Hawkley, & Thisted,

2006b). Additionally, gender differences on the Big Five personality traits are considered in the present study, given the contradicting results in previous studies in adolescence (for a review, see Klimstra et al., 2009). In sum, the present study examined mean-level gender differences in loneliness, depressive symptoms, and personality traits, and further examined whether gender moderated the temporal associations between loneliness and depressive symptoms.

1.6 The present study

Mid-to-late adolescence is considered to be a critical developmental period for studying vulnerability to depression and loneliness (Hankin et al., 1998; Goossens, 2006). However, despite the overly replicated strong association between both internalizing problems (Heinrich & Gullone, 2006; Mahon et al., 2006), the prospective associations between loneliness and depressive symptoms only rarely have been investigated in this developmental phase. The present study aims to fill this important gap in the literature by investigating the temporal sequence between loneliness and depressive symptoms in a 5-year longitudinal study from mid- to late adolescence, by means of cross-lagged path analysis. This statistical procedure allows for accurate estimates of cross-time effects that link the constructs involved, with appropriate controls for all within-time associations (i.e., the correlation between the different variables at each point in time) and stability coefficients (i.e., prediction of a variable by its level at previous time points). Based on existing depression theories (e.g., Blatt, 1990; Coyne, 1976), we expected reciprocal associations to emerge.

The role of personality traits in these associations was examined in two different ways. First, we investigated whether the prospective associations between loneliness and depressive symptoms were explained by personality, by comparing a cross-lagged model with and without controlling for all Big Five personality traits. Second, we investigated whether the prospective associations between loneliness and depressive symptoms were different for adolescents with high versus low levels of specific Big Five personality traits (i.e., whether specific personality traits acted as moderators). Previous studies have shown that both neuroticism and extraversion are consistent correlates of loneliness and depressive symptoms in adolescence (e.g., Asendorpf & van Aken, 2003; Klimstra et al., 2010), and that neuroticism represents a specific susceptibility to negative affect (Eysenck, 1987; Gray, 1981). Therefore, we specifically expected that neuroticism would explain or moderate the prospective associations between loneliness and depressive symptoms. Finally, the role of

gender was examined. Although we expected adolescent girls to show more depressive symptoms compared to boys (Nolen-Hoeksema & Girgus, 1994), no gender differences were expected in the prospective associations between loneliness and depressive symptoms (Cacioppo et al., 2010; Lasgaard et al., 2011).

2. Method

2.1 Participants and procedure

Data from the "Family and Health" project, conducted in The Netherlands, were used for the present study. This longitudinal project examines different socialization processes related to various health behaviors in adolescents and their families, including alcohol use, smoking, and psychosocial adjustment (Harakeh, Scholte, de Vries, & Engels, 2005; van der Vorst, Engels, Meeus, Dekovic, & Van Leeuwe, 2005). Families with two parents and at least two children aged 13-16 years (no twins, nor mentally or physically disabled) were selected from the registers of 22 municipalities, both from rural and urban areas. Approximately 5,000 invitation letters were sent, and 885 families agreed to participate by returning the response forms. The remaining families were contacted by telephone to ascertain whether they met inclusion criteria, which was the case for 765 families. Because of financial constraints we only were able to select a maximum of 428 families, based on a further selection to obtain an equal distribution of sex and educational level of the adolescents. Trained interviewers visited the participants at home, asking all four family members to complete an extensive questionnaire individually. Each family received € 30 (about 45 US dollar) if all four family members completed the questionnaire. Additionally, after completion of three waves, five travel cheques of € 1,000 (about 1,500 US dollar) were raffled among the participating families.

So far, five annual waves that included measures of loneliness and depressive symptoms were collected between 2002 and 2006. At the first wave (T1), 428 families participated. Drop-out was low, with 416 families (97%) participating in the second wave (T2), 403 families (94%) participating in the third wave (T3), 356 families (83%) participating in the fourth wave (T4), and 313 families (73%) at the fifth wave (T5). Participants with and without complete data were compared using Little's (1988) Missing Completely At Random (MCAR) test. This comparison yielded a non-significant chi-square value (χ^2 (496) = 398.82, *ns*), suggesting that missing values could be reliably estimated.

Missing values were estimated using the full-information maximum likelihood (FIML) procedure. In the present study, only data obtained from the oldest child in the family were used, because these individuals fell in the age range that spans mid- to late adolescence (*M*age at T1 was 15.22 years, *SD* = .60). More than 95% of the adolescents were Caucasian, and there was an equal distribution of gender (53% was male) and educational level (29% followed preparatory secondary vocational education, 29% followed senior general secondary education, 40% followed pre-university education, and 2% followed other types of education). All primary analyses were conducted in Mplus (Version 4; Muthén & Muthén, 2002).

2.2 Measures

Loneliness. The subscale peer-related loneliness of the Loneliness and Aloneness Scale for Children and Adolescents (Marcoen, Goossens, & Caes, 1987) was used to capture loneliness. The instrument was developed for use with Dutch-speaking participants and has high internal consistency and construct validity (Goossens et al., 2009). The subscale used in the present study contains 12 items answered on a 4-point Likert-type scale, ranging from 1 (*never*) to 4 (*often*). A sample item reads "I feel left out by my friends". Cronbach's alphas at T1-T5 varied between .90 and .94, with a mean of .92.

Depressive symptoms. Depressive symptomatology was measured using a six-item questionnaire (Kandel & Davies, 1982), which has been shown to have good concurrent validity in Dutch young adults (van Roekel, Engels, Verhagen, Goossens, & Scholte, 2011). Items were answered on a 5-point Likert-type scale, ranging from 1 (*never*) to 5 (*always*). A sample item reads "During the last year, I felt unhappy, sad and depressed". Cronbach's alphas at T1-T5 varied between .78 and .87, with a mean of .82.

Personality traits. Personality traits were assessed at T1 with the Dutch version of the Quick Big Five questionnaire (Goldberg, 1992; Vermulst & Gerris, 2005), which previously has been shown to have good internal validity (Akse, Hale, Engels, Raaijmakers, & Meeus, 2004). A 7-point Likert scale, ranging from 1 (*completely untrue*) to 7 (*completely true*), was used when scoring 30 items that assess five personality dimensions: Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness. All dimensions are measured with 6 items each, such as: talkative (Extraversion), sympathetic (Agreeableness), systematic (Conscientiousness), worried (Neuroticism), and creative (Openness). Cronbach's alpha was

.84 for Extraversion, .77 for Agreeableness, .85 for Conscientiousness, .73 for Neuroticism, and .70 for Openness.

3. Results

3.1 Preliminary analyses

Table 4.1 lists means and standard deviations by gender, along with correlations between loneliness and depressive symptoms at each time point. Stability coefficients (i.e., the correlation between two subsequent measurement occasions) were high for both loneliness (ranging between .62 and .67; all *p*s < .001) and depressive symptoms (ranging between .54 and .58; all *p*s < .001). Within-time correlations between loneliness and depressive symptoms ranged from .34 to .50 (all *p*s < .001), showing that loneliness and depressive symptoms co-occurred. As shown in Table 4.2, personality traits related somewhat differently to loneliness and depressive symptoms, that is, the direction of the correlations was the same, but the strength differed. Specifically, loneliness was related more strongly (and negatively) to extraversion (t (425) = 13.01, $p < .001$) and agreeableness (t (425) = 9.69, $p < .001$), whereas depressive symptoms were related more strongly (and positively) to neuroticism (t (425) = 9.49, $p < .001$). Furthermore, conscientiousness only was related negatively to depressive symptoms, but not to loneliness, and openness only was related negatively to loneliness, but not to depressive symptoms.

To investigate gender differences in loneliness and depressive symptoms, a MANOVA was performed with gender as fixed factor, and loneliness and depressive symptoms at all time points as dependent variables. This yielded a significant effect (Wilks' λ = .88; F (10,280) = 3.78, $p < .001$; η^2 = .12). Follow-up analyses showed that female adolescents were higher on both loneliness and depressive symptoms at all time points, although the effect sizes of loneliness (η^2 ranging between .01 and .03) were smaller than the effect sizes of depressive symptoms (η^2 ranging between .04 and .09). Similarly, a MANOVA was performed with gender as fixed factor and the Big Five personality traits as dependent variables. This yielded a significant effect (Wilks' λ = .96; F (5,409) = 3.16, $p < .01$; η^2 = .04. Follow-up analyses indicated that gender had a significant effect on neuroticism only, with female adolescents (M = 3.78; SD = .06) showing higher levels of neuroticism than male adolescents (M = 3.56; SD = .06; F (1,420) = 6.59, $p < .05$).

Table 4.1

Means, Standard Deviations, and Correlations Among Loneliness and Depressive Symptoms

	Males	*Females*									
Variable	*M (SD)*	*M (SD)*	2	3	4	5	6	7	8	9	10
1. Loneliness T1	1.55 (0.52)	1.60 (0.51)	.66	.54	.41	.43	.34	.19	.19	.23	.21
2. Loneliness T2	1.45 (0.51)	1.56 (0.52)	_	.67	.58	.53	.33	.38	.27	.37	.31
3. Loneliness T3	1.47 (0.50)	1.60 (0.59)		_	.65	.53	.31	.38	.44	.39	.31
4. Loneliness T4	1.39 (0.49)	1.55 (0.55)			_	.62	.27	.33	.34	.49	.31
5. Loneliness T5	1.36 (0.52)	1.52 (0.54)				_	.25	.26	.25	.37	.44
6. Depressive symptoms T1	2.32 (0.67)	2.59 (0.61)					_	.58	.45	.51	.33
7. Depressive symptoms T2	2.27 (0.61)	2.59 (0.63)						_	.58	.55	.48
8. Depressive symptoms T3	2.30 (0.58)	2.56 (0.57)							_	.54	.48
9. Depressive symptoms T4	2.07 (0.65)	2.37 (0.71)								_	.57
10. Depressive symptoms T5	1.99 (0.67)	2.26 (0.72)									_

Note. T = Time; All correlations significant at $p < .001$.

Table 4.2

Correlations Among Loneliness, Depressive Symptoms, and Personality Traits at T1

Variable	2	3	4	5	6	7
1. Loneliness	.41***	-.42***	.00	-.22***	.29***	-.11*
2. Depressive symptoms	_	-.21***	-.11*	-.12*	.42***	-.01
3. Extraversion		_	-.12*	.19***	-.36***	.20***
4. Conscientiousness			_	.29***	.06	.07
5. Agreeableness				_	-.07	-.34***
6. Neuroticism					_	-.08
7. Openness						_

Note. T = Time.

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

Finally, analyses of variance with repeated measures (RANOVA) indicated a significant decrease in both depressive symptoms (Wilks' $\lambda = .75$; F (4, 288) = 23.96, $p < .001$) and loneliness (Wilks' $\lambda = .95$; F (4, 287) = 3.89, $p < .01$) over time, but there were no gender differences in the mean-level changes of either loneliness (Wilks' $\lambda = .95$; F (4,286) = 0.21, *ns*) or depressive symptoms (Wilks' $\lambda = .99$; F (4,287) = 0.18, *ns*).

3.2 Temporal sequence of loneliness and depressive symptoms

Various indices were used to evaluate model fit of the cross-lagged model (Kline, 2005). The Chi-square (χ^2) should be as small as possible, the Comparative Fit Index (CFI) should exceed .90 for a reasonable fit and .95 for a good fit to the data, and the Root Mean Square Error of Approximation (RMSEA) should be less than .05 for a close approximate fit, or between .05 and .08 for a reasonable fit to the data.

An unconstrained model with all stability paths, within-time correlations and cross-lagged paths in both directions was estimated (χ^2 (24) = 146.49, $p < .001$; CFI = .92; RMSEA = .11). Next, this model was compared with a model in which the following three parameters were constrained to be equal across time: (a) stability paths of depressive symptoms, (b) stability paths of loneliness, and (c) correlated changes between loneliness and depressive symptoms, that is, correlations between the residuals of loneliness and depressive symptoms at T2, T3, T4, and T5 (e.g., Asendorpf & van Aken, 2003). The hypothesis of invariance

would be rejected if the difference in the χ^2 index of both models is significant at $p < .05$ (Steiger, Shapiro, & Browne, 1985). Results indicated that all stability paths and correlated changes could be considered equal across time ($\Delta\chi^2$ (9) = 11.02, *ns*). In a next step, we constrained all cross-lagged paths from loneliness to depressive symptoms and all cross-lagged paths from depressive symptoms to loneliness, respectively, to be equal across time. Model comparison indicated that these constraints were allowed ($\Delta\chi^2$ (15) = 24.30, *ns*), and loneliness was a stronger predictor of depressive symptoms ($B = .13$, $p < .001$) than vice versa ($B = .07$, $p < .001$). This final bidirectional model had an acceptable fit to the data (χ^2 (39) = 170.79, $p < .001$; CFI = .92; RMSEA = .09), and is represented in Figure 4.1.

A multigroup comparison was used to examine gender differences. This approach compares a constrained model (e.g., a model in which the estimated cross-lagged parameters are set equal across gender) with an unconstrained model (e.g., a model in which these parameters are allowed to vary across gender). The hypothesis of invariance would be rejected if the difference in the χ^2 index of both models was significant at $p < .05$. Results indicated that the cross-lagged model fitted equally well for males and females ($\Delta\chi^2$ (2) = 4.71, *ns*).

3.3 Role of personality traits

To investigate whether personality traits explain the prospective associations between loneliness and depressive symptoms, we compared our final cross-lagged model with the same model including controls for the Big Five personality traits. Therefore, paths from all five personality traits to depressive symptoms and loneliness at each time point were included in the model (Bollen, 1989). This model had an acceptable fit to the data (χ^2 (77) = 215.52, $p < .001$; CFI = .92; RMSEA = .07). Loneliness and depressive symptoms were bidirectionally related, as was the case in the original model, and only small differences in parameter estimates between the two models emerged (see Figure 4.1). Thus, the prospective associations between loneliness and depressive symptoms were not attributable to personality traits.

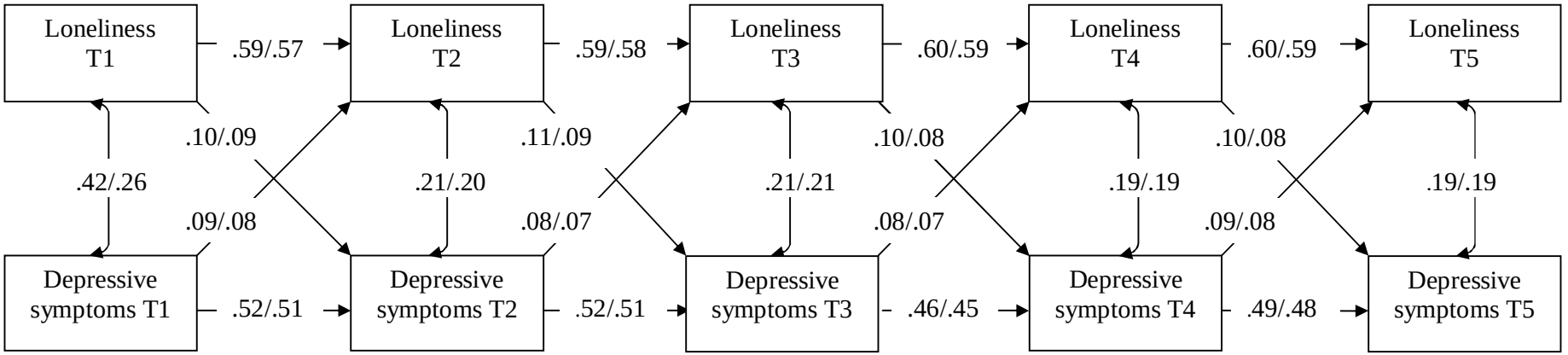


Figure 4.1. Final cross-lagged model with standardized path coefficients.

Note. Parameter estimates before the slash represent the estimates of the model without controls for personality traits; parameter estimates after the slash represent estimates of the model with controls for personality traits. T= Time. All $p < .001$.

To investigate the moderating effects of personality traits, groups of participants with high versus low levels of each of the Big Five personality traits were determined through a median split procedure. Next, the parameters of the cross-lagged model were compared in both groups by means of a multigroup comparison for each Big Five trait. Results indicated that the model fitted equally well among high and low levels of extraversion ($\Delta\chi^2$ (2) = 2.14, *ns*), conscientiousness ($\Delta\chi^2$ (2) = 4.95, *ns*), agreeableness ($\Delta\chi^2$ (2) = 0.28, *ns*), and openness ($\Delta\chi^2$ (2) = 2.40, *ns*). However, a significant difference was found for neuroticism ($\Delta\chi^2$ (2) = 7.56, $p < .05$). Specifically, the cross-paths between loneliness and depressive symptoms were significant in the group with high levels of neuroticism ($B = .14$ for the path from loneliness to depressive symptoms; $B = .10$ for the reverse path; all $p < .001$), but not significant in the group with low levels of neuroticism ($B = .06$ for the path from loneliness to depressive symptoms; $B = .01$ for the reverse path; *ns*).

4. Discussion

Both loneliness and depressive symptoms represent important and interrelated problems in adolescence (Allen & Sheeber, 2009; Goossens, 2006). However, findings on the direction of prospective links between these two types of internalizing problems were inconsistent (Lasgaard et al., 2011; Vanhalst et al., 2010; Weeks et al., 1980) and information on the role of personality traits and gender in these associations was limited, despite strong concurrent associations between the two constructs and personality traits (Asendorpf & van Aken, 2003; Kotov et al., 2010). The present study, which relied on an extensive, five-wave design, contributed to extant literature in three important ways. First, cross-lagged path analysis indicated that loneliness and depressive symptoms influenced one another bidirectionally from mid- to late adolescence, with the direction from loneliness to depressive symptoms being stronger than the reversed direction. Second, this vicious circle between loneliness and depressive symptoms proved to be highly robust, as it could not be "explained away" by the Big Five personality traits when applying appropriate statistical controls. Third and finally, neuroticism was the only personality trait that acted as a moderator, in that the bidirectional associations between loneliness and depressive symptoms only emerged in relatively neurotic adolescents. This finding suggests a particular type of vulnerability for the development of internalizing problems in adolescents with high scores on neuroticism.

4.1 The vicious circle between loneliness and depressive symptoms: Potential intervening mechanisms

The reciprocal relationship between loneliness and depressive symptoms suggests that lonely adolescents are at risk for later depressive symptoms, and, conversely, depressed adolescents have an increased tendency to experience loneliness over time, as could be expected based on depression theories (Blatt, 1990; Coyne, 1976; Lewinsohn, 1974). This finding integrates the results of two earlier studies on cross-lagged effects between loneliness and depressive symptoms in late adolescence. Whereas the study of Lasgaard et al. (2011) found a unidirectional association from depressive symptoms to subsequent levels of loneliness, the study of Vanhalst et al. (2010) found bidirectional associations, with the path from loneliness to subsequent depressive symptoms being stronger than the reverse path. However, these short-term longitudinal studies only may have shown a snapshot of the underlying, long-term bidirectional process occurring across adolescence as shown in the present five-wave longitudinal study. Our results, therefore, suggest that a cyclical process between loneliness and depressive symptoms might be at work that maintains and potentially enhances both forms of maladjustment.

Intervening mechanisms that perpetuate or interrupt the vicious circle between loneliness and depressive symptoms should be explored in future research. Previous research found that passive coping strategies in general, and rumination about loneliness in particular, partially mediated the relationship between loneliness and depressive symptoms (Vanhalst et al., 2010; Vanhalst, Luyckx, Raes, & Goossens, 2012). However, there are additional mechanisms that could explain why lonely adolescents are at risk for later depressive symptoms. For example, lonely people typically attribute their interpersonal failures to personal and unchangeable characteristics (e.g., shyness or low ability), and their interpersonal successes to luck or other external factors (Anderson, 1999; Heinrich & Gullone, 2006). This detrimental attribution style also was found to relate to depressive symptoms (Anderson, 1999). Therefore, we suggest future research to focus on attribution style as a mediator between loneliness and depressive symptoms.

A possible intervening mechanism in the opposite direction (i.e., from depressive symptoms to loneliness) can be derived from Coyne's (1976) interpersonal theory of depression. This theory postulates that the interpersonal behaviors and attitudes of depressed individuals tend to induce rejection by significant others. Several studies to date focused on

reassurance seeking as an example of such rejection-evoking behavior (e.g., Joiner et al., 1992; Joiner, Katz, & Lew, 1999). Specifically, depressed individuals tend to seek reassurance from significant others to alleviate their doubts about whether others truly care about them. However, excessive reassurance seeking may evoke aggravating reactions from significant others, and ultimately lead to rejection, and, therefore, to experiences of loneliness. So far, reassurance seeking has been investigated mainly as a perpetuating factor in long-term depression, but in our opinion it also should be considered as a possible mediating factor in the association between depressive symptoms and loneliness. In sum, we suggest that future research investigates these possible intervening variables (i.e., coping, attribution style, and reassurance seeking) as contributors to loneliness, depressive symptoms, and the interplay between both variables. Examining these variables together has the additional advantage to distinguish between unique and shared effects, and to examine possible interactions.

4.2 Robustness of the associations between loneliness and depressive symptoms

In a first set of additional analyses, the robustness of the vicious circle between loneliness and depressive symptoms was tested by statistically controlling for the effect of personality traits. In line with previous cross-sectional and longitudinal studies that had examined only the role of neuroticism (Cacioppo et al., 2006a, 2010), controlling for the Big Five personality traits at baseline did not alter the prospective associations between loneliness and depressive symptoms. Thus, personality traits did not explain the vicious circle between loneliness and depressive symptoms, showing that the associations between loneliness and depressive symptoms are fairly robust.

4.3 Looking for vulnerable subgroups: Moderating role of neuroticism

In a second set of additional analyses, we examined the moderating effects of gender and personality traits. By doing so, we could distinguish vulnerable subgroups of adolescents, that is, groups for whom the vicious circle linking loneliness to depressive symptoms was more pronounced than in others. First, consistent with previous studies (e.g., Lasgaard et al., 2011), gender did not affect the prospective associations between loneliness and depressive symptoms, although girls experienced more loneliness and depressive symptoms than boys at all measurement occasions. Hence, despite such mean differences, the actual sequence linking loneliness to depressive symptoms over time was virtually identical for boys and girls. Second, no differences in the strength of the prospective associations were found between

adolescents with high versus low levels of extraversion, conscientiousness, agreeableness, or openness. However, neuroticism was found to moderate these prospective associations. Specifically, whereas bidirectional prospective effects were found for adolescents with high levels of neuroticism, no such effects were found for adolescents with low levels of neuroticism. The only vulnerable group identified in the present study, therefore, consists of adolescents with high scores on the personality trait of neuroticism.

Our results, therefore, indicate that neuroticism is a specific risk factor for the longitudinal co-morbidity between loneliness and depressive symptoms, because it increases the probability that the one internalizing symptom will evolve into the other. This may imply that neuroticism not only relates to higher levels of loneliness and depressive symptoms but also exacerbates those outcomes. This finding is in line with the definition of neuroticism (i.e., the inability to deal with negative emotions; Caspi et al., 2005), in that neurotic adolescents are unable to prevent their experience of loneliness from progressing into later depressive symptoms, and vice versa. The pattern of findings obtained is further compatible with the differential exposure-reactivity model, proposed by Bolger and Zuckerman (1995) as a framework for examining the relationships between personality and stress. The differential exposure-reactivity model states that personality may not only influence the exposure to stress but also the responses to stress. Applied to the variables of interest of the present study, personality traits (and particularly neuroticism) may be related not only to the experience of loneliness but also to the responses to loneliness, and therefore, to possible consequences such as depressive symptoms. However, additional research is needed to make clear statements about the role of neuroticism in the link between loneliness and depressive symptoms.

4.4 Practical implications

Both the prospective results and the moderating role of neuroticism may have implications for prevention and intervention programs in clinical settings, but also in the school or family context. For example, parents or teachers could be encouraged to be attentive towards signs of enduring loneliness in their children or students, and to seek help before it evolves into depression. School counselors that treat adolescents with symptoms of loneliness or depression, should be particularly alert if these adolescents also show signs of neuroticism. Furthermore, a loneliness or neuroticism screening instrument could be employed to identify adolescents that are particularly at risk for depression, and, therefore, particularly might benefit from prevention programs (for cut-off scores for neuroticism and loneliness, see Costa

& McCrae, 1992, and Perry, 1990, respectively). The vicious circle between loneliness and depressive symptoms can further be relevant for bullying intervention programs, as bullying is associated with both loneliness and depressive symptoms (Hawker & Boulton, 2000).

Clinical intervention programs should aim to break the vicious circle that makes lonely people vulnerable for later depressive symptomatology and vice versa, to ensure that these internalizing problems do not escalate. One way to do so would be to improve emotional stability, given that emotional stability (i.e., low neuroticism) was found to be a protective factor against these internalizing problems reinforcing one another across time. Although core personality traits such as neuroticism are considered to be difficult to modify, specific facets of the different core traits may be more amendable (Costa & McCrae, 1995; McCrae & Costa, 1999). Therefore, future research should focus on specific facets of neuroticism and investigate which of these facets are particularly harmful or protective for the experience of loneliness, depressive symptoms or the association between the two. For example, previous research indicated that different facets of neuroticism (e.g., hostility, self-consciousness, or vulnerability) are differently related to positive and negative affect, life satisfaction, and happiness (Quevedo & Abella, 2011). We further argue that the role of attribution styles in the association between loneliness and depressive symptoms is an important area for clinical practice, given the association between maladaptive attribution styles with both loneliness and depressive symptoms (Anderson, 1999). Indeed, loneliness interventions that addressed maladaptive social cognition (including attribution style) had a larger effect size compared to any other type of intervention (i.e., addressing social support, social skills, and opportunities for social interventions; Masi, Chen, Hawkley, & Cacioppo, 2011).

4.5 Limitations and conclusion

Although the present article yielded important information on the temporal sequence of loneliness and depressive symptoms, some limitations and suggestions for future research need to be mentioned. First, the adolescents in the present study were raised in intact two-parent families and were mainly Caucasian. Regarding family situations, previous research indicated that children from intact families had, on average, better psychological and psychosocial adjustment in comparison to children from divorced families (i.e., including lower scores on depressive symptoms and loneliness; Amato & Keith, 1991). Regarding ethnicity, adolescents from ethnic minorities showed higher levels of depressive symptoms (Anderson & Mayes, 2010) and loneliness (Bellmore, Witkow, Graham, & Juvonen, 2004)

compared to adolescents from ethnic majorities. However, although mean differences in loneliness and depressive symptoms may be expected to emerge, studies in older adults indicated that the association between loneliness and depressive symptoms is similar across family situations and ethnicity (Cacioppo et al., 2006a, 2006b). In sum, future studies in adolescence that are more balanced in terms of family situations and background are required to assess further the generalizability of our findings.

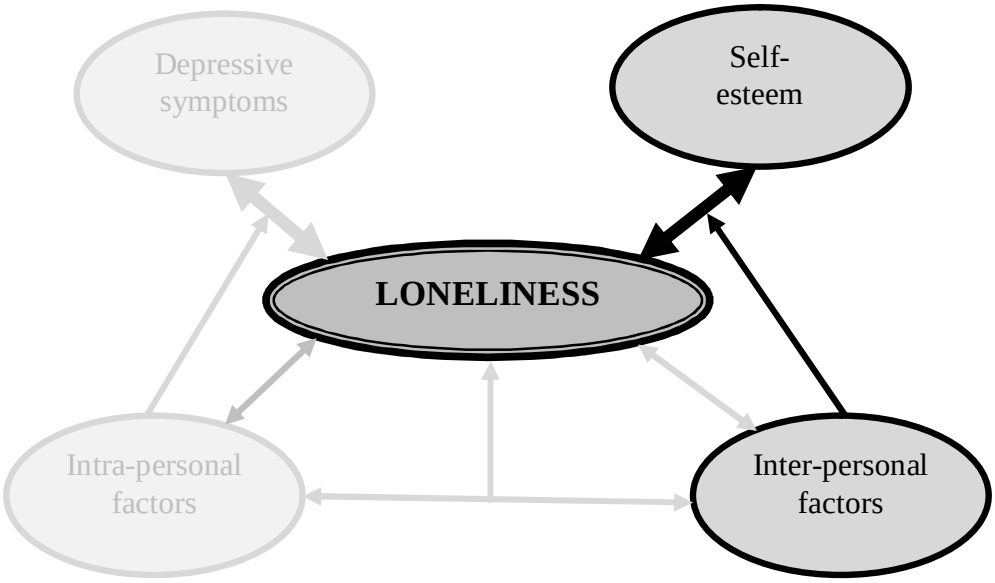
A second limitation of the present study may be related to shared method variance, caused by the exclusive use of self-report measures. However, loneliness and depressive symptoms are internal and subjective processes, which are most appropriately investigated with self-report measures. With respect to personality traits, other-reported measures could be used, although a recent study showed that these measures might be as informative about the raters' personality as they are about the personality of the person being rated (Wood, Harms, & Vazire, 2010). Third, personality traits were measured only at baseline in the present study. Although personality traits are generally considered to be stable over time, a recent study indicated that certain personality traits (such as neuroticism) mature across adolescence (Klimstra et al., 2009). Therefore, future research should investigate the role of personality traits longitudinally, and examine whether changes in personality levels are accompanied by changes in the prospective effects between loneliness and depressive symptoms.

Despite the limitations mentioned, the present five-wave longitudinal study was the first to demonstrate that loneliness and depressive symptoms influence one another in mutual fashion from mid- to late adolescence. This type of developmental interplay cannot simply be reduced to the association that both types of internalizing problems have with any of the Big Five personality traits. Finally, as neuroticism was found to moderate the bidirectional associations between loneliness and depressive symptoms, adolescents who score high on the Big Five trait of neuroticism seem to represent a specific risk group that deserves special attention from all adults involved in the care of adolescents, professionally or otherwise.

5

Loneliness and self-esteem:

Prospective effects and the role of social acceptance



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Abstract

Low self-esteem has been shown to relate to current and later feelings of loneliness in adolescence. However, it remains unclear why low self-esteem puts adolescents at risk for experiencing loneliness. Further, longitudinal research on the direction of effects between loneliness and self-esteem is virtually non-existent. The present study aims to fill these gaps in the literature. First, the direction of effects between loneliness and self-esteem is investigated in two independent longitudinal studies: a five-wave study sampling Dutch adolescents (*M* age = 15.22 years at T1; *N* = 428) and a three-wave study sampling Belgian adolescents (*M* age = 14.95 years at T1; *N* = 862). Second, the mediating role of social acceptance was investigated in the latter sample by applying a multi-method approach that included actual (i.e., peer-reported) and perceived (i.e., self-reported) social acceptance. Results indicated that self-esteem and loneliness influenced one another in a reciprocal manner. Furthermore, the dominant path from self-esteem to loneliness was partially mediated by perceived – but not actual – social acceptance. Specifically, low self-esteem was related to less perceived social acceptance over time, which, in turn, increased feelings of loneliness. The importance of distinguishing actual from perceived social acceptance is discussed, and suggestions for future research are outlined.

1. General introduction

Experiencing low self-esteem and feeling lonely are common and interrelated problems in adolescence. Self-esteem is defined as a global sense of one's worth, or, in other words, an attitude about oneself (Rosenberg, 1965). Loneliness is defined as the negative emotional response to a discrepancy between the desired and achieved quality of one's social network (Peplau & Perlman, 1982). Both low self-esteem and loneliness have repeatedly been shown to relate to lower well-being. For example, low self-esteem shows positive associations with various indices of maladjustment such as depression, eating disorders, engagement in risk behaviors, and lower academic performance (Baumeister, Campbell, Krueger, & Vohs, 2003; Harter, 2006). Similarly, when sustained over time, loneliness is related to anxiety, depression, sleep disturbances, and cardiovascular diseases (for reviews, see Ernst & Cacioppo, 1999; Heinrich & Gullone, 2006). Although low self-esteem and loneliness are problems that affect people of all ages, they may be particularly relevant among mid- and late adolescents because of the developmental tasks that they are facing. Specifically, adolescents are expected to increasingly establish mature peer relationships and develop an integrated sense of self (Erikson, 1968; Steinberg & Morris, 2001).

Numerous cross-sectional studies have documented a strong concurrent association between low self-esteem and loneliness (for reviews, see Ernst & Cacioppo, 1999; Heinrich & Gullone, 2006; Mahon, Yarcheski, Yarcheski, Cannella, & Hanks, 2006). Nevertheless, knowledge on prospective associations and particularly on the explanatory mechanisms linking self-esteem to loneliness remains limited. Although theoretical assumptions have explained this association in terms of a reciprocal process in which both constructs reinforce one another over time (Peplau, Miceli, & Morasch, 1982), empirical evidence on the direction of effects between self-esteem and loneliness is virtually non-existent. Greater knowledge about the direction of effects and about explanatory factors is of crucial importance, not only in order to advance understanding of the relation between self-esteem and loneliness, but also to improve clinical work aimed at alleviating youth's loneliness.

In short, the main goal of the present manuscript is to clarify and explain the prospective associations between self-esteem and loneliness. Therefore, two studies on two independent samples were conducted. Specifically, we examined the direction of effects between self-esteem and loneliness in a five-wave sample of Dutch adolescents (Study 1) and a three-wave study in Belgian adolescents (Study 2). In addition, Study 2 examined the role of

both perceived and actual social acceptance as underlying mechanisms in the pathway from low self-esteem to loneliness.

2. Study 1

2.1 Introduction

The strong association between self-esteem and loneliness may imply that low self-esteem is a risk factor for experiencing loneliness or, vice versa, that feeling lonely impairs one's self-esteem. Alternatively, a transactional model may also be at work, in which self-esteem and loneliness reciprocally reinforce one another, resulting in a vicious circle. Several comprehensive theories on loneliness, such as the evolutionary theory of loneliness (Cacioppo et al., 2006; Hawkley & Cacioppo, 2010) or the cognitive discrepancy model (de Jong-Gierveld, 1987; Kupersmidt, Sigda, Sedikides, & Voegler, 1999; Peplau & Perlman, 1982) have acknowledged the strong association with self-esteem. These theories, however, do not provide specific hypotheses on the direction of effects or on underlying mechanisms. We propose, in line with Peplau, Miceli and Morasch (1982), that low self-esteem and loneliness are closely and reciprocally interrelated, and that a deleterious transactional process between both constructs may be at work. Thus, as detailed below, we expect that (a) low self-esteem leads to increased loneliness and (b) loneliness is a risk factor for lowered self-esteem.

First, and of crucial importance for the present study, low self-esteem has been shown to increase individuals' risk for later loneliness (Olmstead, Guy, O'Malley, & Bentler, 1991). This relationship may be explained by socio-cognitive processes. Peplau and colleagues (1982), for instance, suggested that individuals with low self-esteem engage in certain behaviors and cognitive processes that impede satisfying social relationships, and, consequently, increase their feelings of loneliness. That is, individuals with low self-esteem are more likely to behave in ways that evoke rejection by their peers (e.g., reassurance seeking; Joiner, Katz, & Lew, 1999) and to interpret others' reactions as rejecting (Murray, Rose, Bellavia, Holmes, & Kusche, 2002). Thus, these behaviors or cognitions associated with low self-esteem may induce (perceived) problems in the relationships with peers, which may be related to increased loneliness.

Second, loneliness, in turn, is hypothesized to diminish adolescents' self-esteem, particularly for those adolescents who experience chronic feelings of loneliness and blame themselves for their social failures (Peplau et al., 1982). Therefore, self-esteem may be a

direct reflection or internalization of the experience of loneliness. Adolescents' dissatisfaction with their social life may set the stage for a broader dissatisfaction with themselves as a person, resulting in lower self-esteem. In addition, the stigma that is associated with loneliness (De Jong-Gierveld, van Tilburg, & Dykstra, 2006) may foster lonely individuals' feelings of failure. Particularly in adolescence, individuals tend to define themselves in terms of social relationships and are increasingly aware of and concerned about their social status (Parkhurst & Hopmeyer, 1999). Therefore, loneliness in adolescence may imply the feeling of having failed a critical social task (Larson, 1999) and, therefore, impair self-esteem.

Taken together, a transactional model may emerge in which low self-esteem and loneliness influence and reinforce one another simultaneously. Such an exacerbating process may further pose adolescents at higher risk of experiencing low self-esteem and loneliness. To empirically test this model, a longitudinal study design is needed in which self-esteem and loneliness are measured at multiple measurement waves. To date, just a single study using such longitudinal design has tested the hypothesized reciprocal links between self-esteem and loneliness, showing that low self-esteem predicted relative increases in loneliness in young adulthood, but not vice versa (Olmstead et al., 1991). However, only two measurement points separated by a 4-year interval were used in that study. Thus, the possibility that loneliness predicts relative decreases in self-esteem across shorter time intervals cannot be excluded. Therefore, there is a clear need for longitudinal studies using cross-lagged analyses in which loneliness and self-esteem are measured multiple times at regular (e.g., 1-year) intervals.

Study 1 aims to address this need by investigating the direction of effects in a five-wave longitudinal sample with annual measurement waves, using cross-lagged path analyses. Based on previous theorizing, we expect to find a transactional model in which low self-esteem and loneliness reinforce and exacerbate one another across time. Further, we expect the path from self-esteem to loneliness to be stronger than the reversed path, based on the one study that has empirically tested the direction of effects between self-esteem and loneliness (Olmstead et al., 1991). In addition, gender differences were investigated. Earlier research consistently indicated that girls, on average, have lower self-esteem than boys (Kling, Hyde, Showers, & Buswell, 1999), whereas gender differences in loneliness are less clear (Weeks & Asher, 2012). So far, no studies have investigated whether the associations between self-esteem and loneliness differ for boys and girls.

2.2 Method

2.2.1 Participants and procedure

Data from the 'Family and Health' project, collected in The Netherlands, were used for Study 1. This longitudinal project examined different socialization processes in relation to various health behaviors in adolescents and their families (Harakeh, Scholte, de Vries, & Engels, 2005; van der Vorst, Engels, Meeus, Dekovic, & Van Leeuwe, 2005). Families with two parents and at least two children aged 13-16 years (that were no twins, nor mentally or physically disabled) were selected from the registers of 22 municipalities, both from rural and urban areas. Invitation letters were sent, and families that agreed to participate were contacted by telephone to establish whether they met inclusion criteria. Next, a further selection was made to obtain an equal distribution of gender and educational level of the adolescents. Trained interviewers visited the participants at home, asking all four family members to complete an extensive questionnaire individually. Each family received € 30 (about $45) when all four family members completed the questionnaire. Additionally, after completing three waves, five travel cheques of € 1,000 (about $1,495) were raffled among the participating families.

Self-esteem and loneliness measures were included in five annual waves between 2002 and 2006. At the first wave (T1), 428 families participated. Drop-out was low, with 416 families (97%) participating in the second wave (T2), 403 families (94%) participating in the third wave (T3), 356 families (83%) participating in the fourth wave (T4), and 313 families (73%) in the fifth wave (T5). Participants with and without complete data were compared using Little's (1988) Missing Completely At Random (MCAR) test. This comparison yielded a non-significant chi-square value (χ^2 (116) = 5.35, *ns*), suggesting that missing values could be reliably estimated. Missing values were estimated using the full-information maximum likelihood (FIML) procedure.

Because using data from siblings would create dependency in the data, only data obtained from the oldest child in the family were used in Study 1. The age range of the oldest child covered mid- and late adolescence, the developmental period of interest in the present study. Mean age at the first wave was 15.22 years (*SD* = .60) and 53% was male. The participants were equally distributed among the low (33.5%), middle (32.8%), and high (32.8%) educational levels, and more than 95% was Caucasian.

2.2.2 Measures

Self-esteem. Self-esteem was measured using the Rosenberg Self-Esteem Scale (Rosenberg, 1965), which was translated into Dutch by Van der Linden, Dijkman, and Roeders (1983). There is substantial evidence for the validity and reliability of this Dutch translation (Van der Linden et al., 1983) and the original scale (Hagborg, 1993). The scale contains 10 items scored on a 4-point Likert scale, ranging from 1 (*does not apply to me at all*) to 4 (*applies to me very well*). A sample item reads "I feel that I have a number of good qualities". Cronbach's alphas at T1-T5 varied between .85 and .90, with a mean of .88.

Loneliness. The subscale peer-related loneliness of the Loneliness and Aloneness Scale for Children and Adolescents (LACA; Marcoen, Goossens, & Caes, 1987) was used to capture loneliness. The instrument was developed for use with Dutch-speaking participants and has high internal consistency and construct validity (Goossens et al., 2009). The subscale used in the present study contains 12 items answered on a 4-point Likert-type scale, ranging from 1 (*never*) to 4 (*often*). Sample items read "I feel left out by my friends". Cronbach's alphas at T1-T5 varied between .90 and .94, with a mean of .92.

2.3 Results and brief discussion

2.3.1 Preliminary analyses

The correlation between the same variable at two subsequent measurement occasions (i.e., stability coefficient) was high for both self-esteem (ranging between r = .47 and .68; all ps < .001) and loneliness (ranging between r = .40 and .66; all ps < .001). Within-time correlations between loneliness and self-esteem ranged from r = -.40 to -.56 (all ps < .001), showing that adolescents with lower self-esteem at a given point in time were likely to experience greater feelings of loneliness. To investigate gender differences at each age, a MANOVA was performed, with gender as fixed factor, and loneliness and self-esteem as dependent variables. Table 5.1 presents mean values as a function of gender at each measurement wave. Multivariate tests showed a significant effect (Wilks' λ = .92; F (12,376) = 2.52, p < .01), and follow-up univariate analyses indicated that girls experienced more loneliness and had lower self-esteem than boys at all measurement waves. Note, however, that the effect sizes of the gender differences in loneliness were smaller than the effect sizes of the gender differences in self-esteem.

Table 5.1
Mean Differences as a Function of Gender (Study 1 and 2)

	Loneliness				Self-esteem				Perceived social acceptance				Actual social acceptance			
	Boys Mean (*SD*)	Girls Mean (*SD*)	*F*	η^2	Boys Mean (*SD*)	Girls Mean (*SD*)	*F*	η^2	Boys Mean (*SD*)	Girls Mean (*SD*)	*F*	η^2	Boys Mean (*SD*)	Girls Mean (*SD*)	*F*	η^2
Study 1																
T1	1.50 (0.52)	1.60 (0.52)	4.13*	.01	3.34 (0.45)	3.11 (0.53)	22.72***	.05	_	_			_	_		
T2	1.45 (0.51)	1.56 (0.51)	5.16*	.01	3.36 (0.46)	3.11 (0.55)	25.50***	.06	_	_			_	_		
T3	1.47 (0.50)	1.60 (0.58)	6.32*	.02	3.38 (0.45)	3.18 (0.50)	18.33***	.04	_	_			_	_		
T4	1.40 (0.46)	1.53 (0.52)	7.05**	.02	3.43 (0.42)	3.25 (0.51)	16.19***	.04	_	_			_	_		
T5	1.37 (0.42)	1.50 (0.48)	7.79**	.02	3.43 (0.42)	3.29 (0.48)	9.80**	.02	_	_			_	_		
Study 2																
T1	1.60 (0.47)	1.65 (0.57)	0.60	.00	3.26 (0.51)	3.07 (0.59)	6.91**	.02	3.17 (0.49)	3.07 (0.58)	1.85	.01	0.11 (0.27)	0.18 (0.19)	5.72*	.02
T2	1.55 (0.45)	1.55 (0.47)	0.00	.00	3.39 (0.46)	3.24 (0.52)	5.88*	.02	3.23 (0.49)	3.12 (0.50)	2.75	.01	0.23 (0.27)	0.27 (0.26)	0.39	.00
T3	1.57 (0.47)	1.62 (0.52)	0.41	.00	3.38 (0.46)	3.20 (0.53)	8.31**	.03	3.22 (0.50)	3.11 (0.51)	2.64	.01	0.19 (0.25)	0.24 (0.22)	2.94	.01

Note. *SD* = Standard Deviation. Degrees of freedom: *F* (1,412) for Study 1 and *F* (1,289) for Study 2. * $p < .05$. ** $p < .01$. *** $p < .001$.

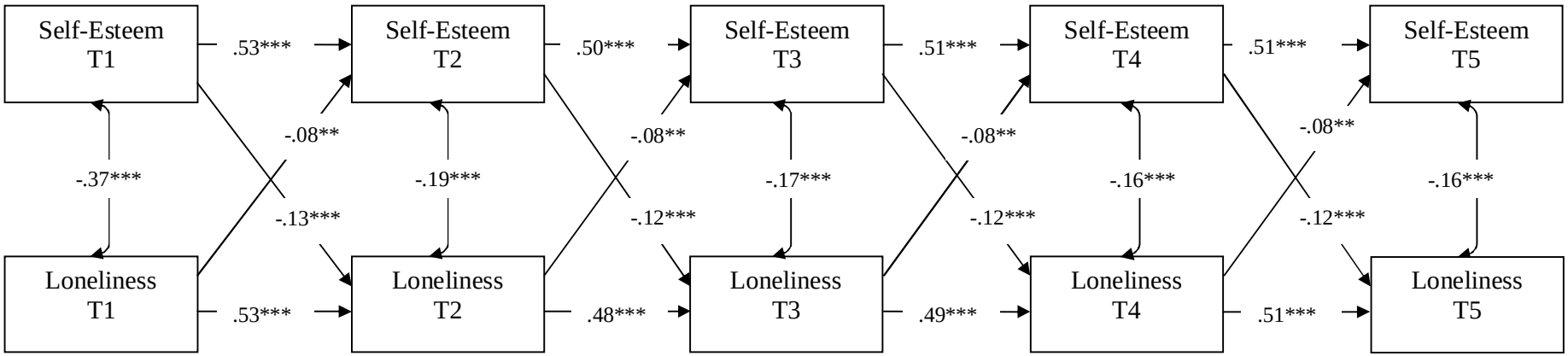


Figure 5.1. Final cross-lagged model with standardized path coefficients (Study 1).

Note. Two-year stability paths between T1-T3, T2-T4 and T3-T5 and gender-effects were included in the model, but are not represented for reasons of clarity. T= Time; * $p < .05$. ** $p < .01$. *** $p < .001$.

2.3.2 Direction of effects

Cross-lagged path analyses with observed variables were performed to examine the direction of effects between loneliness and self-esteem. This statistical procedure allows for accurate estimates of cross-time effects between loneliness and self-esteem, while accounting for all within-time associations (i.e., the correlation between the different variables at each point in time) and stability coefficients (i.e., prediction of a variable by its level at previous time points). In all models tested, gender and age were controlled for by allowing paths from gender and age to loneliness and self-esteem at each time point.

First, an unconstrained model with all 1-year and 2-year stability paths, within-time correlations and cross-lagged paths in both directions was estimated (χ^2 (18) = 29.97, $p < .05$; CFI = .99; RMSEA = .04). Next, this model was compared with a model in which the following parameters were constrained to be equal across time: (a) 1-year stability paths of self-esteem, (b) 2-year stability paths of self-esteem, (c) 1-year stability paths of loneliness, (d) 2-year stability paths of loneliness and (e) correlated changes, that is, correlations between the residuals of self-esteem and loneliness at T2-T5. The hypothesis of invariance would be rejected if the difference in the χ^2 index of both models is significant at $p < .05$. Results indicated that all stability paths and correlated changes could be considered equal across time ($\Delta\chi^2$ (13) = 17.60, *ns*). In a next step, we constrained all cross-lagged paths from loneliness to self-esteem and all cross-lagged paths from self-esteem to loneliness, respectively, to be equal across time. Model comparison indicated that these constraints were allowed ($\Delta\chi^2$ (19) = 18.23, *ns*). This final model had an acceptable fit to the data (χ^2 (37) = 54.70, $p < .05$; CFI = .99; RMSEA = .03), and is represented in Figure 5.1. Specifically, low self-esteem and loneliness were found to affect one another reciprocally, with the standardized coefficients from self-esteem to loneliness (β ranging between -.12 and -.13, $p < .001$) being stronger than the standardized coefficients from loneliness to self-esteem (β = -.08, $p < .01$).

Finally, a multigroup comparison was used to examine gender differences. This approach compares a constrained model (e.g., a model in which all estimated cross-lagged parameters are set equal across gender) with an unconstrained model (e.g., a model in which these parameters are allowed to vary across gender). The hypothesis of invariance would be rejected if the difference in the χ^2 index of both models was significant at $p < .05$. Results

indicated that the cross-lagged model did not differ between males and females ($\Delta\chi^2$ (7) = 4.97, *ns*).

2.3.3 Intermediate conclusion

Results from Study 1 indicated that loneliness and self-esteem reciprocally affected one another across time. Indeed, low self-esteem gives rise to relative increases in loneliness, and vice versa, loneliness sets the stage for relative decreases in self-esteem. Further, our findings tentatively suggest that the path from self-esteem to loneliness is stronger than the reverse path. Finally, although girls had lower self-esteem and reported slightly higher levels of loneliness compared to boys, the reciprocal model between loneliness and self-esteem applied equally to boys and girls.

3. Study 2

3.1 Introduction

Study 2 was set up to replicate the cross-lagged findings between self-esteem and loneliness as reported in Study 1, and, more importantly, aimed to explain and understand why adolescents' low self-esteem may aggravate feelings of loneliness. As suggested by Peplau and colleagues (1982), peer relationship problems may play a crucial role in explaining why low self-esteem sets the stage for later loneliness, although this has never been examined empirically. Therefore, we investigated whether social acceptance acts as a mediator between self-esteem and loneliness. Specifically, we examined whether adolescents with low self-esteem are less accepted by their peers – or perceive themselves to be less accepted – and whether their lowered social acceptance heightens the risk of experiencing loneliness.

Both actual and perceived social acceptance are examined in the present study. Actual social acceptance refers to the overall extent to which one is liked versus disliked by the peer group. It is typically assessed using a sociometric procedure in which peers are asked to nominate the classmates who they like the most, and people in their class who they like the least (Coie, Coppotelli, & Dodge, 1982). Perceived social acceptance, by contrast, is defined as the degree to which one feels liked and accepted by peers (Harter, 1988), and, as such, is typically assessed by means of self-report questionnaires. Not all adolescents have an accurate perception of their social acceptance (Cillessen & Bellmore, 1999), suggesting that actual and

perceived social acceptance may differ, and thus may also differentially explain the association between self-esteem and loneliness. On the one hand, individuals with low self-esteem may be more likely to engage in certain behaviors that directly deteriorate *actual* social acceptance, such as reassurance seeking (Joiner et al., 1999) or aggressive behavior (Donnellan, Trzesniewski, Robins, Moffitt, & Caspi, 2005). On the other hand, low self-esteem may color adolescents' perceptions of others' reactions (e.g., more anticipated rejection; Anthony, Wood, & Holmes, 2007; Murray et al., 2002), resulting in lowered *perceived* social acceptance.

Previous studies have documented associations between self-esteem and actual/perceived social acceptance, on the one hand, and between actual/perceived social acceptance and loneliness, on the other hand. The association between self-esteem and social acceptance is a central premise in the sociometer theory (Leary, 2005; Leary, Terdal, Tambor, & Downs, 1995). This theory states that self-esteem serves as an internal gauge – a sociometer – that monitors the likelihood that one will be included or excluded by significant others. No clear distinction between actual and perceived social acceptance is made, however. Indications of acceptance are related to increased self-esteem, whereas indications of rejection are related to decreased self-esteem. Harter (1999) similarly proposes that social acceptance is among the major sources of self-esteem, particularly in adolescence. Empirical studies generally confirm the strong association between self-esteem and perceived social acceptance in adolescence, both concurrently and longitudinally (e.g., Bellmore & Cillessen, 2006; Harter, 1999; Keefe & Berndt, 1996). The association between self-esteem and actual social acceptance, however, is less clear. Whereas some studies indicated that low self-esteem is related to less actual social acceptance, most studies concluded that there is no association between both constructs (for reviews, see Baumeister et al., 2003; Wylie, 1979).

The association between social acceptance and loneliness figures prominently in other theories. The social needs theory of loneliness, for example, posits that loneliness arises when important social needs – such as acceptance by one's peer group – are not being met (Weiss, 1973, 1974). In line with this theory, previous studies indicated that both actual and perceived social acceptance are related to the experience of loneliness. Specifically, previous sociometric studies indicated that children (e.g., Parker & Asher, 1993) as well as adolescents (e.g., Kingery, Erdley, & Marshall, 2011) who are poorly accepted by their peers experience higher levels of loneliness compared to their well-accepted peers. However, not all poorly-accepted children feel lonely, and not all lonely children are poorly accepted (Qualter &

Munn, 2001). Furthermore, low perceived social acceptance was found to contribute to emotional distress, including the experience of loneliness (Kupersmidt, Buchele, Voegler, & Sedikides, 1996).

In sum, both actual and perceived social acceptance have been found to relate to self-esteem and loneliness, and, consequently, both can be considered candidates to mediate the relation between self-esteem and loneliness. Nevertheless, we hypothesize that perceived – more so than actual – social acceptance will act as an underlying mechanism in the relation between self-esteem and loneliness, for two reasons.

First, as clearly suggested in prior work (Baumeister et al., 2003), we expect the relation with self-esteem to be stronger for perceived than for actual social acceptance. When distinguishing between actual and perceived social acceptance, previous studies convincingly showed that high self-esteem does not necessarily make a person likable (Brockner & Lloyd, 1986; Buhrmester, Furman, Wittenberg, & Reis, 1988; Cameron, Gaetz, Balchen, & Stinson, 2010). Although people with high self-esteem claim to be more accepted by their peers, as shown in strong positive correlations between self-esteem and perceived social acceptance, this may not always reflect reality. Indeed, individuals may only see what they already believe is true, based on their self-esteem (Kenny & DePaulo, 1993). For example, individuals with low self-esteem saw signs of rejection from their romantic partner where none existed (Murray et al., 2002) and anticipated less acceptance from novel interaction partners compared to individuals with high self-esteem (Anthony et al., 2007). Thus, it might be the case that low self-esteem shapes adolescents' perceptions, in that they anticipate, expect, or perceive that others do not like them, whereas no actual rejection is occurring.

Second, we also expect the relation with loneliness to be stronger for perceived than for actual social acceptance. Based on the definition of loneliness used in the present study, the evaluation of one's social network and the internal comparison between actual and desired social relationships are of crucial importance (Peplau & Perlman, 1982). Indeed, the cognitive discrepancy model of loneliness, on which the current definition is based, explicitly posits that deficits in one's social network do not directly influence loneliness, but that the subjective evaluation of one's social network is particularly relevant (de Jong-Gierveld, 1987; Kupersmidt et al., 1999). Therefore, individuals with similar levels of actual social contact may differ in their perceived level of social contact, and may therefore differently experience psychological well-being, including loneliness. Supporting this hypothesis, a previous study

in early adolescents showed that perceived social acceptance was a stronger predictor of depressive symptoms than actual social acceptance (Zimmer-Gembeck, Hunter, & Pronk, 2007).

Taken together, Study 2 aims (a) to replicate the cross-lagged findings between self-esteem and loneliness as obtained in Study 1 and (b) to explain why low self-esteem may put adolescents at risk for experiencing loneliness. Regarding the first goal, we expected similar findings to emerge as in Study 1, that is, a transactional process between self-esteem and loneliness. Regarding the second goal, we tentatively hypothesized that perceived, but not actual social acceptance would be an explanatory mechanism in the relation between low self-esteem and loneliness. This hypothesis was investigated using a conservative method for testing longitudinal mediation (Cole & Maxwell, 2003; Little, Preacher, Selig, & Card, 2007). In addition, as in Study 1, gender differences were examined in all analyses.

3.2 Method

3.2.1 Participants and procedure

All ninth and tenth grade students from three secondary schools in Belgium were invited to participate, as part of a larger study on loneliness in adolescence. Assessments took place annually after the winter break, which has been shown to be the most appropriate timing for peer nomination procedures (Mayeux, Bellmore, & Cillessen, 2007). Parents were notified before the start of the study and could revoke consent for the participation of their child. Less than 1% of the potential sample did not receive parental permission to participate. Adolescents in the schools could also revoke consent on the day of testing, and about 4% of the adolescents did so at each measurement wave. At each measurement wave, all students in the school were invited to participate, also those students who were in a different school the year before. This decision was made because we wanted to include all class members for the peer nominations, and not only the class members who were in that school the year before. In sum, a total of 862 adolescents participated in the present study, with 526 adolescents participating at Time 1, 637 participating at Time 2, and 658 participating at Time 3. A total of 272 adolescents (31%) participated in one out of the three waves, 241 adolescents (27%) participated in two out of three waves, and 369 adolescents (42%) participated in all three waves. Participants with and without complete data were compared using Little's (1988) Missing Completely At Random (MCAR) test. As in Study 1, this comparison yielded a non-

significant chi-square value (χ^2 (399) = 345.92, *ns*), and FIML was used to account for missing data.

Participants filled out a questionnaire packet in their classroom that contained both self-report questionnaires (i.e., loneliness, self-esteem, and perceived social acceptance) and sociometric measures (i.e., actual social acceptance). At T1, 52% of the participants were ninth-graders, and 48% were tenth-graders, with a mean age of 14.95 years (*SD* = .94). The majority of the participants were Caucasian, and 63% were female.

3.2.2 Measures

To capture loneliness and self-esteem, the same two instruments as in Study 1 were used, that is, the peer-related subscale of the LACA (Marcoen et al., 1987) and the Rosenberg Self-Esteem Scale (Rosenberg, 1965). Reliability was excellent at all three waves for both loneliness (Cronbach's alpha ranging between .88 and .90) and self-esteem (Cronbach's alpha was .88 at all three waves).

Perceived social acceptance. The 5-item Perceived Social Acceptance scale of the Adolescent Self-Perception Profile (Harter, 1988) was used to assess adolescents' perceptions of social acceptance by peers. In the original response format, adolescents were asked to select one of two opposing statements that was most like him or her, and rate whether this statement was "*sort of true for me*" or "*really true for me*". However, we used a less time-consuming item format (i.e., Likert scale) that showed similar discriminant validity, and better reliability and convergent validity than the original version (Wichstrom, 1995). Therefore, we used this 4-point Likert scale ranging from 1 (*Describes me very poorly*) to 4 (*Describes me very well*). A sample item reads "Other adolescents find it kind of hard to like me". Cronbach's alpha ranged between .75 and .77.

Actual social acceptance. Actual social acceptance was measured by means of peer nominations, for which we made use of a particular feature of the secondary school system in Belgium. At all grade levels, students are assigned to a certain class group by school personnel at the beginning of the school year, and they take almost all courses with that particular class group (thus allowing for the use of sociometric techniques as employed in elementary school classes). Each participant received an alphabetic list of names of all class members preceded by a number. They were instructed to read each sociometric nomination item, consider the peers in their class who fit the description, and then write down the number

of those peers, starting with the peer who fit the description best. Unlimited nominations were used. Two sociometric items were used to capture peer acceptance: like most (*the people in your class you like the most*) and like least (*the people in your class you like the least*). Nominations received were counted for each question, and divided by the maximum possible nominations (i.e., the number of participating classmates), to create a standardized, proportional measure (Cillessen, 2009). A measure of actual social acceptance was computed by subtracting the standardized number of like least nominations from the standardized number of like most nominations.

3.3 Results and brief discussion

3.3.1 Preliminary analyses

To investigate multivariate effects of participants' gender and grade, a MANOVA was performed, with gender and grade as fixed factors, and all study variables as dependent variables. This yielded a significant multivariate effect for gender (Wilks' $\lambda = .91$; F (12,274) = 2.23, $p < .05$; $\eta^2 = .09$), but not for grade (Wilks' $\lambda = .95$; F (12,274) = 1.26, *ns*; $\eta^2 = .05$). Univariate follow-up analyses indicated that girls had lower self-esteem than boys at all time points. Furthermore, girls had higher scores on social acceptance than did boys at Time 1, but this difference did not occur at the other time points. Girls and boys did not differ in loneliness and perceived social acceptance at the three time points (see Table 5.1).

Table 5.2 presents correlations among all study variables at the three time points. As expected, there was a high negative correlation between self-esteem and loneliness. Stability coefficients (i.e., the correlation between the same variable at two subsequent time points) were high for all variables. Loneliness was significantly associated with the presumed mediators at all three time points, although the correlation between loneliness and actual social acceptance was smaller than the correlation between loneliness and perceived social acceptance at all three time points (t (367) = 7.16, $p < .001$ at T1; t (367) = 4.73, $p < .001$ at T2; t (367) = 2.67, $p < .01$ at T3). Partial correlations indicate a strong negative association between loneliness and perceived social acceptance ($r = -.73$ at T1; $r = -.66$ at T2; $r = -.63$ at T3; all ps < .001), controlled for actual social acceptance. By contrast, partial correlations indicate generally non-significant associations between loneliness and actual social acceptance ($r = -.01$ at T1, *ns*; $r = -.09$ at T2, $p < .05$; and $r = -.04$ at T3, *ns*), controlled for perceived social acceptance. Furthermore, as reported in Table 5.2, self-esteem was only

Table 5.2

Correlations Between all Study Variables at the Three Time Points (Study 2)

Variable	2	3	4	5	6	7	8	9	10	11	12
1. Loneliness T1	.62***	.53***	-.52***	-.42***	-.40***	-.75***	-.54***	-.49***	-.28***	-.23***	-.13*
2. Loneliness T2	_	.62***	-.44***	-..53***	-.43***	-.49***	-.69***	-.50***	-.13**	-.27***	-.07
3. Loneliness T3		_	-.37***	-.41***	-.51***	-.43***	-.48***	-.64***	-.11*	-.17***	-.11*
4. Self-esteem T1			_	.68***	.59***	.53***	.40***	.34***	.09	.09	.00
5. Self-esteem T2				_	.73***	.39***	.54***	.41***	-.01	.06	-.11*
6. Self-esteem T3					_	.41***	.40***	.50***	.02	.03	-.03
7. Perceived SA T1						_	.64***	.54***	.37***	.26***	.16**
8. Perceived SA T2							_	.66***	.27***	.30***	.15**
9. Perceived SA T3								_	.13*	.22***	.14**
10. Actual SA T1									_	.49***	.41***
11. Actual SA T2										_	.55***
12. Actual SA T3											_

Note. T = Time; SA = Social Acceptance. * $p < .05$. ** $p < .01$. *** $p < .001$

related to perceived, and not actual, social acceptance at each time point. Partial correlations indicate a strong positive association between self-esteem and perceived social acceptance (r = .55 at T1; r = .55 at T2; r = -.63 at T3; all ps < .001), controlled for actual social acceptance. By contrast, and surprisingly, partial correlations indicate negative associations between self-esteem and actual social acceptance (r = -.14 at T1; r = -.14 at T2; and r = -.11 at T3; all ps < .01), controlled for perceived social acceptance.

3.3.2 Direction of effects

As in Study 1, cross-lagged path analyses were performed to examine reciprocal influences between loneliness and self-esteem across time. Gender and grade were controlled for in all models. First, an unconstrained model with all stability paths, within-time correlations, and cross-lagged paths in both directions was estimated (χ^2 (2) = 1.32, *ns*; CFI = 1.00; RMSEA = .00). Next, this model was compared to a model in which the stability paths of self-esteem and loneliness, the within-time correlations, and the cross-paths from loneliness to self-esteem and vice versa, were constrained to be equal across time. Comparing this constrained model with the comparison model indicated that all stability paths and cross-lagged paths could be constrained to be equal across time ($\Delta \chi^2$ (5) = 1.17). This final bidirectional model (χ^2 (7) = 3.01, *ns*; CFI = 1.00; RMSEA = .00) is represented in Figure 5.2. Results indicate that self-esteem and loneliness affected one another across time, with the standardized coefficients from self-esteem to loneliness about twice as strong as the coefficients from loneliness to social acceptance. Finally, multigroup analyses indicated that the cross-lagged model fitted equally well for boys as for girls ($\Delta\chi^2$ (4) = 2.40, *ns*).

3.3.3 Mediation analyses

The intervening role of social acceptance in the relation between self-esteem and loneliness was examined longitudinally, as mediation is a causal process and temporal separation is fundamental in making causality claims (Little et al., 2007). Specifically, we used the multiple panel model for testing mediation recommended by Cole and Maxwell (2003) and Little et al. (2007), to test both mediators simultaneously. This strict statistical procedure includes all within-time correlations, all stability coefficients, paths from the independent variable (i.e., self-esteem) to the hypothesized mediators (i.e., actual and perceived social acceptance) at subsequent time points, and paths from the hypothesized

mediators to the dependent variable (i.e., loneliness) at subsequent time points. In addition, we controlled for gender and grade. This model resulted in a good fit to the data (χ^2 (31) = 79.98, $p < .001$; CFI = .98; RMSEA = .04). Next, we checked for temporal stationarity (i.e., effects do not change in magnitude over time; Little et al., 2007). Results indicated that equality constraints were allowed for all stability paths and cross-paths (χ^2 (8) = 16.45, *ns*). These equality constraints were included in our final model, which had a good fit to the data (χ^2 (39) = 99.21 ($p < .001$); CFI = .98; RMSEA = .04) and is represented in Figure 5.3. As expected, self-esteem predicted increases in perceived social acceptance one year later, which, in turn, predicted decreases in loneliness one year later. Unexpectedly, self-esteem predicted significant decreases in actual social acceptance over time, which was unrelated to later changes in loneliness. Multigroup analyses indicated that this model fitted equally well for boys and girls ($\Delta\chi^2$ (7) = 7.08, *ns*). Importantly, the standardized path coefficient of the path between self-esteem at T1 and loneliness at T3 (i.e., the path we were trying to mediate) dropped from -.14 ($p < .01$) to -.08 ($p < .05$), indicating partial mediation.

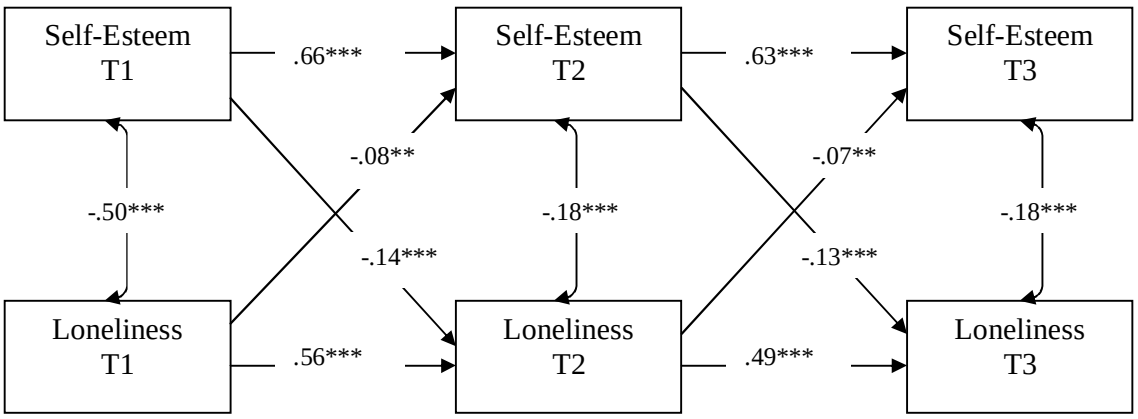


Figure 5.2. Final cross-lagged model with standardized path coefficients (Study 2).
Two-year stability paths between T1 and T3, gender- and grade-effects were included in the model, but are not presented for reasons of clarity.
T= Time; * $p < .05$. ** $p < .01$. *** $p < .001$

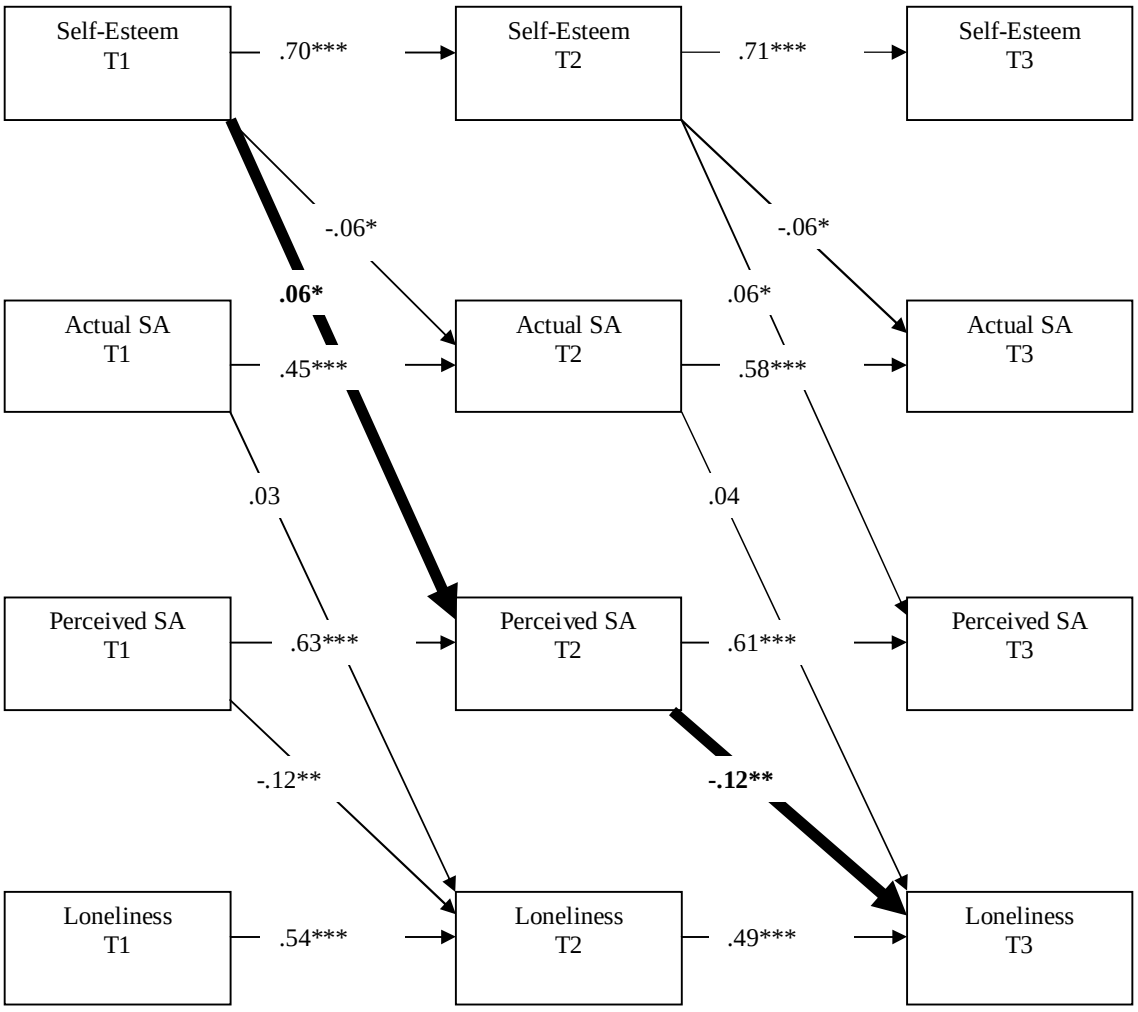


Figure 5.3. Final model with perceived versus actual social acceptance as mediator between self-esteem and loneliness (Study 2).

T = Time; SA = Social Acceptance. The paths that represent the mediation process are represented in bold. Gender- and grade-effects, all within-time associations, and the path from self-esteem T1 to loneliness T3 were part of the model, but are not presented for reasons of clarity.

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

3.3.4 Intermediate conclusion

The cross-lagged findings obtained in Study 2 were highly similar to the cross-lagged findings obtained in Study 1. Indeed, self-esteem and loneliness were found to affect one another through a transactional model, in which the paths from self-esteem to loneliness appeared somewhat stronger than the reverse paths. Moreover, as expected, perceived social acceptance was found to partially mediate this predominant path, whereas actual social acceptance did not mediate this relation. Based on these results, we can conclude that self-esteem shapes adolescents' perceptions of their social standing in their class, which, in turn, partially explains why low self-esteem is a risk factor for loneliness. All models applied equally to boys and girls

4. General discussion

Although the strong association between self-esteem and loneliness has often been demonstrated (Ernst & Cacioppo, 1999; Heinrich & Gullone, 2006; Mahon et al., 2006), the present study represents the first in-depth investigation of the prospective associations between self-esteem and loneliness. Specifically, the present study aimed (a) to investigate the direction of effects between self-esteem and loneliness, and (b) to explain why low self-esteem puts adolescents at risk for increased loneliness. Cross-lagged results from two independent longitudinal samples indicated that self-esteem and loneliness reciprocally affected one another in late adolescence, supporting a transactional model in which low self-esteem and loneliness exacerbate one another. Moreover, low self-esteem appeared to be a somewhat stronger predictor of later feelings of loneliness than vice versa (for similar results, see Olmstead et al., 1991). Furthermore, perceived – but not actual – social acceptance was found to partially mediate the relation between self-esteem and loneliness. Indeed, adolescents with low self-esteem tend to feel less accepted by their peers, which, in turn, is a risk factor for later feelings of loneliness. Finally, and rather unexpectedly, high self-esteem predicted relative decreases in actual social acceptance over time. The different patterns of results for perceived versus actual social acceptance highlight the clear need to distinguish actual from perceived social acceptance, as detailed below.

4.1 Self-esteem and loneliness: A vicious circle

Highly similar findings emerged from the cross-lagged analyses from the two studies in the present manuscript, providing clear evidence for a transactional model between self-

esteem and loneliness. In line with previous theoretical models (Peplau et al., 1982), low self-esteem was found to relate to relative increases in loneliness over time, and vice versa, feeling lonely was found to predict relative decreases in self-esteem over time. This finding suggests that a vicious circle between low self-esteem and loneliness might be at work that maintains and reinforces both forms of maladjustment. Adolescents may get stuck in an increasingly deleterious process in which their low self-esteem makes them feel more lonely, which, in turn, lowers their self-esteem again, and so forth. Bearing in mind that establishing mature peer relationships and developing an integrated sense of self are among the core developmental tasks in late adolescence (Erikson, 1968; Steinberg & Morris, 2001), such a vicious circle between self-esteem and loneliness may harm the development of adolescents severely. Results of the present studies further indicate that this deleterious process may emerge in both boys and girls, despite the moderate gender differences in self-esteem (Studies 1 and 2) and small gender differences in loneliness (only in Study 1).

In addition, the present study was the first to investigate *why* self-esteem acts as a risk factor for experiencing loneliness. Previous theoretical accounts suggested that certain behaviors and cognitions that characterize people with low self-esteem may hinder satisfying social relationships, and, consequently, increase loneliness (e.g., Peplau et al., 1982). The present study empirically tested these theoretical assumptions and suggests that particularly cognitions and perceptions may be a crucial explanatory factor. Indeed, a clear difference between actual and perceived social acceptance emerged, as discussed in more detail below. Only perceived – but not actual – social acceptance was found to be a partial mediator in the association between self-esteem and loneliness. Adolescents with low self-esteem were likely to perceive themselves to be poorly accepted by their peers, whereas this perception did not reflect what their peers reported. Lower perceived social acceptance, in turn, was found to set the stage for increased loneliness. Again, this process seems to occur for boys and girls in a similar way.

We focused on explaining the pathway from self-esteem to loneliness, but future studies should focus on explaining the reverse path as well, that is, why experiencing loneliness is a risk factor for drops in self-esteem. We expect that this reverse pathway may occur in a more direct or straightforward way, though. Indeed, adolescents' dissatisfaction with their social life may foster a broader negative attitude towards themselves, hence directly affecting their self-esteem. Therefore, we suggest future studies to focus on moderators, rather than on mediators in this reversed association. For example, attribution style could function as

a moderator between loneliness and self-esteem. Specifically, loneliness may be associated more strongly with lowered self-esteem when loneliness is attributed to internal unchangeable causes. In contrast, if loneliness is attributed to external, coincidental, or changeable causes, the association with self-esteem could be less pronounced (Anderson, Horowitz, & French, 1983; Peplau et al., 1982).

4.2 Actual versus perceived social acceptance: Differentially related to loneliness and self-esteem

The present study clearly indicated that perceived and actual social acceptance are differentially related to well-being, both concurrently and prospectively. Concurrently, a significant positive correlation was found between self-esteem and perceived social acceptance, whereas there was no correlation between self-esteem and actual social acceptance. This pattern of findings suggests that adolescents with high self-esteem perceive themselves as better accepted by their peers, although their actual group standing is not necessarily higher. Similarly, adolescents with low self-esteem perceive themselves as poorly accepted, whereas this perception does not necessarily hold true in the eyes of their peers.

On a related note, perceived social acceptance was more strongly related to loneliness than was actual social acceptance. Indeed, the concurrent correlation between loneliness and actual social acceptance was significant but rather weak (ranging between r = -.11 and -.28), in contrast to studies in childhood in which this correlation is noticeably higher (e.g., Parker & Asher, 1993). One explanation for this difference may be that the older adolescents become, the more their world expands beyond the classroom, and the more social experiences outside the classroom become important for their psychosocial well-being, including loneliness. For example, adolescents may have (or lack) satisfying friendships or romantic relationships outside the classroom which become increasingly important in their experience of loneliness, perhaps even more important than acceptance by classmates (McElhaney, Antonishak, & Allen, 2008). Therefore, future studies could focus on changes in the sources of the experience of loneliness from early to late adolescence.

Across time, the difference between actual and perceived social acceptance was even more pronounced. Note, however, that the results for actual social acceptance were controlled for perceived social acceptance, and vice versa, in the longitudinal model. First, perceived social acceptance predicted later decreases in loneliness, whereas actual social acceptance was

unrelated to changes in loneliness over time. This finding is in line with the cognitive discrepancy model of loneliness (de Jong-Gierveld, 1987; Kupersmidt et al., 1999), stating that interpersonal problems do not necessarily influence loneliness. Indeed, only the subjective perception and evaluation of such problems relate to loneliness. Our results further corroborate earlier cross-sectional studies indicating that perceived, rather than actual, social acceptance predicts maladjustment (Zimmer-Gembeck et al., 2007). In sum, the perception of social acceptance is crucial to well-being. In contrast, being liked by one's peers is not automatically sufficient for well-being, and being disliked by one's peers does not automatically result in maladjustment (for similar conclusions, see Crick & Ladd, 1993; Graham, Bellmore, & Juvonen, 2003).

Second, self-esteem predicted increases in perceived social acceptance (as expected), but decreases in actual social acceptance. The unexpected finding that self-esteem was negatively related to actual social acceptance over time warrants further research. We propose two possible ways in which high self-esteem may relate to lowered peer acceptance over time. First, adolescents may resent peers who are overly self-confident or arrogant (Baumeister et al., 2003). For example, high self-esteem has been linked to narcissism (Baumeister, Bushman, & Campbell, 2000), characterized by perceptions and fantasies of personal superiority, an inflated sense of entitlement, low empathy, and a belief that ordinary people cannot understand one (American Psychiatric Association, 1994). Such expressions of narcissism are likely off-putting to others, resulting in decreases in actual – but not perceived – social acceptance. Second, adolescents with high self-esteem may be intolerant of threats to the self, and they may act aggressively toward those who criticize them (Baumeister et al., 2000; Baumeister, Smart, & Boden, 1996; Diamantopoulou, Rydell, & Henricsson, 2008; Menon et al., 2007), which likely decreases actual – but not perceived – social acceptance. Indeed, prior experimental work found a significant interaction between self-esteem and ego threat in predicting actual social acceptance (Heatherton & Vohs, 2000). Specifically, ego threat was manipulated, with an ego-threat condition (i.e., individuals took a difficult intellectual test and received strong negative feedback) versus a neutral condition (i.e., individuals took a neutral version of the same test and received no feedback). Afterwards, all participants had a structured conversation with a naive participant who rated their likability. In the neutral condition, individuals were equally liked regardless their level of self-esteem, whereas in the ego-threat condition, individuals with high self-esteem were rated as less likable than individuals with low self-esteem (Heatherton & Vohs, 2000). Although these

research lines may explain our unexpected finding, replication of our results is warranted before making interpretations and drawing conclusions.

4.3 Importance of distinguishing self- and other-views

The finding that self-reported and peer-reported social acceptance differently relate to well-being raises more general questions on the accordance between self- and other views. The symbolic interactionist theory (Cooley, 1902; Harter, 2006; Mead, 1934) states that interactions with and feedback from others determines how people think they are viewed by others, and that these perceptions are generally accurate. Results of the present study, however, challenge the assumption that self- and other-views correspond neatly – at least concerning social acceptance. Perceived social acceptance is more than a pure reflection of one's actual social acceptance, which is revealed by the modest correlation between actual and perceived social acceptance, which was also revealed by earlier studies (e.g., Kistner, David-Ferdon, Repper, & Joiner, 2006; McElhaney et al., 2008). Our findings further tentatively suggest that perceived social acceptance mainly stems from other sources, such as one's self-esteem. Therefore, one's global self-esteem may be more essential for one's perception of group standing than one's actual group standing is. Indeed, it is possible that adolescents do not accurately know how others view them and that they base their judgments on self-perceptions rather than on the feedback they receive from others (Kenny & DePaulo, 1993). Adolescents with low self-esteem may think peers view them in the same negative way as they view themselves, irrespective of their actual social standing.

This may not be surprising, given that people's appraisals of how other's view them are typically egocentrically biased (e.g., the spotlight effect and the illusion of transparency; Gilovich & Savitsky, 1999). Because people are typically focused on their own (social) behavior and internal states, they overestimate their salience to others. These biases may particularly apply in adolescence, as adolescents typically think they are the center of attention, a phenomenon referred to as 'adolescent egocentrism' (Elkind, 1967; Schwartz, Maynard, & Uzelac, 2008). Possibly, adolescents with low self-esteem may focus more on their (social) failures, and assume that these failures are salient to others, leading to lower perceived social acceptance. On the contrary, adolescents with high self-esteem may tend to focus on their (social) successes and assume that these successes are salient to others, leading to higher perceived social acceptance.

Together, these findings highlight an important distinction between self-and other-views, which applies to other variables than social acceptance and to parent- or teacher beliefs as well (for examples, see Cole, Martin, & Powers, 1997; Giletta, Scholte, Engels, & Larsen, 2010; Graham et al., 2003). A specific way to distinguish self- and other-views is examining the discrepancy between the two. For instance, Cillessen and Bellmore (1999) asked children not only which peers they liked and disliked, but also which peers they thought that liked and disliked them. Dyadic accuracy was calculated, and indicated that inaccurate perceptions of social acceptance were related to concurrent higher levels of loneliness. We suggest future research to investigate whether dyadic accuracy could also act as a mediator between self-esteem and loneliness, which could be proposed based on the results of the present study.

4.4 Limitations and conclusion

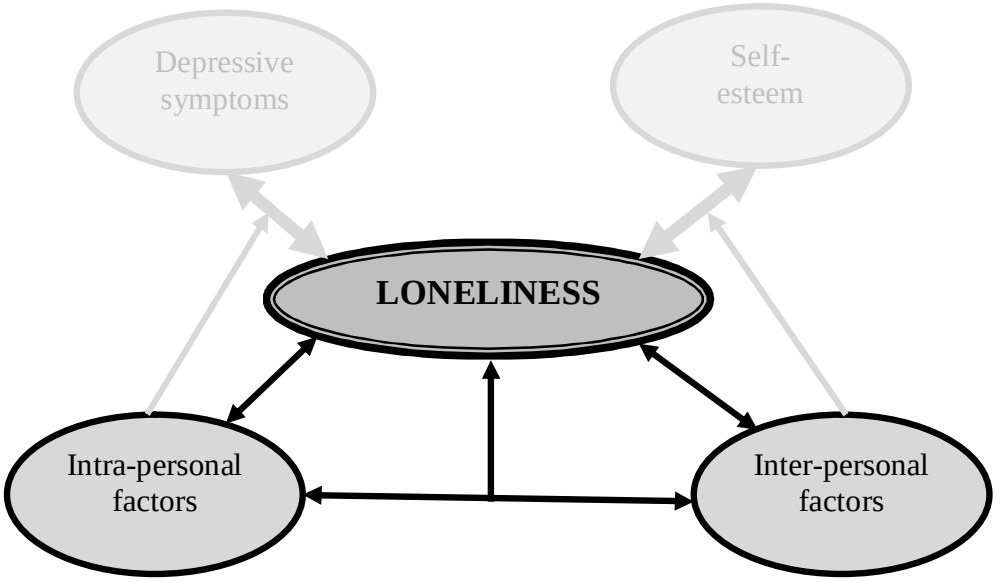
Although the present article yielded important information on the role of actual and perceived social acceptance in the relation between self-esteem and loneliness, it was not without its limitations. A first limitation is that we measured generalized perceived social acceptance, in comparison to specific (i.e., class group) actual social acceptance. We suggest that future research assesses perceived and actual social acceptance with regard to the same reference group (for examples, see Cillessen & Bellmore, 1999; Kistner et al., 2006). As noted, the difference between actual and perceived social acceptance in the present study may be partially explained by the broader reference group for perceived social acceptance. Second, actual social acceptance was the only variable measured through peer-report. This may partially explain why the associations with self-esteem and loneliness were less strong for actual than for perceived social acceptance. Third, most theoretical accounts propose that perceived social acceptance influences self-esteem (Harter, 1999; Leary et al., 1995), whereas the present study focused on the opposite direction, that is, self-esteem influencing perceived social acceptance. Investigating the direction of effects between self-esteem and perceived social acceptance is beyond the scope of the present study, but could be a valuable avenue for future research.

Despite these limitations, the present study was the first to investigate how and why low self-esteem acts as a risk factor for experiencing loneliness, using sophisticated longitudinal methods of analysis. Support for a transactional model between low self-esteem and loneliness was found. Furthermore, perceived – but not actual – social acceptance

explained why low self-esteem puts adolescents at risk for intensified loneliness, providing evidence for the powerful effects of cognitions and (biased) perceptions on adjustment.

6

Individual characteristics and the peer context as predictors of loneliness



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Abstract

The present study builds on the child-by-environment model and examines the joint effects of individual characteristics (i.e., self-esteem and shyness) and peer experiences (i.e., social acceptance, victimization, friendship quantity, and friendship quality) as predictors of loneliness. A total of 884 adolescents (*M*age = 15.80; 68% female) participated in this multi-informant study. Results indicated that, in addition to self-esteem and shyness, being poorly accepted by peers, being victimized, lacking friends, and experiencing poor-quality friendships each contributed independently to the experience of loneliness. Further, friendship quantity and quality mediated the relation between the two individual characteristics and loneliness. Finally, a significant interaction was found between self-esteem and social acceptance in predicting loneliness. The present study highlights the importance of investigating the joint effects of the peer context and individual characteristics in examining loneliness. Suggestions to elaborate the child-by-environment model in loneliness research are discussed, and clinical implications are outlined.

1. Introduction

Loneliness, defined as the negative emotional response to a discrepancy between the desired and achieved quality of one's social network (Peplau & Perlman, 1982), is a problem that affects multiple domains in adolescents' lives. Whereas transient feelings of loneliness do not necessarily pose substantial problems, enduring feelings of loneliness are a cause for concern. Loneliness may lead to numerous problems of clinical relevance, including depression, anxiety disorders, marijuana use, sleep disturbances, and suicide ideation (for reviews, see Ernst & Cacioppo, 1999; Heinrich & Gullone, 2006). Therefore, investigating predictors of loneliness is of crucial importance. Because one's social network is expected to be redefined in this developmental phase, it is particularly relevant to investigate loneliness through mid- and late adolescence. Specifically, adolescents gradually spend more time with peers and have an increased need and capacity for forming intimate peer relationships (Buhrmester, 1990; Steinberg & Morris, 2001). Hence, the present study focuses on loneliness in mid- and late adolescence.

Two broad factors that influence loneliness are generally distinguished, that is, individual factors embedded in one's personality and situational factors such as peer experiences (Weiss, 1982). Abundant research to date focused either on the peer context (e.g., social acceptance) or on individual characteristics (e.g., shyness) as predictors of feeling lonely in youth (Ernst & Cacioppo, 1999; Heinrich & Gullone, 2006). However, both research lines have been developed rather independently, although previous theorizing highlighted the value of employing a child-by-environment model of emotional adjustment. This model emphasizes that the *combination* of environmental and individual characteristics contributes to emotional well-being, and not so much environmental or individual characteristics in isolation (Ladd, 2003; Magnusson & Stattin, 2006). Starting from a child-by-environment model, the present study investigated the contribution of two individual characteristics (i.e., self-esteem and shyness) and four peer experiences (i.e., social acceptance, victimization, friendship quantity, and friendship quality) in predicting loneliness in adolescence. Specifically, as detailed below, three hypothesised models on the interplay between individual characteristics and peer experiences are tested (i.e., additive, mediation, and moderation models).

1.1 Peer experiences related to loneliness

A number of negative peer experiences have been identified as important predictors of loneliness in childhood and adolescence. First, the degree to which adolescents are accepted by their peers, typically assessed via a peer nomination procedure (e.g., like-most minus like-least nominations or ratings), has been found to negatively predict loneliness (e.g., Sletta, Valas, Skaalvik, & Sobstad, 1996). Second, peer victimization, defined as being a victim of intentional harmful behavior that is repeated over time by one or more individuals with a stronger power position (Olweus, 1991), is also a well-established predictor of loneliness in adolescence (Eslea et al., 2004; Hawker & Boulton, 2000). Third, previous research has pointed to the importance of considering close, dyadic friendship relations as a buffer against feeling lonely (e.g., Nangle, Erdley, Newman, Mason, & Carpenter, 2003; Parker & Asher, 1993). Moreover, previous work emphasized the distinct contribution of friendship quantity and friendship quality as buffers against loneliness (e.g., Nangle et al., 2003; Parker & Asher, 1993; Shin, 2007). Friendship quantity refers to the number of reciprocal (mutual) dyadic friendships one has, whereas friendship quality refers to the various provisions that one's friendships afford (e.g., companionship, help, security, and closeness).

Although social acceptance, peer victimization, and friendship are closely related to one another, they each have unique features and are conceptually and empirically distinct (e.g., Asher, Parker, & Walker, 1996; Ladd, Kochenderfer, & Coleman, 1997). Social acceptance is the degree to which a certain peer group (e.g., class) likes a specific individual (regardless of how that specific individual values the other members of the peer group), and is therefore a group-level construct. Peer victimization, conversely, involves a limited subgroup within the peer group, that is, bullies, victims, and bystanders. Friendship, finally, is defined as a dyadic-level construct referring to a reciprocal or mutual relationship between two individuals (Bukowski & Hoza, 1989). Furthermore, the various types of peer experiences differ from one another in the provisions they afford. Although social acceptance and friendships offer some common provisions, such as companionship, the first is considered to provide a sense of inclusion and connection to the larger group, whereas the latter is considered to provide intimacy, trust, and support within close relationships (Furman & Robbins, 1985; Ladd et al., 1996). Hence, in order to distinguish between unique and shared effects of each peer experience on loneliness, it is important to collect data on these different types of peer experiences simultaneously.

Only a handful of studies to date have assessed multiple types of peer experiences simultaneously and investigated the unique effects of these peer experiences on loneliness. For example, a study in kindergarten indicated that friendship quantity and victimization, but not social acceptance, were unique predictors of loneliness (Ladd et al., 1997). Other work examining friendship quantity, friendship quality, and social acceptance showed mixed results. Some of these studies indicated that friendship quantity and quality, but not social acceptance, were unique predictors of loneliness in childhood (Nangle et al., 2003), whereas others found all three variables to be unique contributors to childhood loneliness (e.g., Kingery, Erdley, & Marshall, 2011; Parker & Asher, 1993; Shin, 2007). Only one study examined the four experiences collectively, but that study focused more generally on internalizing and social problems reported by teachers, rather than specifically on loneliness as experienced by the adolescents themselves (Waldrip, Malcolm, & Jensen-Campbell, 2008). This latter study in early adolescence indicated that all four peer experiences uniquely contributed to internalizing problems, and that all peer experiences except for victimization contributed to social problems (Waldrip et al., 2008).

Taken together, although a couple of studies focused on distinguishing shared versus unique effects of the several peer experiences on loneliness, current knowledge remains rather limited given the mixed results. One possible explanation for these mixed results is the different 'combinations' of peer experiences that are examined. Specifically, because all peer experiences are intertwined, the distinction between shared versus unique effects is highly sensitive to which other predictors are part of the model. As noted, no study to date has examined all four peer experiences collectively in predicting loneliness. Therefore, examining the shared versus unique effects of social acceptance, victimization, friendship quantity, and friendship quality in the prediction of loneliness is a first aim of the present study.

In addition, given that previous studies focused almost exclusively on childhood to mid-adolescence, a unique contribution of the present study is its mid- to late adolescent sample (i.e., Grades 9 to 12). Indeed, the degree to which certain peer experiences contribute to feeling lonely, and the value that one places on different kinds of peer relationships, may differ at different ages (Asher & Paquette, 2003). We tentatively expected that friendship – and particularly friendship quality – would be the strongest predictor of loneliness in adolescence. This hypothesis is based on the increased need for intimacy in peer relationships (Steinberg & Morris, 2001), and due to the fact that friendships, rather than social acceptance, are considered to offer this provision (Bukowski & Hoza, 1989). Finally, as noted, in addition

to examining social-environmental factors, individual characteristics are also considered in the present study.

1.2 Individual characteristics related to loneliness

A meta-analysis on predictors of loneliness in adolescence concluded that certain individual characteristics make individuals particularly prone to loneliness (Mahon, Yarcheski, Yarcheski, Cannella, & Hanks, 2006). Shyness and low self-esteem emerged as the individual characteristics with the largest effect sizes in that meta-analysis. Hence, in addition to the four peer variables mentioned earlier, these two individual characteristics are investigated in the present study. Shy individuals are less talkative and exhibit a lack of interaction with peers (Kingery, Erdley, Marshall, Whitaker, & Reuter, 2010), which may explain why shyness is a well-established predictor of loneliness (Boivin, Poulin, & Vitaro, 1994; Woodhouse, Dykas, & Cassidy, 2012). Low self-esteem also has consistently been found to relate to the experience of loneliness across the life span (e.g., Peplau, Miceli, & Morasch, 1982; Qualter & Munn, 2002).

Shyness and low self-esteem have been shown to relate to one another (Crozier, 1995; Lawrence & Bennett, 1992). Low self-esteem, characterized by negative beliefs about one's social abilities and appearance, may contribute to social anxiety and withdrawal, characteristic of shyness. Conversely, shyness and socially withdrawn behavior may thwart opportunities for rewarding social experiences and subsequent boosts in self-esteem (Crozier, 1995). Given this association between shyness and self-esteem, examining both individual characteristics in the same study has the additional value of distinguishing between shared and unique effects. Very few studies have investigated the joint effects of self-esteem and shyness on loneliness. Both self-esteem and shyness showed direct and unique effects on loneliness in college students (Zhao, Kong, & Wang, 2012). A similar study in early adolescents, however, indicated that self-esteem had a direct effect on loneliness, whereas shyness was only indirectly related to loneliness (Stoeckli, 2009). In sum, self-esteem, more so than shyness, is expected to be a unique contributor of loneliness in the present study.

1.3 Towards integration

Despite a rich body of research on predictors of loneliness in adolescence (for reviews, see Ernst & Cacioppo, 1999; Heinrich & Gullone, 2006), there is a lack of empirical research examining the interplay among these different predictors. In the present study, therefore, we

integrate the individual characteristics and negative peer experiences mentioned earlier as contributors to adolescent loneliness in a child-by-environment model. Indeed, previous studies have indicated that shyness and self-esteem are associated with the several peer experiences discussed. Specifically, shy children are less socially accepted, are more at risk to be victimized by their peers, report poorer friendship quality, and have less friends in general (for reviews, see Kingery et al., 2010; Rubin, Coplan, & Bowker, 2009). Regarding self-esteem, evidence shows associations with victimization (e.g., Hawker & Boulton, 2000), friendship quantity (Kingery et al., 2011), and friendship quality (e.g., Franco & Levitt, 1998). Self-esteem explicitly has been related to social acceptance, which is the central premise in the sociometer theory (Leary, Terdal, Tambor, & Downs, 1995). This theory states that self-esteem serves as an internal gauge – a sociometer – that monitors the likelihood that one will be accepted versus excluded by other people (Leary et al., 1995). Hence, investigating the interplay between individual characteristics and peer experiences in the prediction of loneliness is warranted.

Three models of child-by-environment interplay are distinguished in the present study, and all three models have received some support in previous research examining individual characteristics and peer experiences in predicting adjustment (Ladd & Troop-Gordon, 2003). First, *additive models* presume that interpersonal experiences contribute to (mal)adjustment, above and beyond the contributions of children's characteristics. A study in childhood, for example, indicated that shyness, low social acceptance, and low friendship quantity each uniquely predicted higher levels of concurrent and later loneliness (Renshaw & Brown, 1993). Second, *mediator models* presume that the effect of a specific individual characteristic on well-being is explained by certain peer experiences. For example, two longitudinal studies indicated that shyness in childhood was related to negative peer experiences, which, in turn, predicted loneliness (Boivin, Hymel, & Bukowski, 1995; Pedersen, Vitaro, Barker, & Borge, 2007). Similarly, in a study in preadolescence, shyness was indirectly related to loneliness through its effect on given friendship nominations of peers, whereas self-esteem was only directly related to loneliness (Stoeckli, 2009). *Moderator models*, finally, imply that the specific combination of certain individual characteristics with certain peer experiences influences adjustment. For example, two studies indicated that the co-occurrence of high levels of (specific forms of) shyness and negative peer experiences (i.e., peer rejection and exclusion) were related to depressive symptoms in childhood (Bell-Dolan, Foster, & Christopher, 1995; Gazelle & Ladd, 2003). Therefore, all three models were examined in the

present study. In line with previous longitudinal studies (e.g., Boivin et al., 1995; Pedersen et al., 2007), individual characteristics were assumed to affect peer experiences rather than vice versa in the additive and mediator models.

1.4 The present study

The present study aimed to address several gaps in the literature. First, as the majority of research on social-environmental antecedents of loneliness focused on childhood and early adolescence, the present study was conducted with a mid- to late adolescent sample (i.e., Grades 9-12). Second, because no previous studies investigated the joint contribution of low social acceptance, victimization, low friendship quantity, and low friendship quality to feelings of loneliness, these different peer experiences were examined simultaneously in the present study, in order to distinguish between shared and unique effects. Third, research on peer experiences has often neglected the role of individual characteristics – particularly self-esteem – in predicting loneliness, and vice versa. Therefore, the present study focused on both social-environmental and individual factors as antecedents of loneliness, with a specific focus on the interplay between both.

Both self-report and peer-report measures were used to capture individual characteristics and peer experiences. As noted, based on previous theoretical and empirical work, we expected the two individual characteristics to uniquely predict loneliness, with self-esteem being the strongest predictor. Similarly, we expected the four peer experiences to uniquely predict loneliness in adolescence, with friendship quality being the strongest predictor. Finally, in line with the models outlined earlier, we expected considerable interplay between the individual characteristics and peer experiences. Specifically, based on previous research (Bell-Dolan et al., 1995; Boivin et al., 1995; Gazelle & Ladd, 2003; Pedersen et al., 2007; Stoeckli, 2009), both mediation and moderation models are plausible.

Although not the focus of the present study, we also explored the role of three demographic variables in the experience of loneliness: gender, grade, and family structure. Although the role of grade and family structure have rarely been investigated in previous work, gender differences have often been examined. Regarding loneliness, it remains unclear whether there are gender differences, and whether girls or boys are more lonely (Koenig & Abrams, 1999; Weeks & Asher, 2012). Regarding individual characteristics, boys typically have higher self-esteem than girls (Kling, Hyde, Showers, & Buswell, 1999), whereas no consistent gender differences are found for shyness (Rubin et al., 2009). Regarding peer experiences, girls typically

report higher quality friendships than boys. No consistent gender differences are found for friendship quantity, social acceptance, or victimization (Perry & Pauletti, 2011; Rose & Rudolph, 2006). Therefore, in line with these studies, we expect girls to have higher friendship quality and lower self-esteem compared to boys, but no gender hypothesis regarding loneliness could be forwarded in the present study.

2. Method

2.1 Participants and procedure

All students in Grades 9 through 12 from three secondary schools in Belgium were invited to participate in the present study. Parents were notified before the start of the study and could revoke consent for the participation of their child. Less than 1% of the potential sample did not receive parental permission to participate. Adolescents in the schools could also revoke consent on the day of testing, and about 4% of the adolescents did so. Participants filled out a questionnaire packet in their classroom. This packet contained both self-report questionnaires (i.e., loneliness, friendship quality, and self-esteem) and sociometric measures (i.e., social acceptance, victimization, friendship quantity, and shyness). For the sociometric measures, we made use of a particular feature of the secondary school system in Belgium. At all grade levels, students are assigned to a certain class group by school personnel at the beginning of the school year and they take almost all courses within that particular class group, which allows reliable class nominations. The software program SOCSTAT (Thissen-Pennings & Bendermacher, 2002) was used to calculate all sociometric variables.

We had both self-reported and peer-reported information from 884 adolescents. Mean age of the participants was 15.79 years (*SD* = 1.33) and 68% were female. Participants were equally divided among the ninth (26%), tenth (27%), eleventh (26%), and twelfth (22%) grade. Participants had diverse family backgrounds: 71% came from an intact family, 26% had divorced parents, and about 3% had a parent that was deceased.

2.2 Measures

Loneliness. The subscale peer-related loneliness of the Loneliness and Aloneness Scale for Children and Adolescents (LACA; Marcoen, Goossens, & Caes, 1987) was used to capture loneliness. This self-report questionnaire was developed for use with Dutch-speaking participants and has high internal consistency and construct validity (Goossens et al., 2009).

The subscale used in the present study contains 12 items answered on a 4-point Likert-type scale, ranging from 1 (*never*) to 4 (*often*). A sample item reads "I feel isolated from other people". Mean score was 1.67 (*SD* = 0.54), and Cronbach's alpha was .89.

Friendship quality. Friendship quality was measured by means of the Friendship Qualities Scale (FQS; Bukowski, Hoza, & Boivin, 1994). This scale consists of 5 subscales that can be summed to yield a composite measure of friendship quality: companionship (e.g., "My friend and I spend all our free time together"), conflict (e.g., "My friend and I can argue a lot"), help (e.g., "My friend would help me if I needed it"), security (e.g., "If my friend or I do something that bothers the other one of us, we can make up easily"), and closeness (e.g., "I feel happy when I am with my friend"). Adolescents were asked to answer the items with their very best friend in mind, who could be inside or outside the school, but who could not be their romantic partner. We used the total scale in the present study, which contains 23 items, answered on a 5-point Likert-type scale, ranging from 1 (*does not apply to me at all*) to 5 (*applies to me very well*). Mean score was 4.12 (*SD* = 0.48), and Cronbach's alpha was .89.

Self-Esteem. Self-esteem was measured using the Rosenberg Self-Esteem Scale (Rosenberg, 1965), which was translated into Dutch by Van der Linden, Dijkman, and Roeders (1983). There is substantial evidence for the validity and reliability of this Dutch translation (Van der Linden et al., 1983) and for the original scale (Hagborg, 1993). The scale contains 10 items scored on a 4-point Likert scale, ranging from 1 (*does not apply to me at all*) to 4 (*applies to me very well*). A sample item reads "I feel that I have a number of good qualities". Mean score was 3.09 (*SD* = 0.59), and Cronbach's alpha was .88.

Social acceptance. Peer nominations were used to calculate a peer acceptance score. Each participant received an alphabetic list of names of all class members preceded by a number. They were instructed to read each sociometric nomination item, consider the peers in their class who fit the description, and then write down the number of those peers, starting with the peer who fit the description best. An unlimited number of nominations could be given. Two sociometric items were used to capture social acceptance: like most (*the people in your class you like the most*) and like least (*the people in your class you like the least*). A continuous measure of actual social acceptance was computed by subtracting the number of like least nominations from the number of like most nominations. This score was standardized within gender within each class to account for the unequal gender distribution that could have favoured girls' social acceptance.

Victimization. A peer nomination procedure was used to capture peer victimization, using the following sociometric question: "*Which people in your class are victimized?"*. A clear definition of victimization was added: "By victimization, we mean that someone is mean to someone else, or when that person is threatened, locked up, kicked,... It is called victimization if it happens regularly and if it is difficult for the victim to defend him/herself. It is also called victimization if someone is teased often in a mean way. It is NOT victimization if two persons are about equally strong and they argue, fight or tease one another" (Giletta, Scholte, Engels, & Larsen, 2010; Olweus, 1989). Received nominations were counted for each individual and standardized within class.

Friendship quantity. To calculate the number of reciprocal friendships, we used the following question: "*Which people in your class are your best friends?"* Only the five first nominations were used to calculate bidirectional friendships. We checked for each participant whether each nominated classmate also nominated that specific participant as a best friend. If so, their relationship was counted as a reciprocal friendship. A total of 83% of participants had at least one reciprocal friendship within the class group, with a mean of 1.97 (*SD* = 1.37).

Shyness. Participants were asked "*Which people in your class are shy and/or socially withdrawn?"* Received nominations were counted for each individual and standardized within class.

3. Results

3.1 Preliminary analyses

To investigate multivariate effects of participants' gender, grade, and family structure, three-way analyses of variance were performed. A first MANOVA, with the individual characteristics (i.e., self-esteem and shyness) as dependent variables, yielded a significant multivariate effect for gender (Wilks' $\lambda = .99$; F (2,860) = 5.91, $p < .01$; $\eta^2 = .01$), but not for grade (Wilks' $\lambda = 1.00$; F (6,1720) = 0.41, *ns*) or family structure (Wilks' $\lambda = .99$; F (4,1720) = 2.03, *ns*). Follow-up analyses indicated that girls ($M = 2.99$, $SD = .59$) had, on average, lower self-esteem than boys ($M = 3.28$, $SD = .54$; F (1,861) = 11.38, $p < .01$). A second MANOVA, with all peer experiences (i.e., social acceptance, victimization, friendship quantity, and friendship quality) as dependent variables, again yielded a significant result for gender (Wilks' $\lambda = .99$; F (4,811) = 2.90, $p < .05$; $\eta^2 = .01$), but not for grade (Wilks' $\lambda = .99$; F (12,2146) = 0.77, *ns*) or family structure (Wilks' $\lambda = .99$; F (8,1622) = 0.69, *ns*). Follow-up

analyses indicated that girls (M = 4.21, SD = 0.44) reported higher levels of friendship quality than boys (M = 3.94, SD = 0.51; F (1,814) = 5.37, $p < .05$). A final ANOVA with loneliness as the dependent variable indicated a marginally significant effect for gender (F (1,865) = 3.85, p = .05; η^2 = .00), but not for grade (F (3,865) = 2.08, *ns*) or family structure (F (2,865) = 0.16, *ns*). Girls (M = 1.70, SD = .55) were somewhat more lonely than boys (M = 1.60, SD = .52). In each (M)ANOVA, interactions between the three demographic variables were tested, but these interactions always yielded non-significant results. In sum, only gender differences were found: girls scored lower on self-esteem and higher on friendship quality and loneliness as compared to boys. Therefore, only gender was used as a control variable in all further analyses.

Table 6.1 presents correlations among all study variables. All variables were significantly associated with loneliness in the expected direction. The four peer variables were all related to one another, although the correlations between friendship quality and the other peer experiences were the weakest. The correlation between the two individual characteristics, self-esteem and shyness, was r = -.09 ($p < .05$). Shyness was associated with all four peer experiences, except victimization. Self-esteem was associated with the two friendship measures, but not with social acceptance or victimization.

Table 6.1

Correlations Among all Study Variables

Variable	2	3	4	5	6	7
1. Loneliness	.30***	-.55***	-.30***	.30***	-.28***	-.45***
2. Shyness		-.09*	-.44***	.44***	-.29***	-.12**
3. Self-Esteem			.04	-.01	.10*	.24***
4. Social Acceptance				-.54***	.49***	.13**
5. Victimization					-.25***	-.14**
6. Friendship Quantity						.17***
7. Friendship Quality						_

Note. M = Mean; SD = Standard Deviation. * $p < .05$. ** $p < .01$. *** $p < .001$.

Testing the Additive Model

To examine whether individual characteristics and peer experiences uniquely predict loneliness, a three-step hierarchical regression analysis was performed, with loneliness as dependent variable (see Table 2). In Step 1, gender was entered as a control variable. In Step 2, self-esteem and shyness were added in the regression analyses, explaining additional variance ($\Delta R^2 = .30$). Both individual characteristics contributed significantly to the experience of loneliness in adolescence. In Step 3, the four types of peer experiences (i.e., social acceptance, victimization, friendship quantity, and friendship quality) were added as independent variables. All four peer experiences significantly predicted adolescent loneliness (above the effects of individual characteristics), resulting in additional explained variance from Step 2 to Step 3 ($\Delta R^2 = .10$). Therefore, we can conclude that an additive model is at work in the prediction of adolescent loneliness. Note that, although self-esteem and shyness remained significant predictors of loneliness, their effects became less strong when adding the peer experiences, which indicates the importance of examining mediation.

To investigate whether these associations were different for boys versus girls, interaction terms with gender were calculated. Specifically, all variables were centered prior to calculating interaction terms (Aiken, West, & Reno, 1991). The six interaction terms with gender were simultaneously tested as a set (Jaccard & Turrisi, 2003). A significant change in R^2 between the model including the set of interaction terms and the model including only the main effects suggests that at least one interaction term is important enough to be retained. A non-significant change in R^2, conversely, suggests that none of the interaction terms were necessary and they could be dropped from the model. Adding the set containing the six interaction terms with gender ($\Delta R^2 = .01$; F (6, 820) = 2.03, *ns*) resulted in a non-significant R^2 change. Thus, the results obtained in the present study applied equally well to boys and girls.

Similarly, interaction terms with grade and family situation were calculated, although these two demographic variables were unrelated to mean differences in loneliness, individual characteristics, or peer experiences. Adding the set of interaction terms with grade ($\Delta R^2 = .00$; F (6, 820) = 1.12, *ns*) and family situation ($\Delta R^2 = .01$; F (6, 820) = 0.51, *ns*) also resulted in non-significant R^2 changes.

Table 6.2

Three-Step Hierarchical Regression Analysis Predicting Loneliness

	Step 1		Step 2		Step 3	
Predictor	β	R^2	β	R^2	β	R^2
Demographics (Step 1)		.01				
Gender	.10**		-.03		.09**	
Individual Characteristics (Step 2)				.31		
Shyness			.25***		.12***	
Self-Esteem			-.48***		-.40***	
Peer Experiences (Step 3)						.41
Social Acceptance					-.09**	
Victimization					.12***	
Friendship Quantity					-.11***	
Friendship Quality					-.24***	

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

3.3 Testing the moderation model

To investigate the moderation hypothesis between individual characteristics and peer experiences, interaction terms were computed by multiplying the mean-centered scores for self-esteem and shyness with each peer experience variable (Aiken et al., 1991), resulting in eight interaction terms. Adding the set of the four interaction terms with shyness resulted in a non-significant R^2 change ($\Delta R^2 = .00$; F (4, 808) = 0.71, *ns*), whereas adding the set of the four interaction terms with self-esteem yielded a significant result ($\Delta R^2 = .01$; F (4, 808) = 3.56, $p < .01$). A closer look at the interaction terms indicated no significant prediction of loneliness by the interaction terms with victimization (β = -.01), friendship quantity (β = .04), and friendship quality (β = -.01). However, the interaction between self-esteem and social acceptance significantly predicted loneliness (β = .07, $p < .05$). As represented in Figure 6.1,

in addition to a main effect of self-esteem on loneliness, an interaction with social acceptance occurred. Specifically, low self-esteem is associated with loneliness, particularly when this is accompanied by low social acceptance.

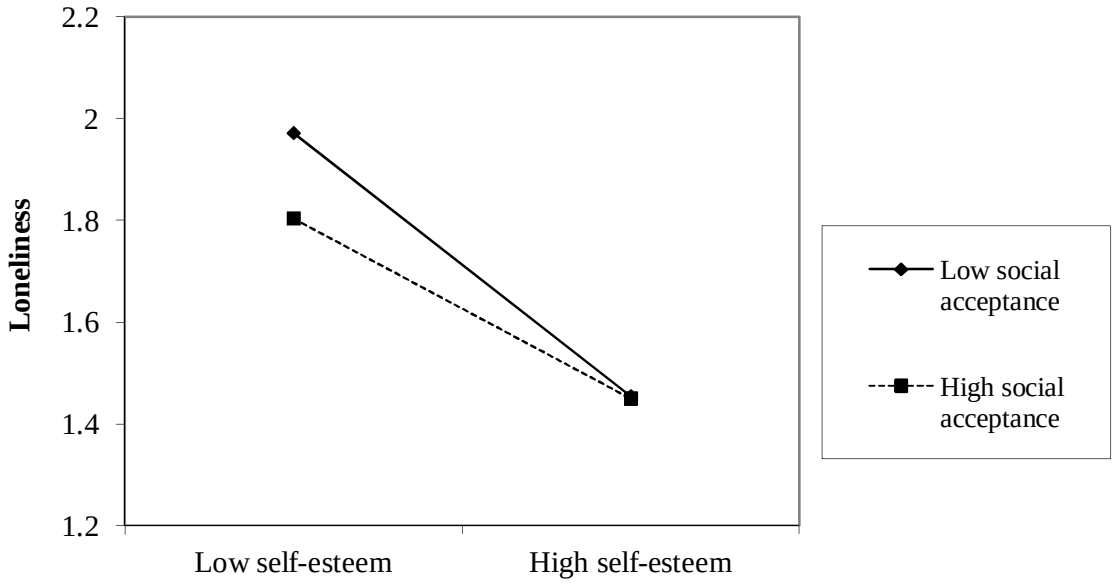


Figure 6.1. Simple slopes of self-esteem predicting loneliness at low (1 SD below the mean) and high (1 SD above the mean) levels of social acceptance.

3.4 Testing the mediation model

To examine mediation, two multiple mediator models were tested in Mplus (Version 4; Muthén & Muthén, 2002), using a non-parametric resampling method (i.e., bootstrapping; Preacher & Hayes, 2008) with 5,000 resamples. The first model examined whether the four peer experiences mediated the relationship between shyness and loneliness. Results indicated a significant total indirect effect through the four peer experiences (unstandardized coefficient = .07, S.E. = .01, 95% CI [0.045,0.103]). Specifically, friendship quantity (unstandardized coefficient = .02, S.E. = .01, 95% CI [0.009,0.034]) and friendship quality (unstandardized coefficient = .03, S.E. = .01, 95% CI [0.013,0.053]) were significant mediators, whereas social acceptance (unstandardized coefficient = .02, S.E. = .01, 95% CI [0.000,0.043]) and victimization (unstandardized coefficient = .00, S.E. =.00, 95% CI [-0.004,0.013]) were not.

The second model, with self-esteem instead of shyness as the independent variable, indicated a significant total indirect effect through the four peer experiences (unstandardized

coefficient = -.09, S.E. = .02, 95% CI [-0.134,-0.051]). Specifically, friendship quantity (unstandardized coefficient = -.01, S.E. = .01, 95% CI [-0.029,-0.003]) and friendship quality (unstandardized coefficient = -.07, S.E. = .01, 95% CI [-0.111,-0.042]) were significant mediators, whereas social acceptance (unstandardized coefficient = -.01, S.E. = .01, 95% CI [-0.022,0.008]) and victimization (unstandardized coefficient = -.00, S.E. =.00, 95% CI [-0.010,0.002]) again were not. In sum, the association between individual characteristics (i.e., shyness and self-esteem) and the experience of loneliness was partly mediated by friendship quantity and quality.

4. Discussion

The present study indicated that diverse peer experiences and individual characteristics contribute to the experience of loneliness in adolescence. The six predictors of interest in the present study all uniquely contributed to loneliness, that is, low self-esteem and shyness as individual characteristics; and low social acceptance, being victimized, low friendship quantity, and low friendship quality as peer experiences. Furthermore, notable interplay between the individual characteristics and the peer context in the prediction of loneliness was found. Specifically, friendship quantity and quality were partial mediators in the association between the two individual characteristics and loneliness, and self-esteem interacted with social acceptance in predicting loneliness. In line with past research (Kling et al., 1999; Rose & Rudolph, 2006), boys were found to have higher self-esteem and lower friendship quality compared to girls, but gender did not moderate the associations with loneliness (for similar results, see Stoeckli, 2009; Zhao et al., 2012). In sum, the present study clearly indicates the merits of using a child-by-environment model in studying loneliness in adolescence, as we found support for additive, mediator, and moderator models.

4.1 Individual characteristics and peer experiences as unique predictors: Support for an additive model

The two individual characteristics (i.e., self-esteem and shyness) and four peer experiences (i.e., social acceptance, victimization, friendship quantity, and friendship quality) each uniquely predicted loneliness, supporting an additive model of the link between individual characteristics, peer experiences, and loneliness in adolescence. Therefore, we can conclude that experiencing loneliness in adolescence is a matter of both individual characteristics and negative peer experiences, in line with similar research in childhood (e.g.,

Renshaw & Brown, 1993). The fact that peer experiences had a unique effect above and beyond the individual characteristics assessed also implies that difficulties in the peer context are not a mere consequence of one's shyness or low self-esteem.

When zooming in on the four peer experiences, the present study was the first to examine all four simultaneously in the prediction of loneliness in adolescence. Previous studies in childhood investigating at least three peer experiences showed mixed results, particularly regarding the role of social acceptance. Results of the present study are in line with studies showing that social acceptance, as much as other peer experiences, is a unique contributor to the experience of loneliness (e.g., Kingery et al., 2011; Parker & Asher, 1993; Shin, 2007), although the contribution of social acceptance was the weakest of all peer experiences. In line with our hypotheses, low friendship quality was the strongest social-environmental contributor to loneliness in adolescence. The fact that low social acceptance was the weakest predictor, and low friendship quality the strongest, is not surprising in light of Sullivan's (1953) theory on the development of peer relationships. Sullivan suggested that close dyadic peer relationships become more important than social acceptance as children enter adolescence. Indeed, a review of the literature on childhood peer relations indicated that social acceptance is most critical in childhood but decreases in importance thereafter. By middle to late childhood, friendships are more critical for one's adjustment (Gifford-Smith & Brownell, 2003). Developmental changes in social cognition and affective needs may explain this increased importance in dyadic relationships (Parkhurst & Hopmeyer, 1999; Rubin, Bukowski, Parker, & Bowker, 2008). Our results are in line with this assertion, although we suggest future studies to use a longitudinal design to further examine the impact of the different peer experiences at different ages.

4.2 Interplay between individual characteristics and peer experiences: Support for a mediation and moderation model

Results of the present study indicated an interesting interplay between individual characteristics and the peer context in predicting loneliness. First, part of the association between individual characteristics and loneliness could be explained by difficulties in the peer context. Specifically, the association between self-esteem and shyness on the one hand and loneliness on the other hand was partly mediated by friendship quality and friendship quantity. These results suggest that being shy or having low self-esteem affects one's friendships, which, in turn, affects loneliness. The finding that this mediational model only

applied for the two friendship constructs, and not for social acceptance or victimization, is in line with the study by Pedersen and colleagues (2007). These authors found that childhood shyness was indirectly related to adolescent loneliness and depressive symptoms through friendship quantity, but not through social acceptance. Similarly, the study by Woodhouse et al. (2012) found no support for social acceptance as a mediator between shyness and loneliness. However, a previous study in preadolescence indicated that the association between shyness and loneliness was partly mediated by peer rejection and victimization (Boivin et al., 1995). A possible explanation for this discrepancy is that the authors of this latter study did not include measures of friendship in their mediational model. Therefore, the mediational results obtained for social acceptance and victimization may be due to the overlap of these constructs with friendship quantity and quality. Future research is needed to examine this hypothesis.

Second, moderation analyses involving the two individual characteristics and the several peer experiences indicated only one significant interaction in the prediction of loneliness, that is, between self-esteem and social acceptance. Specifically, low self-esteem was associated with higher levels of loneliness, particularly when accompanied by low social acceptance. High self-esteem, conversely, was associated with lower levels of loneliness, irrespective of the level of social acceptance. In sum, results of the present study indicate that the interplay between shyness and peer experiences supports a mediation model (with friendship), whereas the interplay between self-esteem and peer experiences supports both a mediation model (for friendship) and moderation model (for social acceptance) in the prediction of loneliness. Remarkably, no interplay between the individual characteristics and victimization was found in the present study, neither through mediation, nor moderation.

4.3 Extending the child-by-environment model

Although the present study addressed a number of important issues, our results also raised some new questions. Specifically, questions arise about how other individual characteristics and other contextual factors may contribute, uniquely and in combination, to loneliness in adolescence. Therefore, further elaboration of the child-by-environment model is an important avenue for future research. Regarding individual characteristics, previous research indicated the role of personality traits, and neuroticism in particular, in the experience of loneliness (Vanhalst et al., 2012). It is unclear to date, however, whether neuroticism has a unique effect on loneliness, or whether the association between neuroticism

and loneliness is indirect in nature. Indeed, previous research has shown that one's personality and peer relationships are interrelated (Harris, 1995), thus both direct and indirect pathways from personality traits to loneliness could be explored in future studies. Regarding environmental characteristics, the role of other relational contexts could be considered in future research, including the role of parents (e.g., attachment, parenting style, or family climate) and the role of a romantic partner (e.g., relationship quality). Both contexts have proven to be important in the experience of loneliness in adolescence (Ernst & Cacioppo, 1999; Furman & Shaffer, 2003; Rotenberg, 1999).

Finally, biological factors could also extend the child-by-environment model. Loneliness has been shown to have a strong genetic component and the interplay between genetic and environmental factors has been found to predict loneliness in adolescence. Specifically, in addition to a main effect of the serotonin transporter gene on the course of loneliness in adolescence, prior work showed an interaction between this genotype and maternal support in predicting loneliness (van Roekel, Scholte, Verhagen, Goossens, & Engels, 2010). Furthermore, although no support for a main effect of a dopamine receptor gene was found, a significant interaction between this genotype with parental support in the prediction of loneliness emerged (van Roekel, Goossens, Scholte, Engels, & Verhagen, 2011). Both gene-environment interactions indicated that adolescents carrying the "risk allele" were more lonely when they had less supportive parents. In sum, we suggest that future research should expand upon the child-by-environment model by including personality traits and genetic factors as 'child' characteristics, and romantic relationships and the family context as 'social-environmental' characteristics.

4.4 Clinical implications

Results of the present study indicated that the distinction between social acceptance, victimization, friendship quantity, and friendship quality is meaningful, given that they all uniquely contributed to the experience of loneliness in adolescence, despite considerable shared variance. Therefore, all four peer experiences, together with the different individual characteristics, should be targeted in loneliness prevention and intervention programs. To date, the focus of such programs in childhood and adolescence is often on social skills training, based on the assumption that lonely children and adolescents lack the skills necessary to develop positive interactions with their peers. A review of the effects of social skills training indicated that such trainings can improve social acceptance, but they have not

yet been shown to be successful in promoting the development of high-quality friendships (Asher et al., 1996). However, in line with the hypothesized developmental changes in the importance of social acceptance and friendship from childhood to adolescence (Gifford-Smith & Brownell, 2003), our results suggest that promoting high-quality friendship may be more effective in reducing loneliness in adolescence. Different interpersonal tasks and skills should be emphasized if the goal is to promote friendship rather than social acceptance. Specifically, Asher and colleagues (1996) provided 10 hypotheses about the requirements for successful friendship adjustment that could guide the development of programs aimed to promote friendship quantity and quality.

In addition to the peer context, individual characteristics should not be forgotten in loneliness prevention and intervention studies. Indeed, a recent meta-analysis on loneliness interventions indicated that interventions addressing maladaptive social cognition had a greater effect size compared to interventions that aimed to improve peer experiences (i.e., improving social skills, enhancing social support, and increasing opportunities for social contact) (Masi, Chen, Hawkley, & Cacioppo, 2011). Note, however, that the majority of the studies reviewed in this meta-analysis were meant to reduce loneliness in the elderly. In sum, our results suggest that loneliness prevention or intervention programs should aim to improve both individual characteristics and peer experiences – in particular friendship quality. It is evident that the main focus of the intervention should match the specific strengths and weaknesses of the lonely individual or group targeted in the prevention or intervention program.

4.5 Limitations and conclusion

The present study was not without its limitations. First, the cross-sectional design did not allow us to draw conclusions about temporal sequence. In the mediational models, the decision to consider the individual characteristics as antecedents and the peer experiences as mediators, however, was based upon previous longitudinal studies (e.g., Boivin et al., 1995; Pedersen et al., 2007). On a related note, loneliness was considered the outcome in the present study, but it could be an antecedent of certain individual characteristics or peer experiences as well. However, a previous cross-lagged study in childhood provided support for a unidirectional rather than a bidirectional model with low social acceptance leading to subsequent feelings of loneliness (Ladd, 2006). Thus, although all hypothesized directions in

the present study were based upon previous longitudinal work, future studies could replicate our findings in a longitudinal dataset in order to elucidate the direction of effects.

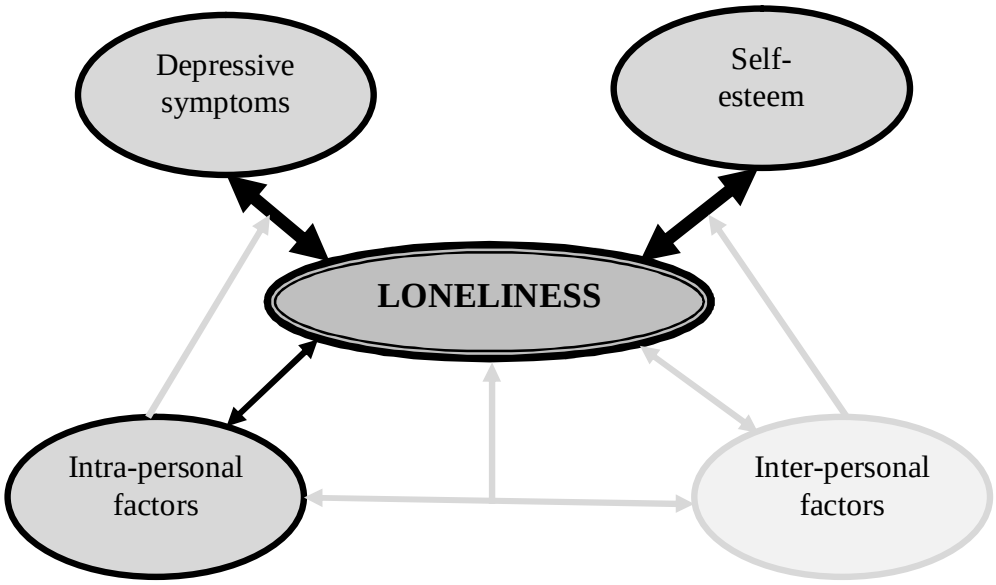
Second, all variables measured using a peer nomination technique were limited to the class as a reference group, which is standard practice (e.g., Ladd & Troop-Gordon, 2003; Parker & Asher, 1993). Although we agree that the class is an appropriate reference group to assess shyness, social acceptance, and victimization, there might be a problem concerning friendship quantity. Adolescents may have had reciprocal friendships outside their class, grade, or even school, which were not taken into account. Therefore, it might be that associations with friendship quantity were somewhat biased in the present study.

Despite these limitations, the present study was the first to investigate two individual characteristics (i.e., shyness and self-esteem) and four different peer experiences (i.e., social acceptance, victimization, friendship quantity, and friendship quality) together as predictors of loneliness in adolescence using a child-by-environment model. Our results clearly suggest that loneliness is a matter of both individual characteristics and the peer context. Previous studies already called for including different peer experiences in the same study (e.g., Ladd et al., 1997). Results of the present study support this call, and reveal the need for including different individual characteristics as well. Integrating several individual characteristics and contextual factors in a comprehensive model offers greater insight into how the peer context and individual characteristics co-operate in the emergence or prevention of loneliness in adolescence.

7

Trajectories of loneliness:

Associations with personality and psychosocial functioning



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Abstract

Although loneliness is a common problem across late adolescence, its developmental course has not been investigated in depth in this period of life. The present study aims to fill this gap by means of a five-wave cohort-sequential longitudinal study spanning ages 15 to 20 (N = 389). Both variable-centered (i.e., latent growth curve modeling) and person-centered (i.e., latent class growth analysis) approaches were used. Variable-centered analyses showed that loneliness generally decreased over time. Person-centered analyses pointed to considerable inter-individual differences in the development of loneliness, and identified five trajectory classes (i.e., stable low, low increasing, moderate decreasing, high increasing, and chronically high). These five trajectory classes were differentially related to personality traits at age 15 (i.e., extraversion, agreeableness, and emotional stability) and psychosocial functioning at age 20 (i.e., depressive symptoms, self-esteem, anxiety, and perceived stress). These findings underscore the additional value of studying subgroups regarding the development of loneliness.

1. Introduction

During mid- to late adolescence, there is an increased need to form intimate peer relationships (Buhrmester, 1990). Hence, an important developmental task in this period of life is establishing close relationships with peers (Steinberg & Morris, 2001). A lack of intimate peer relationships, however, may result in loneliness. Loneliness is defined as the negative emotional response to a discrepancy between the desired and achieved quality of one's social network (Peplau & Perlman, 1982). Given the increased capacity for intimacy, loneliness, in general, is expected to decrease from mid- to late adolescence. However, not all adolescents succeed in establishing intimate and satisfying peer relationships. Consequently, individual differences in the development of loneliness may emerge over time. To date, no studies have examined the developmental course of loneliness from mid- to late adolescence, including the transition from high school to the work or university context. The present study addresses this particular gap by applying both variable-centered and person-centered analytical techniques in a cohort-sequential study spanning ages 15 to 20.

1.1 Developmental course of loneliness across adolescence

Although longitudinal studies covering ages 15 to 20 are lacking, a review of cross-sectional studies confirmed the expected decreasing developmental trend from mid- to late adolescence (Marcoen & Goossens, 1993). In addition to the hypothesized general decreasing trend in loneliness, we expected substantial inter-individual differences as adolescents do not all develop in the same direction (e.g., Luyckx, Schwartz, Goossens, Soenens, & Beyers, 2008). Hence, using appropriate statistical methods, such as latent class growth analysis (Nagin, 2005), several trajectory classes may be identified, each with their own specific developmental trend that possibly diverges from the average trend.

Recent longitudinal research has increasingly focused on loneliness trajectories. A first study found three loneliness trajectories in the third through fifth grade, that is, a stable low, an increasing, and a decreasing group (Jobe-Shields, Cohen, & Parra, 2011). A second study with Latino participants identified three loneliness trajectory classes in the first two years of high school. These trajectory classes were referred to as consistently low, chronically high, and low but increasing (Benner, 2011). However, no research to date focused on such trajectory classes spanning mid- to late adolescence. Given that an increased diversity in

psychosocial development is hypothesized to emerge as adolescents start making the transition to adulthood (Arnett, 2004), such research is urgently needed.

1.2 Validation of trajectory classes

From a clinical point of view, it is important to identify predictors and outcomes of specific subgroups at risk, such as adolescents who suffer from chronically elevated levels of loneliness. However, such knowledge is limited to date. Benner (2011) indicated that adolescents in the low-increasing and chronically high loneliness trajectories made less academic progress and were less likely to have passed their exit exams. Jobe-Shields and colleagues (2011) found that children with stable low loneliness levels showed the most positive peer functioning as compared to the group having an increasing loneliness trend. Peer functioning of the children with a decreasing loneliness trend was indistinguishable from the children with stable low loneliness levels in Grades 4 and 5. The present study aimed to contribute to this literature by analyzing the role of personality traits (as predictors) and indicators of psychosocial functioning (as outcomes) in relation to loneliness trajectories. Additionally, two demographic variables (gender and SES) were examined. All these variables have been shown to relate to loneliness, as detailed below.

First, previous studies reported mixed results when examining gender differences in levels of loneliness (e.g., Ernst & Cacioppo, 1999) and loneliness trajectories. Specifically, whereas Jobe-Shields and colleagues (2011) found no differences in gender distribution among the different loneliness trajectories, Benner (2011) found that girls were less likely to be in the low-increasing loneliness class. These mixed results may partly be explained by the different samples of both studies. Whereas the former study sampled third through fifth graders from a university-affiliated public elementary school, the latter study sampled Latino adolescents across the first two years of high school. Next, SES has previously been related to loneliness levels, with higher levels of loneliness found in lower SES groups (Hawthorne, 2008). However, no research to date investigated its relation to the development of loneliness. Therefore, the present study explored whether adolescents in different loneliness trajectories differed in terms of gender and SES.

Second, only a handful of studies focused on the association between one's personality and loneliness. Five major traits, referred to as the Big Five, are typically distinguished (McCrae & Costa, 1987): extraversion (i.e., the tendency to engage in social behaviors and

experience positive moods), agreeableness (i.e., an individual's sociability, empathy, and cooperativeness), conscientiousness (i.e., organizational and motivational aspects of a person's behavior), emotional stability (i.e., the ability to deal with negative emotions, also referred to as the opposite of neuroticism), and openness (i.e., the way an individual seeks for and deals with new information). The few studies that investigated the association with loneliness indicated that higher levels of emotional stability, extraversion, and agreeableness are associated with lower levels of loneliness (e.g., Cacioppo et al., 2006; Vanhalst et al., 2012), although the association with agreeableness was not consistently replicated (e.g., Asendorpf & van Aken, 2003). No research to date, however, investigated whether the Big Five traits may lead adolescents to embark on specific loneliness trajectories.

Finally, the experience of loneliness has been shown to relate to more depressive symptoms, lower self-esteem, higher anxiety, and greater perceived stress (Ernst & Cacioppo, 1999; Heinrich & Gullone, 2006). Less is known about the associations between these indicators of psychosocial functioning and loneliness trajectories. However, a previous study in childhood indicated that children with chronic feelings of loneliness reported higher levels of depression in comparison with children experiencing loneliness only temporarily (Qualter, Brown, Munn, & Rotenberg, 2010).

1.3 The present study

The present study aimed to examine the course of loneliness from mid- to late adolescence. We expected (a) a general decreasing trend in loneliness, and (b) inter-individual differences in loneliness trajectories. Specifically, we hypothesized that the majority of individuals would not experience substantial levels of loneliness through mid- and late adolescence. However, we additionally expected that certain risk groups of adolescents with chronically high or increasing levels of loneliness could be identified (Benner, 2011; Jobe-Shields et al., 2011). Finally, the present study aimed to validate the different loneliness trajectories by investigating differences between these trajectories on the basis of demographic variables and personality traits at age 15, and psychosocial functioning at age 20. We specifically hypothesized that only certain personality traits (i.e., emotional stability, agreeableness, and introversion; Cacioppo et al., 2006), but all measures of psychosocial functioning (i.e., depressive symptoms, self-esteem, anxiety, and perceived stress) differentiate between trajectories.

2. Method

2.1 Participants and procedure

Data from the 'Family and Health' project, conducted in The Netherlands, were used for this study (see Harakeh, Scholte, de Vries, & Engels, 2005; van der Vorst, Engels, Meeus, Dekovic, & Van Leeuwe, 2005). Families with two parents and at least two children aged 13-16 years were invited to participate. Trained interviewers visited the participants at home, asking all four family members to complete a questionnaire individually during each annual measurement wave (for a monetary reward). Loneliness measures were included in five annual waves. At T(ime)1, 428 families participated. Drop-out was low: 416 families (97%) participated at T2, 403 families (94%) at T3, 356 families (83%) at T4, and 313 families (73%) at T5.

In the present study, only data obtained from the oldest child were used, because these individuals fell in the age range of interest. Mean age at the first measurement wave was 15.22 years (SD = 0.60) and 53% were male. The highest obtained educational degree of the parents, an indicator of SES, varied: 10% of the mothers and 14% of the fathers dropped out of school after primary school, 41% of the mothers and 29% of the fathers finished high school (but not college), and 49% of the mothers and 57% of the fathers finished college.

2.2 Measures

Loneliness. The subscale peer-related loneliness of the Loneliness and Aloneness Scale for Children and Adolescents (LACA; Goossens et al., 2009; Marcoen, Goossens, & Caes, 1987) was used. This subscale includes 12 items on a 4-point Likert-type scale, ranging from 1 (*never*) to 4 (*often*). A sample item is "I feel left out by my friends". Cronbach's alphas at T1-T5 ranged between .90 and .93.

Personality traits. Personality traits were assessed at T1 with the Dutch version of the Quick Big Five questionnaire (Goldberg, 1992; Vermulst & Gerris, 2005). A 7-point Likert scale, ranging from 1 (*completely untrue*) to 7 (*completely true*), was used when scoring 30 items that assess five personality dimensions (6 items each). Sample items are: talkative (Extraversion), sympathetic (Agreeableness), systematic (Conscientiousness), worried (Neuroticism), and creative (Openness). Cronbach's alpha was .84 for Extraversion, .77 for Agreeableness, .85 for Conscientiousness, .73 for Emotional Stability, and .70 for Openness.

Depressive symptoms. Depressive symptoms were assessed at T5 using a six-item questionnaire (Kandel & Davies, 1982), which has been shown to have good concurrent validity in Dutch young adults (van Roekel, Engels, Verhagen, Goossens, & Scholte, 2011). Items were answered on a 5-point Likert-type scale, ranging from 1 (*never*) to 5 (*always*). A sample item is "During the last year, I felt unhappy, sad and depressed". Cronbach's alpha was .83.

Self-esteem. The Rosenberg Self-Esteem Scale (Rosenberg, 1965; Dutch translation by Van der Linden, Dijkman, & Roeders, 1983), was used to asses self-esteem at T5. The scale contains 10 items scored on a 4-point Likert scale, ranging from 1 (*does not apply to me at all*) to 4 (*applies to me very well*). A sample item reads "I feel that I have a number of good qualities". Cronbach's alpha was .88.

Perceived stress. The Perceived Distress scale of the Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983; Hewitt, Flett, & Mosher, 1992) was used to measure general perceived stress at T5. The scale contains 7 items scored on a 4-point Likert scale, ranging from 1 (*never*) to 4 (*very often*). A sample items reads: "In the last month, how often have you felt nervous and stressed?". Cronbach's alpha was .81.

Anxiety. Three subscales of the Screen for Child Anxiety Related Emotional Disorders (SCARED; Birmaher et al., 1997) were administered at T5, that is, generalized anxiety (9 items; e.g., "I am a worrier"), panic disorder (13 items; e.g., "When frightened, it is hard to breathe"), and social phobia (4 items; e.g., "I do not like to be with people I do not know"). All items were scored on a 3-point Likert scale, ranging from 1 (*almost never*) to 3 (*often*). Cronbach's alphas were .86, .85, and .88 for generalized anxiety, panic disorder, and social phobia, respectively.

2.3 Plan of analysis

Development at the group level was examined by means of latent growth curve modelling (LGCM). LGCM assesses intra-individual change across time by estimating an intercept (i.e., initial level) and slope (i.e., rate of change) as latent constructs (Willett, Singer, & Martin, 1998). The observed variables measured at the five time points were used as indicators to represent these latent factors. To evaluate model fit, we used the chi-squared index, which should be as small as possible; the Root Mean Square Error of Approximation

(RMSEA), which should be less than .08; and the Comparative Fit Index (CFI), which should exceed .90 (Kline, 2005).

Development at the level of subgroups was examined using latent class growth analysis (LCGA). LCGA models individual-level variability in developmental trajectories through a small number of groups that are defined by unique sizes and shapes (Nagin, 2005). Several criteria were used to decide on the number of classes. First, the Bayesian Information Criterion (BIC) statistic for a solution with *k* classes should be lower than for a solution with *k*-1 classes. Second, classification quality was assessed by entropy, with values equal or higher than .70 indicating accurate classification (Reinecke, 2006). Third, we utilized the Lo, Mendell, and Rubin (2001) test (LRT; Nylund, Asparoutiov, & Muthen, 2007), which provides a *p*-value that can be used to determine if there is a statistically significant improvement in fit through the inclusion of an additional class. Fourth, all groups had to represent at least 1% of the sample (Luyckx et al., 2008).

To investigate whether the different validation variables distinguished between trajectory classes, a series of (M)ANOVAs was performed for all continuous variables (i.e., personality traits and psychosocial functioning), and a series of cross-tabulations with chi-square analyses for all categorical variables (i.e., demographics).

As the present study focused on developmental patterns of loneliness from mid- to late adolescence, we explicitly considered participants' age and rearranged our dataset according to age at T1. Specifically, 38 adolescents (8.9%) were 14 years old, 259 (60.5%) were 15 years old, 130 (30.4%) were 16 years old, and one adolescent (0.2%) was 17 years old at T1. Only two cohorts had an adequate sample size for structural equation modeling (SEM). Hence, we excluded the adolescents aged 14 and 17 and continued with the adolescents aged 15 or 16 at T1 (N = 389). Participants aged 15 at T1 and participants aged 16 at T1 were treated as two separate cohorts. We checked whether we could combine both cohorts into a single cohort-sequential design, spanning an age range from 15 to 20. Therefore, a multi-group SEM approach for LGCM was used (Little, Preacher, Selig, & Card, 2007), that compared a constrained model (i.e., a growth curve model in which the estimated parameters of intercept and slope are set equal across cohorts) with an unconstrained model (i.e., a growth curve model in which these parameters are allowed to vary across cohorts). Because the constrained model did not significantly worsen model fit in comparison with the

unconstrained model ($\Delta\chi^2$ (2) = 2.21, *ns*), a single cohort-sequential design was allowed for all further analyses.

3. Results

3.1 Preliminary analyses

Loneliness was stable over time, with stability coefficients ranging between .40 and .66 (all *p*s < .001). Mean levels of loneliness were low (i.e., 1.55, 1.52, 1.54, 1.52, 1.49, and 1.45, at ages 15 through 20, respectively; *SD*s between 0.51 and 0.55). No differences in mean levels of loneliness were found between boys and girls (Wilks' λ = .97; *F* (5,255) = 1.44, *ns*). Mean levels of loneliness at T1 did not vary according to educational level of father (*F* (3, 386) = 1.76, *ns*) or mother (*F* (3, 386) = 0.59, *ns*). With respect to personality, loneliness at baseline was negatively correlated with extraversion (*r* = -.43, *p* < .001), agreeableness (*r* = -.20, *p* < .001), emotional stability (*r* = -.28, *p* < .001), and openness (*r* = -.11, *p* < .05), but was unrelated to conscientiousness (*r* = .00, ns). With respect to psychosocial functioning loneliness at T5 was related to higher levels of depressive symptoms (*r* = .44, *p* < .001), lower self-esteem (*r* = -.51, *p* < .001), higher levels of perceived stress (*r* = .23, *p* < .001), and higher levels of generalized anxiety (*r* = .40, *p* < .001), panic disorder (*r* = .13, *p* < .05), and social phobia (*r* = .47, *p* < .001).

3.2 Development at the group level

LGCM was applied to examine mean-level changes in loneliness at the group level, by fixing the factor loadings at -1, 0, 1, 2, and 3 for the cohort aged 15 at T1, and at 0, 1, 2, 3, and 4 for the cohort aged 16 at T1. Results revealed a slight decrease in loneliness across time (*M* intercept = 1.53, *p* < .001; *M* slope = -0.02, *p* < .001; χ^2 (22) = 46.95, *p* < .01; CFI = .97; RMSEA = .08).[2] In addition, results indicated significant variance in intercept (unstandardized estimate = 0.48, *p* < .001) and slope (unstandardized estimate = 0.01, *p* < .001).

[2] We also checked for non-linear growth, but both the quadratic and cubic model resulted in a non-significant slope (*M* quadratic term = 0.000, *ns*; *M* cubic term = -0.002, *ns*). Therefore, the quadratic and cubic components were excluded from all further analyses.

Table 7.1

Results of Semi-Parametric Group-Based Modeling

			Number of Participants in Each Trajectory Class					
Solution	BIC	Entropy	1	2	3	4	5	6
2-class	2615.68	.94	89 (23%)	300 (77%)				
3-class	2448.14	.94	16 (4%)	268 (69%)	105 (27%)			
4-class	2408.27	.90	241 (62%)	35 (9%)	101 (26%)	12 (3%)		
5-class	2385.12	.89	12 (3%)	25 (6%)	32 (8%)	66 (17%)	254 (65%)	
6-class	2389.45	.89	12 (3%)	74 (19%)	27 (7%)	8 (2%)	233 (60%)	35 (9%)

Note. N = 389; BIC = Bayesian Information Criterion.

3.3 Development at the level of subgroups

LCGA with a cohort-sequential design was applied to identify loneliness subgroups. Models with two through six classes were estimated, as detailed in Table 7.1. The six-class solution for loneliness had a higher BIC value than the five-class solution, indicating that the five-class solution was a better option. In addition, the five-class solution had an adequate value for entropy, had a lower BIC value than the four-class solution, and the LRT (at $p < .001$) favored the five-class solution over a four-class solution. Therefore, a five-class solution was selected.

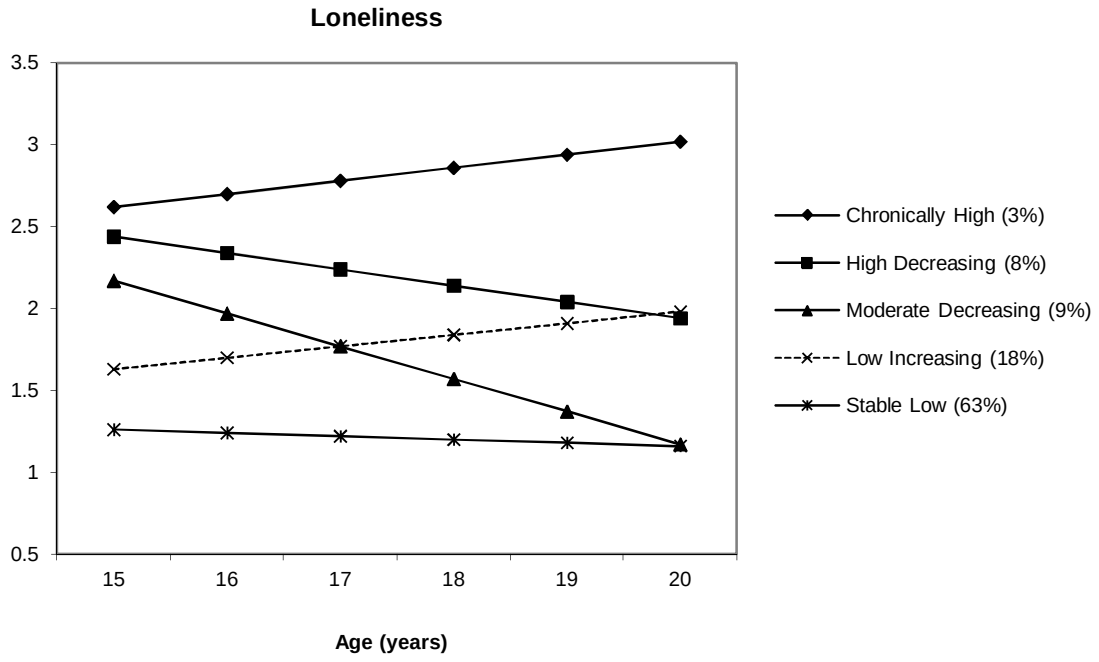

Figure 7.1. Estimated mean trends for the five loneliness trajectory classes.

The first trajectory class was called "chronically high loneliness" ($N = 12$; 3% of the sample; *M* intercept = 2.70, $p < .001$; *M* slope = 0.08, *ns*), representing adolescents with chronically high loneliness scores. The second trajectory class, "high decreasing loneliness" ($N = 25$; 6%; *M* intercept = 2.34, $p < .001$; *M* slope = -.10, $p < .05$), represented adolescents who reported high initial loneliness scores, but became less lonely over time. The third trajectory class, "moderate decreasing loneliness" ($N = 32$; 8%; *M* intercept = 1.97, $p < .001$; *M* slope = -.20,

ns), consisted of adolescents with an initial moderate loneliness score with a decreasing trend over time. The fourth trajectory class was called "low increasing loneliness" (*N* = 66; 17%; *M* intercept = 1.70, $p < .001$; *M* slope = 0.07, *ns*), and represented adolescents with a low initial score with an increasing trend over time. The last trajectory class, "stable low loneliness" (*N* = 254; 65%; *M* intercept = 1.24, $p < .001$; *M* slope = -0.02, $p < .05$), contained the majority of the adolescents, reporting low scores on loneliness at each measurement wave. These five trajectory classes are represented in Figure 7.1.

3.4 Validation of trajectory classes

With respect to demographics, cross-tabulations indicated that boys and girls were equally distributed across the different trajectory classes (χ^2 (4) = 9.02, *ns*). In addition, an equal distribution of SES was observed among the trajectory classes, as indicated by the educational level of father (χ^2 (12) = 14.09, *ns*) and mother (χ^2 (12) = 7.87, *ns*). In sum, the demographics examined could not differentiate among the five loneliness classes.

With respect to personality traits, a MANOVA with the loneliness trajectory classes as independent variables, and the Big Five traits as dependent variables was performed (Wilks' λ = .82; *F* (20,1225) = 3.91, $p < .001$; η^2 = .05). Follow-up ANOVAs with Tukey post-hoc comparisons indicated that mean levels of extraversion (*F* (4,376) = 14.16, $p < .001$; η^2 = .13), agreeableness (*F* (4,377) = 4.09, $p < .01$; η^2 = .04), and emotional stability (*F* (4,377) = 4.80, $p < .001$; η^2 = .05) differed between the five trajectory classes (as detailed in Table 7.2). Specifically, participants in the stable low trajectory class reported the highest levels of extraversion, agreeableness, and emotional stability. In contrast, participants with chronically high levels of loneliness had the lowest levels of agreeableness, whereas participants in the moderate decreasing trajectory class had the lowest levels of extraversion and emotional stability. No differences between the trajectory classes were found for conscientiousness (*F* (4,377) = 0.82, *ns*) or openness (*F* (4,378) = 1.39, *ns*).

With respect to psychosocial functioning, a MANOVA with depressive symptoms, self-esteem, and perceived stress as dependent variables was performed (Wilks' λ = .73; *F* (12,691) = 7.26, $p < .001$; η^2 = .10). Follow-up ANOVAs with Tukey post-hoc comparisons indicated that mean levels of depressive symptoms (*F* (4,264) = 12.73, $p < .001$; η^2 = .16), self-esteem (*F* (4,264) = 18.42, $p < .001$; η^2 = .22), and perceived stress (*F* (4,265) = 8.99, $p < .001$; η^2 = .12) were significantly different across the five loneliness trajectory classes (see

Table 7.2). In general, adolescents who never experienced loneliness had the most optimal adjustment profile (i.e., lowest levels of stress, least depressive symptoms, and highest self-esteem), whereas adolescents chronically suffering from loneliness had the most maladjusted profile (i.e., highest levels of stress, most depressive symptoms, and lowest self-esteem). Furthermore, a MANOVA with the three anxiety subscales as dependent variables was performed (Wilks' $\lambda = .73$; F (12,694) = 7.16, $p < .001$; $\eta^2 = .10$). Follow-up ANOVAs with Tukey post-hoc comparisons indicated that the subscales generalized anxiety (F (4,264) = 12.75, $p < .001$; $\eta^2 = .16$) and social phobia (F (4,265) = 16.66, $p < .001$; $\eta^2 = .20$) differentiated among the trajectory classes, whereas panic disorder did not (F (4,265) = 2.03, *ns*). Specifically, adolescents in the stable low and high decreasing trajectory classes reported lower levels of generalized anxiety and social phobia, whereas adolescents in the chronically high, low increasing, and moderate decreasing trajectory classes reported higher levels of generalized anxiety and social phobia (as detailed in Table 7.2).

Table 7.2
Mean Differences in the Continuous Validation Variables Across the Trajectory Classes

Variable	Chronically High	High Decreasing	Moderate Decreasing	Low Increasing	Stable Low
			Personality (T1)		
Extraversion	4.10_{ab}	4.54_{abc}	3.84_{a}	4.58_{bc}	5.05_{c}
Conscientiousness	4.54	4.27	3.93	4.25	4.27
Agreeableness	5.11_{a}	5.28_{ab}	5.32_{ab}	5.42_{ab}	5.56_{b}
Emotional stability	3.97_{ab}	4.20_{ab}	3.77_{a}	4.35_{ab}	4.43_{b}
Openness to experience	4.56	4.79	4.78	4.75	4.94
			Psychosocial functioning (T5)		
Depressive symptoms	2.85_{a}	2.10_{bc}	2.23_{bc}	2.38_{b}	1.99_{c}
Self-Esteem	2.70_{a}	3.40_{bc}	3.17_{b}	3.16_{b}	3.47_{c}
Perceived stress	2.67_{a}	2.46_{ab}	2.48_{ab}	2.58_{ab}	2.32_{b}
Anxiety: Panic Disorder	1.18	1.18	1.20	1.20	1.14
Anxiety: Generalized	1.72_{a}	1.40_{bc}	1.62_{ab}	1.63_{ab}	1.39_{c}
Anxiety: Social phobia	2.05_{a}	1.41_{b}	1.79_{a}	1.77_{a}	1.44_{b}

Note. Means are significantly different from one another if they have different superscripts. A mean without a superscript is not significantly different from any other means.

4. Discussion

The present cohort-sequential longitudinal study was the first to provide an in-depth examination of the developmental course of loneliness from mid- to late adolescence (i.e., ages 15 to 20). In line with the expected normative developmental trend through mid- and late adolescence, results indicated that, on average, adolescents experienced less loneliness over time. In addition to this general trend, substantial individual differences in the development of loneliness were observed. Specifically, five trajectory classes for loneliness were identified. These trajectory classes were meaningfully distinguished on personality traits and psychosocial functioning.

The five trajectory classes included individuals never experiencing substantial levels of loneliness (i.e., low stable trajectory), individuals persistently suffering from loneliness (i.e., chronically high trajectory), individuals who reported an increase in loneliness from ages 15 to 20 (i.e., low increasing trajectory), and two trajectory classes of individuals with a decreasing loneliness trend over time (i.e., high decreasing and moderate decreasing trajectory). Adolescents from the different trajectory classes were found to differ in terms of personality traits and psychosocial functioning. No meaningful differences among the trajectory classes were found with respect to gender or SES, indicating that these demographic variables do not predispose adolescents to embark on specific loneliness trajectories.

The majority of adolescents (63%) never experienced substantial feelings of loneliness during the course of the study. This finding is in line with previous studies in childhood (65%; Jobe-Shields et al., 2011) and mid-adolescence (78%; Benner, 2011), which demonstrated that children and adolescents in this stable low trajectory class showed the most optimal levels of peer functioning and academic adjustment, respectively. The present study contributed to this research line by demonstrating that these adolescents had the most optimal personality (i.e., most extraverted, agreeable, and emotionally stable) and psychosocial profile (i.e., highest self-esteem and lowest levels of perceived stress, depressive symptoms, and anxiety).

As expected, the group of adolescents reporting chronically high levels of loneliness was only a small subgroup (i.e., only 3% of the sample). These adolescents were characterized by low levels of agreeableness and relatively low scores on emotional stability. Further, they were characterized by the lowest levels of self-esteem and the highest levels of

depressive symptoms, perceived stress, generalized anxiety, and social phobia. With respect to depressive symptoms and self-esteem, they scored significantly worse than any other trajectory class. Hence, these adolescents chronically suffering from loneliness can be considered a risk group, not only due to their elevated levels of loneliness, but also due to their broader pattern of psychosocial functioning. Therefore, chronically lonely adolescents would benefit from a more extensive clinical program aimed at addressing all aspects of psychosocial dysfunctioning. Interventions for other trajectories at risk could primarily focus on targeting loneliness. (For a review on loneliness interventions, see Masi, Chen, Hawkley, Cacioppo, 2011).

About one fifth (i.e., 18%) of adolescents had relatively low loneliness scores at baseline but increased across time, in contrast to the general decreasing trend in the sample. Adolescents in this low increasing trajectory class had a similar baseline personality profile as the low stable trajectory class, but both classes were clearly distinguished on psychosocial functioning at the final time point. Specifically, the low increasing trajectory class reported more depressive symptoms, lower self-esteem, and higher levels of generalized anxiety and social phobia compared to the low stable trajectory class. Moreover, anxiety levels in the former class were not different from those in the chronically high trajectory class. Thus, although adolescents in the low increasing trajectory reported relatively low loneliness scores in mid-adolescence, they increasingly experienced loneliness, and they reported rather poor psychosocial well-being at age 20. Possibly, these individuals managed to deal with the changing peer context in mid-adolescence but struggled with certain psychosocial challenges during the transition to adulthood, such as finding a stable romantic relationship or building a social network with fellow students or colleagues. Therefore, future research should examine the impact of changing social contexts in the transition to adult life on the development of loneliness.

Finally, two smaller subgroups of adolescents showed strong decreases in loneliness. A first trajectory class (i.e., high decreasing, 8%) consisted of adolescents experiencing relatively high levels of loneliness at age 15 and moderate levels at age 20, and a second trajectory class (i.e., moderate decreasing, 9%) reported moderate levels of loneliness at age 15 and low levels of loneliness at age 20. Adolescents in the high decreasing trajectory were characterized by moderate levels of agreeableness, extraversion, and emotional stability, and relatively good psychosocial functioning. Although their level of loneliness in mid-adolescence was comparable to the chronically high trajectory class, their psychosocial

functioning at age 20 was comparable to the low stable trajectory class. Hence, despite the fact that these adolescents may have struggled with establishing intimate friendships in mid-adolescence, they seemed to exhibit relatively good psychosocial functioning later on.

In contrast, the adolescents in the other decreasing trajectory class, that is, the moderate decreasing group, showed a psychosocial profile comparable to the low increasers. Specifically, their level of depressive symptoms and self-esteem lay in-between the two extremes (i.e., the low stable and chronically high loneliness trajectories), but their levels of social phobia and generalized anxiety were comparable with the chronically high loneliness trajectory class. Thus, although their levels of loneliness at age 20 were similar to the low stable trajectory class, their psychosocial functioning was not. Furthermore, adolescents in the moderate decreasing loneliness trajectory were characterized by a specific personality profile. They reported the lowest levels of extraversion and emotional stability.

A question yet to be answered is why the latter subgroup of introverted and emotionally unstable adolescents reported moderate loneliness levels at age 15, but a steep decrease in loneliness until age 20. A first explanation is that their personality traits changed from age 15 to 20. They may have become more extraverted and emotionally stable, in line with the general developmental trend during that age period (Klimstra, Hale, Raaijmakers, Branje, & Meeus, 2009). These personality changes, in turn, may have impacted peer functioning and loneliness. However, it may also be the case that their personality traits remained rather stable, but that the impact of these personality traits on peer functioning or on the experience of loneliness changed with age. For example, being introverted at age 15 may evoke stronger negative reactions from peers (and thus, a possibly stronger association with loneliness) than at age 20. Indeed, using a sociometric procedure, introverted early adolescents were significantly less liked by their classmates (Lubbers, Van Der Werf, Kuyper, & Offringa, 2006), whereas introverted college students were not less selected as friends by their fellow students (Selfhout et al., 2010). A final option is that both personality traits and peer functioning remained rather stable for these adolescents, but that their decrease in loneliness was due to other factors, such as a changing attitude towards aloneness.

Loneliness and aloneness are indeed related but different constructs (Goossens et al., 2009). Whereas loneliness is a subjective and unpleasant experience, aloneness refers to objective communicative isolation, which is not necessarily an unpleasant experience (Larson, 1990; Larson & Richards, 1991). Although some adolescents indeed tend to have an affinity

for being alone, others tend to have an aversion to being alone (Marcoen et al., 1987). This attitude towards being alone may relate to increases or decreases in loneliness. For example, lonely adolescents may develop an affinity towards aloneness in an attempt to deal with their feelings of loneliness. By defining oneself as a person who likes spending time alone, the gap between their actual and ideal social network may narrow, and their feelings of loneliness may decrease across time. Alternatively, aversion to aloneness may increase feelings of loneliness during adolescence. Compared to children, adolescents increasingly spend time alone (Larson, 1990). Therefore, aversion to being alone may increase the experience of loneliness during these more extended periods of time alone.

Some limitations of the present study need to be mentioned. First, the adolescents in the present study were mainly Caucasian and were raised in intact two-parent families. A more balanced sample in terms of ethnic background and family situation would be more appropriate to assure the generalizability of our findings. Second, the present study relied exclusively on self-report measures. This approach can cause shared method variance, which in turn might account in part for the effects obtained. However, alternatives for self-reports are not readily available, as most variables in the present study are internal and subjective experiences. Third, no information on adolescents' psychosocial functioning was available at T1. However, early psychosocial functioning may increase susceptibility to loneliness. Hence, psychosocial functioning could be both an antecedent and a consequence of loneliness trajectories, which could be examined in future research. Finally, at a more technical level, it is important to keep in mind that LCGA is a sample-specific statistical technique. Although LCGA in the present study indicated and validated that the development of loneliness in adolescence is different for different subgroups of adolescents, replication in other samples is recommended.

Despite these limitations, the present study represents the first in-depth examination of the development of loneliness through mid- and late adolescence. In addition to a general decreasing trend in loneliness from mid- to late adolescence, considerable heterogeneity in individual trajectories was observed. The five developmental trajectory classes obtained in the present study were characterized by clearly distinguishable personality and adjustment profiles. This finding emphasizes the importance of applying person-centered approaches in addition to the more commonly used variable-centered approaches to study developmental

processes. Indeed, inter-individual differences in intra-individual changes may be highly informative, particularly those developmental changes that do not correspond to the average trend.

8

General Discussion:

Answering and Raising Questions

This closing chapter summarizes the main findings emerging from the empirical chapters in the present dissertation, and discusses these findings within the current loneliness literature. Specific attention is given to the integration and interpretation of the results from the different studies, and to practical and clinical implications. In addition, we reflect on some new questions that arose from our findings, pointing to new avenues for future studies. This chapter is organized according to the four gaps in previous loneliness research, as identified in Chapter 1. For each 'gap', we reflect on the main empirical findings addressing that specific gap (i.e., which questions have been answered?), and we discuss how our findings might stimulate future work (i.e., which questions have arisen?).

1. Loneliness and psychological adjustment: Direction of effects

1.1 Answering questions

One of the major aims of the present dissertation was to clarify the direction of effects between loneliness and psychological adjustment. Numerous studies have indicated strong associations between loneliness, depressive symptoms, and self-esteem (for reviews, see Ernst & Cacioppo, 1999; Heinrich & Gullone, 2006; Mahon, Yarcheski, Yarcheski, Cannella, & Hanks, 2006). However, only little empirical attention has been devoted to the direction of effects, and existing work has shown contradictory results. Therefore, the present dissertation incorporated three longitudinal studies to investigate prospective associations between loneliness and depressive symptoms (i.e., 'L-Tides' and 'Loneliness in College' in Chapter 2, and 'Family and Health' in Chapter 4), and two longitudinal studies to examine the prospective associations between loneliness and self-esteem (i.e., 'Family and Health' and 'LONE-MAPS' in Chapter 5). Replication of our main findings across different samples covering different social contexts (high school versus college) and different countries (Belgium versus the Netherlands) is a considerable strength of the present dissertation.

Regarding the prospective effects between loneliness and self-esteem, findings from the two samples investigated in Chapter 5 were highly similar. Indeed, a transactional model in which loneliness and self-esteem reciprocally affected one another across time was found in both samples. In addition, low self-esteem was found to be a stronger precursor of loneliness than vice versa, which is in line with the only preceding study examining this association (Olmstead, Guy, O'Malley, & Bentler, 1991). Hence, the present dissertation provided clear empirical evidence for a vicious circle between low self-esteem and loneliness

in late adolescence in which low self-esteem and loneliness exacerbate one another. This finding is represented in Figure 8.1 (i.e., an expansion of Figure 1.1 which was used as an overarching framework to introduce the different empirical chapters in this dissertation). Note that the two arrows between loneliness and self-esteem represent the reciprocal effect, while the thickness of the arrows represents the strength of the paths.

Regarding the prospective effects between loneliness and depressive symptoms (also represented in Figure 8.1), the three longitudinal samples under investigation provided clear evidence for loneliness being a risk factor for developing depressive symptoms. The reversed path, that is, the effect of depressive symptoms on later loneliness, was not consistently replicated in all samples. The five-wave study in Dutch adolescents indicated that depressive symptoms are indeed a risk factor for later loneliness, although this effect was found to be somewhat weaker than the reversed effect. By contrast, the two studies in Belgian college students failed to provide support for depressive symptoms being a risk factor for later loneliness. Specifically, the three-wave study found support for this path in only one of the two time intervals, and the two-wave study found no support at all. As noted in Chapters 2 and 4, previous empirical evidence on the prospective associations between loneliness and depressive symptoms also showed mixed results (e.g., Cacioppo, Hawkley, & Thisted, 2010; Lasgaard, Goossens, & Elklit, 2011). So far, no explanations have been offered for these mixed findings. In the meantime, an additional empirical study on this topic was performed. Specifically, the prospective effects between loneliness and depressive symptoms were examined in a three-wave sample of adolescents with congenital heart disease, and results pointed to a reciprocal model (Luyckx et al., 2012). Hence, one of the major challenges of future studies is to explain these different results, as detailed below.

Our findings regarding the transactional models between loneliness on the one hand, and self-esteem and depressive symptoms on the other hand, empirically support what is experienced among clinicians. Indeed, feeling lonely, experiencing depressive symptoms, or having low self-esteem are rarely isolated problems. Therefore, an integrated approach in clinical work with specific attention to antecedents, consequences, and perpetuating factors that affect all three types of psychological maladjustment is strongly advised. For example, loneliness, depressive symptoms, and low self-esteem are related to other problems of clinical significance as well, such as suicide ideation and even suicide attempts (Ernst & Cacioppo, 1999; Groholt, Ekeberg, Wichstrom, & Haldorsen, 2000; Lasgaard et al., 2011; Lewinsohn, Rohde, & Seeley, 1994). Given the severity of these associated outcomes, and given a

possible cumulative effect of the three types of maladjustment, our findings highlight the importance of instant intervention if adolescents express substantial symptoms of loneliness, low self-esteem, or depressive symptoms. Yet, to truly inform clinical work, information about moderating, mediating, or perpetuating factors in the associations between loneliness, depressive symptoms, and self-esteem is indispensable, as described below.

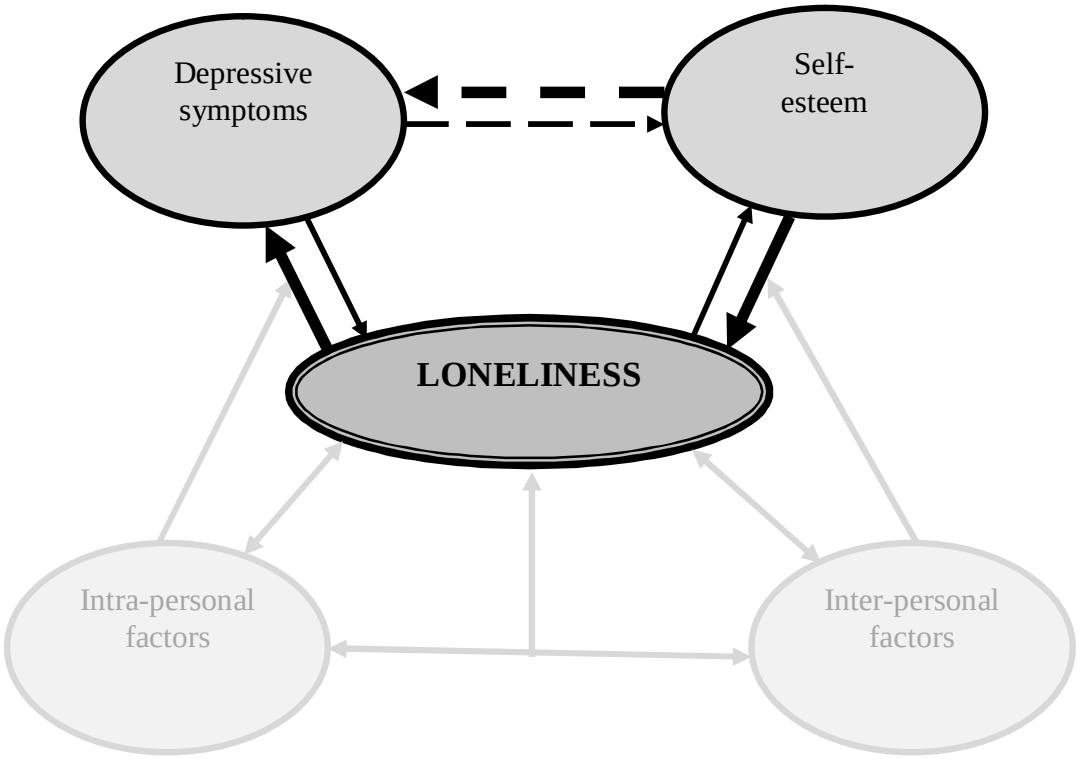

Figure 8.1. Summary of the prospective findings obtained in the present dissertation. Dashed arrows were not investigated in the present dissertation, but represent results of previous studies. Variations in the thickness of the arrows represent the strength of the effects.

1.2 Raising questions

Explaining the inconsistent findings regarding the prospective association between depressive symptoms and loneliness represents an important avenue for future studies, as noted above. Although the different studies in the present dissertation investigating this topic had a different gender composition (i.e., the samples in Chapter 2 were predominantly female,

whereas the sample in Chapter 4 had a balanced gender distribution), gender differences cannot explain the different findings across the different studies. Specifically, multi-group analyses in Chapter 4 clearly indicated that the prospective effects between loneliness and depressive symptoms occurred in the same way for boys and girls, as an extension of the studies by Cacioppo et al. (2010) and Lasgaard et al. (2011) that included gender as a covariate.

As the samples also differed in terms of age range (i.e., Chapter 2 included college students, whereas Chapter 4 included high school students), different developmental stages may explain the different results. Indeed, we suggest future studies to examine two opposing hypotheses, that is, the invariance versus developmental hypothesis. The *invariance hypothesis* implies that the vicious circle between loneliness and depressive symptoms is equally detrimental at different ages. Put differently, this hypothesis entails that the association between loneliness and depressive symptoms would occur similarly across different developmental stages, and, therefore, that the different results found in previous work and the present dissertation should be attributed to other factors. The *developmental hypothesis*, by contrast, implies that the association between depressive symptoms and loneliness would generally vary as a function of the developmental stage. Indeed, studies investigating mid- and late adolescents pointed to a bidirectional model (e.g., Chapter 4; Luyckx et al., 2012), whereas studies in college students (e.g., Chapter 2) and adults (Cacioppo et al., 2010) suggested a unidirectional model with loneliness being a precursor of depressive symptoms.

Hence, could a developmental hypothesis explain our inconsistent findings, in that depressive symptoms only give rise to loneliness in mid- and late adolescence, but not later in life? Is one's social network more resistant to depressive symptoms later in life as compared to adolescence? We propose two ways in which mid- and late adolescence is indeed a particular vulnerable period for the development of loneliness in response to depressive symptoms. First, during mid- and late adolescence, one's social network changes dramatically (Gifford-Smith & Brownell, 2003; Rubin, Bukowski, Parker, & Bowker, 2008). For example, there is an increased need for intimacy and self-disclosure in peer relationships, and peers become the main source of support and advice. Establishing such a support network takes time, however. Therefore, adolescents' social network may not be stable or solid enough to resist during a depressive period, resulting in loneliness. The interpersonal theory of depression (Coyne, 1976; Rudolph, Flynn, & Abaied, 2008) poses that – at any age –

depression leads to interpersonal problems and challenges close relationships. We propose that this social damage may be particularly present in mid- and late adolescence, a period in which the depression rate strongly increases (Hankin et al., 1998), and, at the same time, a period in which the social network is still 'under construction'. Second, increased personality maturity may also explain why a depressive episode not necessarily results in loneliness in (young) adulthood, as compared to mid- and late adolescence. Indeed, emotional stability has previously been found to increase over the course of mid- and late adolescence (Klimstra, Hale, Raaijmakers, Branje, & Meeus, 2009). Together with our finding that emotional stability moderated the cross-lagged associations between loneliness and depressive symptoms (Chapter 4), this increased personality maturity may explain why the association between depressive symptoms and loneliness is stronger in mid- and late adolescence as compared to later in life. In sum, we tentatively expect that a developmental hypothesis might explain our inconsistent findings, and we suggest future research to dig into this issue.

On a related note, future studies are encouraged to examine the invariance versus developmental hypothesis regarding the association between loneliness and self-esteem as well. Indeed, the two studies performed in the present dissertation, together with the only previous study on this topic (Olmstead et al., 1991) covered the period of mid- and late adolescence. During this developmental stage, adolescents tend to define themselves in terms of social relationships and they are increasingly aware of and concerned about their social status (Harter, 1999; Larson, 1999; Parkhurst & Hopmeyer, 1999). Thus, the prospective associations between loneliness and self-esteem may be more pronounced in adolescence as compared to childhood or adulthood. Therefore, replication of the obtained prospective effects between self-esteem and loneliness in different age ranges is encouraged.

A next aspect to consider for future research, is the joint examination of loneliness, depressive symptoms, and self-esteem. Indeed, in the present dissertation, the cross-lagged analyses on loneliness and depressive symptoms were conducted without controlling for self-esteem, and, similarly, the cross-lagged analyses on loneliness and self-esteem were conducted without controlling for depressive symptoms. Therefore, we strongly suggest future research to include all three variables in an integrated model, particularly given the strong overlap between self-esteem and depressive symptoms (Roberts & Monroe, 1992). Moreover, a previous study focused on the direction of effects between depressive symptoms and self-esteem in adolescence and young adulthood, and showed that low self-esteem predicted increased depressive symptoms, whereas the reversed path was absent (Orth,

Robins, & Roberts, 2008). This path is represented in dashed lines in Figure 8.1. Combining loneliness, self-esteem, and depressive symptoms in a single cross-lagged model could considerably advance our understanding of how the three constructs relate to one another, and distinguish between shared, unique, and cumulative effects. It is possible, for example, that loneliness is a partial mediator in the relation between self-esteem and depressive symptoms, given that self-esteem was found to affect loneliness, which, in turn, was found to affect depressive symptoms (Chapters 2, 4, and 5). However, although loneliness may explain a part of the association between self-esteem and depressive symptoms, we additionally expect direct links from self-esteem to depressive symptoms.

A final suggestion for future research is to investigate the direction of effects between loneliness and other types of psychological (dys)functioning, given that the present dissertation focused only on depressive symptoms and self-esteem as indicators of psychological well-being. For example, as shown in Chapter 7, enduring loneliness is associated with generalized and social anxiety. Similarly, several previous studies documented a rather strong association between loneliness and anxiety (for reviews, see Heinrich & Gullone, 2006; Mahon et al., 2006; Moore & Schultz, 1983), also after controlling for depressive symptoms (e.g., Stednitz & Epkins, 2006). Moreover, this association not only holds in population-based samples, but also in clinical samples of adolescents diagnosed with anxiety disorders (Beidel, Turner, & Morris, 1999; Flensborg-Madsen, Tolstrup, Sorensen, & Mortensen, 2012). However, the direction of effects between loneliness and (social) anxiety remains unclear. Therefore, disentangling such prospective associations between loneliness and anxiety disorders or other types of psychopathology is an important area for future research, and can hold vital information for clinical work.

2. Loneliness and psychological adjustment: Underlying mechanisms?

2.1 Answering questions

In addition to investigating *how* loneliness and psychological well-being relate to one another, the present dissertation aimed to examine *why* they are related. For both depressive symptoms and self-esteem, we identified different underlying mechanisms in the predominant paths revealed in the cross-lagged analyses (i.e., the path from loneliness to depressive symptoms, and the path from self-esteem to loneliness). The main results are represented in Figure 8.2.

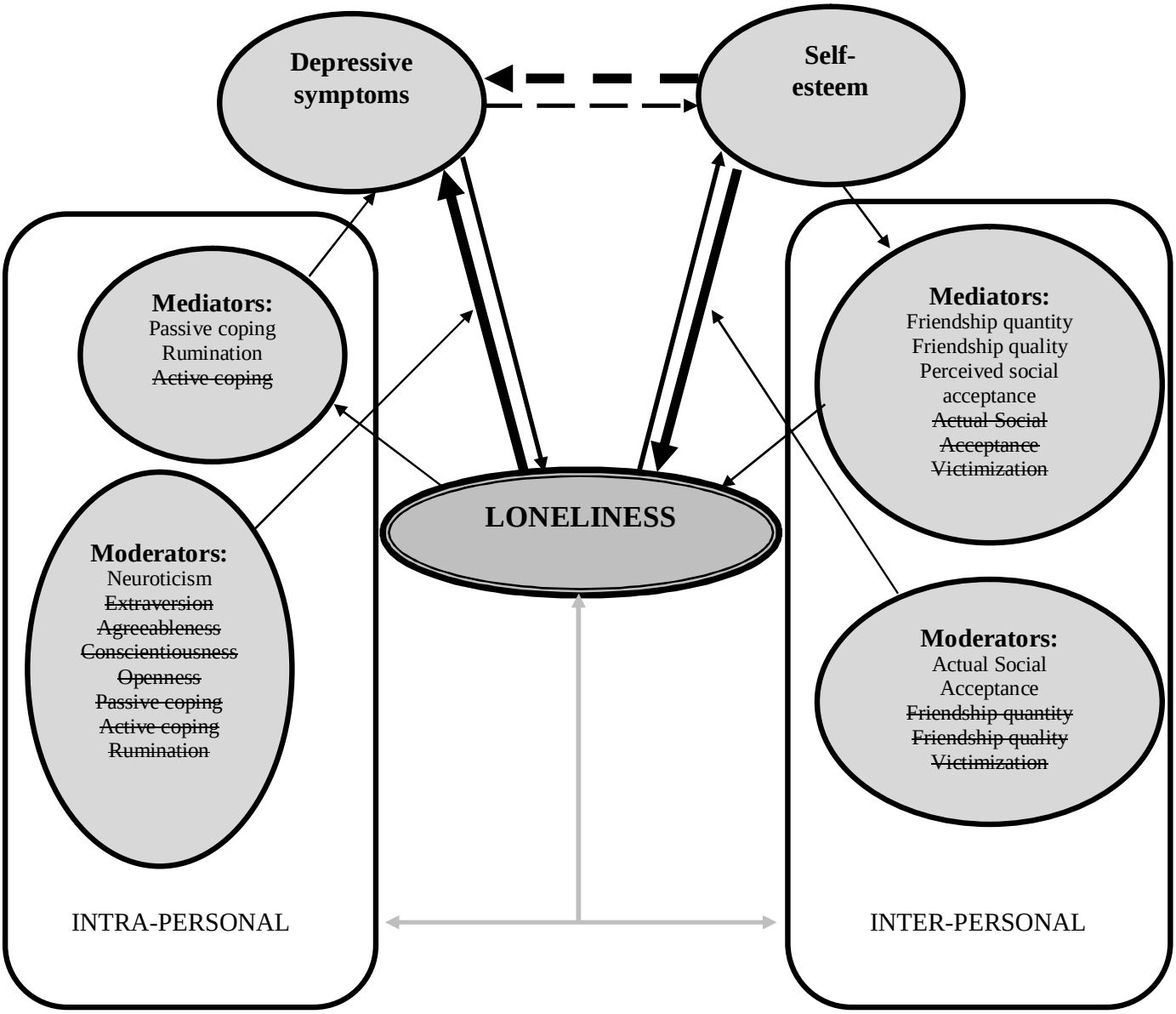

Figure 8.2. Summary of the mediating and moderating findings, added to the prospective findings obtained in the present dissertation. Strikethrough words represent investigated mechanisms with non-significant results that need further examination. Results regarding parent-related loneliness are not represented in the present figure for reasons of clarity.

Several intra-personal factors were identified as mediators or moderators in the link between loneliness and depressive symptoms. Regarding mediation, passive coping strategies in general – and uncontrollable ruminative thoughts in particular – were found to partially explain the association between loneliness and depressive symptoms (Chapters 2 and 3). Adolescents who experience higher levels of loneliness tend to endorse a maladaptive way of coping with them, which makes them vulnerable for experiencing depressive symptoms. This finding is particularly relevant for loneliness interventions. Indeed, reducing passive coping strategies and ruminative thoughts about loneliness, or changing adolescents' perceptions about the controllability of their ruminative thoughts and their social situation could diminish the risk of developing depressive symptoms in response to loneliness. Instead, adolescents could be taught more adaptive ways to cope with their loneliness in order to prevent the development of depressive symptoms. Bearing this in mind, we expected to find empirical evidence for the protective role of active coping strategies on depressive symptoms in the present dissertation (e.g., Auerbach, Abela, Zhu, & Yao, 2010; Herman-Stahl, Stemmler, & Petersen, 1995). However, although active coping strategies were related to less depressive symptoms at the same point in time, we did not find support for the protective function of active coping strategies in the development of depressive symptoms over time (Chapter 2). Therefore, future studies should aim to identify protective underlying mechanisms that might interrupt the vicious circle between loneliness and depressive symptoms, as detailed below.

Regarding moderation of the loneliness-depression link, adolescents high on neuroticism were found to be particularly at risk to get stuck in the vicious circle between loneliness and depressive symptoms (Chapter 4). Indeed, emotionally stable adolescents not only experienced less loneliness and less depressive symptoms, but they were also found to be less vulnerable to experience a cumulative escalation of these internalizing symptoms. Again, this finding has the potential to advance clinical work and studies. For example, it may be important for clinicians to pay attention to signs of emotional instability when treating lonely or depressed patients, and to try to reinforce their emotional stability. Therefore, future studies could investigate whether certain aspects of neuroticism are amendable in clinical work. Finally, rumination was found to moderate the association between parent-related loneliness[3] and depressive symptoms (Chapter 2). That is, the combination of experiencing parent-related

[3] Recall that the present dissertation is based on the multidimensional framework outlined by Marcoen et al. (1987), in which peer- and parent-related loneliness are distinguished. Although all chapters focus on peer-related loneliness, Chapter 3 took into account both peer- and parent-related loneliness, and found differential mediating/moderating results regarding the link between both types of loneliness and depressive symptoms.

loneliness and uncontrollable ruminative thoughts about one's loneliness represents a particular risk for depressive symptoms. Together with the mediating role of rumination in the association between peer-related loneliness and depressive symptoms, this finding highlights again the potential risk of uncontrollable negative thoughts and cognitive vulnerability in response to loneliness, and – as discussed above – could significantly advance clinical work.

Regarding the link between self-esteem and loneliness, we focused on the mediating role of social acceptance in Chapter 5. Specifically, a distinction was made between actual (i.e., peer-reported) and perceived (i.e., self-reported) social acceptance. Results indicated that this distinction was critical, as only perceived – but not actual – social acceptance was found to partially mediate the association between self-esteem and loneliness. Specifically, adolescents low in self-esteem tended to report that they were poorly accepted by their peers, although this did not reflect reality. Low perceived social acceptance, in turn, was a risk factor for intensified loneliness. Chapter 6 also examined the interplay between self-esteem and inter-personal factors in predicting loneliness, albeit using a cross-sectional design. In addition to actual social acceptance, the mediating and moderating role of friendship quality, friendship quantity, and victimization was investigated in that chapter. Friendship quantity and friendship quality were identified as mediators in the link between self-esteem and loneliness. Specifically, results suggested that low self-esteem had a harmful effect on the number of friends and on the quality of one's best friendship. Low friendship quantity and quality, in turn, puts adolescents at risk for loneliness. In line with Chapter 5, no indication for the mediating role of actual social acceptance was found. However, results of Study 6 indicated a moderating – rather than a mediating – role of actual social acceptance. Specifically, the combination of low self-esteem and low actual social acceptance was shown to be a particular risk factor for experiencing loneliness.

Thus, significant interplay between self-esteem and inter-personal functioning was revealed in the present dissertation, and this interplay was important in the experience of loneliness (see below for a further discussion on the importance of combining inter- and intra-personal factors in predicting loneliness). Most importantly, low self-esteem was related to less friends, lower perceived friendship quality, and lower perceived social acceptance, which, in turn, all predicted increased loneliness. Put differently, mediators at both the dyadic level (i.e., friendship quantity and quality) and group level (i.e., social acceptance) were identified. Moreover, all investigated 'perceived' peer experiences were shown to be significant mediators (i.e., friendship quality and perceived social acceptance), whereas most investigated

'actual' peer experiences showed non-significant results (i.e., actual social acceptance and peer-reported victimization), with the exception of friendship quantity. Indeed, based on the definition of loneliness used throughout this dissertation (Peplau & Perlman, 1982) and the cognitive discrepancy model (de Jong-Gierveld, 1987; Kupersmidt, Sigda, Sedikides, & Voegler, 1999), the evaluation of one's social network and the internal comparison between actual and desired social relationships are of crucial importance in the development of loneliness. Therefore, we suggest clinicians to focus on the perception of the social context and related cognitive features when dealing with adolescents with low self-esteem, such as the attribution of social successes and failures, or the interpretation of signals from friends and peers. Indeed, as Bierman (2004) recommended, an important next step in intervention is to address the cognitions behind peer difficulties.

2.2 Raising questions

Notably, the present dissertation focused mainly on intra-personal factors in explaining the link between loneliness and depressive symptoms, and on inter-personal factors in explaining the link between self-esteem and loneliness. However, we are convinced that inter-personal factors could also play an important role in explaining the loneliness - depression link, and that intra-personal factors could be important in the self-esteem - loneliness link. In fact, our results regarding the role of perceived social acceptance are a first confirmation of the latter hypothesis. Indeed, the fact that perceived – and not actual – social acceptance was an underlying mechanism in the association between self-esteem and loneliness stresses the importance of cognitive processes, and, thus, intra-personal factors in this link. Many interesting suggestions for both inter- and intra-personal factors underlying the associations between loneliness and psychological adjustment could be discussed here as suggestions for future studies. However, we would like to highlight the role of attribution style, in line with our call for a stronger emphasis on cognitive factors when examining the peer context.

Lonely individuals tend to attribute their failures to stable, internal, or dispositional causes, whereas they tend to attribute their successes to unstable, behavioral or external causes (Anderson, 1999; Anderson, Miller, Riger, Dill, & Sedikides, 1994; Crick & Ladd, 1993; Renshaw & Brown, 1993). Given the link between this maladaptive attribution style and other types of psychological maladjustment (e.g., depressive symptoms; Anderson et al., 1994), it could be a promising mediator or moderator in the association between loneliness

and psychological maladjustment. In addition, attribution style is hypothesized to be a key component in the continuity of loneliness. Indeed, blaming oneself for one's social failures leads to feelings of pessimism and hopelessness, which may affect one's motivation, behavior, and coping strategies, and therefore, the likelihood that the situation will improve (Anderson, Horowitz, & French, 1983; Hymel, Franke, & Freigang, 1985; Peplau, Miceli, & Morasch, 1982; Renshaw & Brown, 1993). These hypotheses on the impact of attribution style on the continuity of loneliness, and the association between loneliness and other types of psychological dysfunctioning are particularly important to look into in future studies. Indeed, a recent meta-analysis indicated that loneliness interventions addressing maladaptive social cognition (including attribution style) had a larger effect size compared to any other type of intervention (Masi, Chen, Hawkley, & Cacioppo, 2011).

A final issue we would like to address concerns our measurement of loneliness. Although this issue pertains to all empirical chapters in the present dissertation, it is particularly important when interpreting our results regarding the association between loneliness and the peer context, as detailed below. Recall that we identified two disagreements among loneliness researchers regarding measurement issues (pp. 7-9), that is, (a) whether loneliness is a unidimensional versus multidimensional construct, and (b) whether loneliness questionnaires should measure loneliness directly versus indirectly. Regarding the first issue, we adopted a multidimensional approach in the present dissertation (i.e., the four-dimensional approach by Marcoen, Goossens, & Caes, 1987), but limited our empirical studies mainly to peer-related loneliness - which was shown to overlap substantially with unidimensional loneliness measures (Cramer & Barry, 1999; Goossens et al., 2009). Our findings could be extended and strengthened by including the other three dimensions in future research. Given that Chapter 3 already pointed to important differences between peer- and parent-related loneliness in the association with depressive symptoms and rumination, we expect similar differences to emerge regarding the associations with all other inter- and intra-personal factors in the present dissertation. For example, a recent study documented differential associations between the Big Five personality traits, on the one hand, and peer-related loneliness, parent-related loneliness, affinity for aloneness, and aversion to aloneness, on the other hand (Teppers et al., 2012). Therefore, we suggest future studies to examine peer-related loneliness in addition to parent-related loneliness and attitudes towards aloneness, and to distinguish between common and unique antecedents and consequences of the different types of loneliness and attitudes towards aloneness.

Regarding the second issue – whether loneliness questionnaires should measure loneliness directly versus indirectly – we exclusively applied loneliness questionnaires asking indirectly about loneliness in the present dissertation, that is, the UCLA (Russell, Peplau, & Cutrona, 1980; Russell, Peplau, & Ferguson, 1978) and the LACA (Marcoen et al., 1987). Specifically, these questionnaires assume that directly asking about loneliness evokes socially desirable responses due to the stigma that is associated with loneliness. That is, they assume that people would not be willing to admit that they feel lonely. However, by including items that focus on participants' evaluations of their social networks (to avoid social desirability), content validity may be questioned. Indeed, this is the main concern formulated by Weeks and Asher (2012), proponents of direct loneliness assessments. These authors stress the importance of distinguishing between the pure emotional experience of loneliness and the hypothesized causes of loneliness. Given the high correlation between their 'direct' Loneliness in Context questionnaire and our 'indirect' peer-related loneliness scale of the LACA (i.e., r = .73 as reported on page 8 of the present dissertation), we expect that findings will be highly similar if investigated using a direct loneliness questionnaire.

Nevertheless, this issue is particularly relevant for our chapters investigating peer experiences as predictors of loneliness (i.e., Chapters 5 and 6). Indeed, some items of the LACA may show content overlap with friendship quality (e.g., "I think there is no single friend to whom I can tell everything") and perceived social acceptance (e.g., "I feel excluded by my classmates"). Therefore, the associations between loneliness, friendship quality, and perceived social acceptance may have been somewhat overestimated in the present dissertation. To examine this hypothesis, we selected the two items of the peer-related loneliness scale of the LACA that showed the least content overlap (e.g., "I feel isolated from other people"; "I feel alone at school"), and we reran the analyses of Chapter 5 using this reduced peer-related loneliness scale. Results indicated no essential differences as compared to the original results. However, we acknowledge this is an important issue and we advice future studies to replicate our findings using pure loneliness measures, particularly when examining loneliness in relation to peer experiences.

3. Interplay between different inter- and intra-individual correlates of loneliness

3.1 Answering questions

The findings regarding the interplay between self-esteem and different peer experiences described above already highlighted the importance of investigating the joint effects of inter- and intra-personal factors of loneliness. Similarly, Chapter 6 examined the interplay between shyness and these same four peer experiences (i.e., actual social acceptance, victimization, friendship quantity, and friendship quality) in the association with loneliness. Results indicated that the association between shyness and loneliness was partially mediated by friendship quantity and friendship quality. Thus, being shy in adolescence seems to affect one's friendships, which, in turn, affects loneliness. Not only these mediating and moderating effects are important to consider, the additive results reported in Chapter 6 hold important information as well. Indeed, the two intra-personal variables (i.e., shyness and self-esteem) and four inter-personal variables (i.e., i.e., actual social acceptance, victimization, friendship quantity, and friendship quality) examined in Chapter 6 turned out to be unique predictors of loneliness in adolescence. These additive effects suggest that both inter- and intra-personal factors contribute to adolescent loneliness, and that difficulties in the peer-group are not a mere consequence of one's shyness or low self-esteem.

Clinical implications emerging from these findings mainly emphasize that both individual characteristics and the social context should be targeted in loneliness prevention and intervention programs. To date, the focus of such programs in childhood and adolescence is often on social skills training, based on the assumption that lonely children and adolescents lack the skills necessary to develop positive interactions with their peers (Asher, Parker, & Walker, 1996; Bierman, 2004). A review of the effects of social skills training indicated that such trainings can improve social acceptance, but they have not yet been shown to be successful in promoting the development of high-quality friendships (Asher et al., 1996), which is probably more vital to address during clinical work with adolescents. Moreover, social skills trainings are not sufficient for enduring improvements in peer acceptance, particularly not without taking into account cognitive aspects (Bierman, 2004). Indeed, a recent meta-analysis on loneliness interventions indicated that social skills training, together with other direct ways to improve social interactions (i.e., enhancing social support and increasing opportunities for social contact) were less effective compared to interventions addressing maladaptive social cognition (Masi et al., 2011). In sum, clinical work could

benefit from extending the current social skills trainings by including specific friendship skills and by addressing social cognitions.

3.2 Raising questions

The main question emerging from these findings pertains to the extension of our knowledge about the interplay between inter- and intra-personal factors in predicting loneliness. Indeed, we strongly suggest future studies to integrate inter- and intra-personal variables when examining loneliness. So far, the focus was on how personality factors (e.g., shyness) interact with the peer context (both at the group and dyadic level) in predicting loneliness (e.g., Bell-Dolan, Foster, & Christopher, 1995; Boivin, Hymel, & Bukowski, 1995; Gazelle & Ladd, 2003; Pedersen, Vitaro, Barker, & Borge, 2007; Stoeckli, 2009). Less is known, however, about the interaction between intra-personal factors and other social contexts. Two examples of such other important social contexts for adolescents are a romantic partner and parents, as detailed below.

First, adolescents who never had a romantic relationship were found to be lonelier than adolescents having a romantic relationship or adolescents who had a romantic relationship that did not last (Woodhouse, Dykas, & Cassidy, 2012). Indeed, over the course of adolescence, having been in a romantic relationship becomes more normative. Specifically, whereas about 25% of adolescents reported to have had a romantic relationship at age 12, this percentage increased to about 70% of boys and 75% for girls at age 18 (Carver, Joyner, & Udry, 2003; Rubin et al., 2008). Thus, lacking romantic experience may increasingly be related to loneliness. Moreover, having a romantic relationship in young adulthood has been linked to certain personality traits such as extraversion (Neyer & Asendorpf, 2001; Neyer & Lehnart, 2007), and relationship commitment has been linked to other personality traits such as agreeableness and conscientiousness (Ahmetoglu, Swami, & Chamorro-Premuzic, 2010; Lodi-Smith & Roberts, 2007). However, no studies thus far have examined the additive, mediating, or moderating effects of personality traits and having a romantic relationship or relationship commitment on loneliness in adolescence. Therefore, this specific type of interplay between inter- and intra-personal factors is a valuable avenue for future research.

Second, it is likely that intra-personal factors interact with parental influences in predicting loneliness in adolescence. Indeed, there are several ways in which parents can influence their children's loneliness (for a review, see Rotenberg, 1999) and these influences

continue to be important through adolescence (Collins & Steinberg, 2006). Examples of such parental influences are attachment and parenting styles. Regarding attachment, Bowlby (1969/1982) presented an influential theoretical framework for the proposition that children who lack warm, positive early relationships with their parents are susceptible to loneliness. Each person develops a certain attachment style (i.e., a pattern of relational expectations, emotions, and behaviors), which results from attachment experiences with parents (or caregivers). Adolescents tend to interpret later social relationships, such as peer relationships, in the light of their early experiences with parents. Therefore, the failure to form secure attachments in early childhood can be the basis for many forms of personality disturbances and emotional distress, including loneliness (Berlin, Cassidy, & Belsky, 1995; Hazan & Shaver, 1987; Mikulincer, Shaver, & Pereg, 2003; Zimmermann, 2004). Only few studies, however, focused on additive, mediating, or moderating effects of attachment and intra-personal factors on loneliness. One exception is the study by Wiseman, Mayseless and Sharabany (2006), that showed that self-criticism (i.e., a specific type of personality vulnerability; Blatt, 2004) was found to partially mediate the effects of attachment style on loneliness in college students.

Regarding parenting styles, two parenting dimensions may be particularly important to investigate, that is, responsiveness (also referred to as parental warmth or support; Barber, Stolz, & Olsen, 2005) and psychological control (i.e., using manipulative and internally pressuring techniques to enforce children to obey, such as guilt induction, shaming, or conditional loving; Barber & Harmon, 2002; Soenens & Vansteenkiste, 2010). As both parenting dimensions have been shown to relate to loneliness in adolescence (e.g., Jackson, 2007; Lobdell & Perlman, 1986; Soenens, Vansteenkiste, Goossens, Duriez, & Niemiec, 2008; Wiseman et al., 2006), future studies could explore whether they also interact with certain intra-personal factors (e.g., Big Five personality traits of the adolescent) in predicting loneliness. Indeed, similar studies with externalizing behavior as outcomes have shown important interplay between parenting styles and adolescent personality (de Haan, Prinzie, & Deković, 2010; Prinzie, Van der Sluis, de Haan, & Deković, 2010).

Finally, a particular type of interplay between inter- and intra-personal factors in the prediction of loneliness has recently attracted attention, that is, gene-environment interplay. Loneliness has been shown to have a strong genetic component (Bartels, Cacioppo, Hudziak, & Boomsma, 2008; Boomsma, Willemsen, Dolan, Hawkley, & Cacioppo, 2005) and previous studies highlighted important interactions between genetic and environmental factors in

predicting loneliness in adolescence. For example, in addition to a main effect of the serotonin transporter gene (5-HTTLPR), on the course of loneliness in adolescence, an interaction between this genotype and maternal support in predicting loneliness was found (van Roekel, Scholte, Verhagen, Goossens, & Engels, 2010). Furthermore, although no support for a main effect of a dopamine receptor gene (DRD2) was found, a significant interaction between this genotype and parental support in the prediction of adolescent loneliness emerged (van Roekel, Goossens, Scholte, Engels, & Verhagen, 2011). Such studies indicate that genetic predisposition may pose adolescents at higher risk for developing loneliness in reaction to stressful parental environments. Yet, gene-environment studies on loneliness have rarely examined the role of peers as potential environmental stressors. This is surprising considering the central role of peers and peer relationships during adolescence. Therefore, an important suggestion for future studies is to investigate whether adolescents' genetic background interacts with stressful negative peer experiences, such as peer rejection or peer victimization, in the development of loneliness.

4. Developmental course across adolescence

4.1 Answering questions

The final shortcoming in previous literature that we aimed to address in the present dissertation is the lack of knowledge on the developmental course of loneliness across adolescence. Chapters 4 and 7 included information regarding the general developmental trend in adolescence, whereas Chapter 7 provided additional information regarding the existence of subgroups in loneliness trajectories. A general decreasing loneliness trend was identified between ages 15 to 20, showing that adolescents – on average – tend to experience less loneliness across time. However, substantial individual differences in the development of loneliness were observed, as we identified five loneliness trajectories: (a) a low stable trajectory, including individuals never experiencing substantial levels of loneliness across adolescence; (b) a chronically high trajectory, representing adolescents persistently suffering from loneliness; (c) a low increasing trajectory, including individuals showing an increase in loneliness over the course of adolescence – in sharp contrast to the general trend; (d) a high decreasing trajectory, representing individuals with high levels of loneliness in mid-adolescence and moderate levels of loneliness in late adolescence; and (e) a moderate decreasing trajectory, including individuals with moderate levels of loneliness in mid-adolescence and low levels of loneliness in late adolescence. These studies emphasize the

importance of applying person-centered approaches in addition to the more commonly used variable-centered approaches to study developmental processes, as they may uncover important inter-individual differences in intra-individual change.

Adolescents in these five trajectories differed from one another in terms of personality profile (i.e., extraversion, neuroticism, and agreeableness) and psychosocial functioning (i.e., depressive symptoms, self-esteem, anxiety, and perceived stress), which indicates the validity of the five subgroups. Moreover, several other studies have been set up recently to examine loneliness trajectories in adolescence (Benner, 2011; Harris, Qualter, & Robinson, 2012; Ladd & Ettekal, 2012; Qualter et al., 2012; Schinka, van Dulmen, Mata, Bossarte, & Swahn, 2012)[4]. Remarkably, all studies identified a small subgroup of children or adolescents who chronically experienced loneliness, and the percentage of this group ranged from 3% to 14%. This subgroup at risk significantly differed from the other subgroups on a variety of variables. Specifically, childhood predictors of chronic loneliness were low trust beliefs, low social acceptance, negative reactivity, internalizing attribution style, passive play, deficits in social skills, depressive symptoms, and aggression (Qualter et al., 2012; Schinka et al., 2012). Outcomes of chronic loneliness included depressive symptoms, more frequent GP visits, lower perceived general health, deficits in social skills, aggression, suicide attempts, greater trouble sleeping, and academic difficulties (Benner, 2011; Harris et al., 2012; Qualter et al., 2012; Schinka et al., 2012).

Together with the predictors and outcomes uncovered in the present dissertation, these results clearly indicate that the group of adolescents chronically suffering from loneliness is a subgroup at high risk that is in need of clinical intervention. Although many loneliness perspectives stressed the importance of the duration of loneliness (e.g., Ernst & Cacioppo, 1999; Heinrich & Gullone, 2006), these studies are the first to empirically confirm that chronic loneliness, compared to temporary loneliness, is a serious cause for concern.

4.2 Raising questions

Our results regarding the development of peer-related loneliness across adolescence may stimulate similar research regarding the other three dimensions from the multi-dimensional approach applied in the present dissertation, that is, parent-related loneliness, affinity for aloneness, and aversion to aloneness (Marcoen et al., 1987). Specifically, future

[4] All papers in this list that are currently under review will be published together, as a special section on loneliness trajectories in *Journal of Adolescence.* Also Chapter 4 will be published in that special section.

studies could investigate whether these other loneliness dimensions generally increase or decrease across adolescence, and whether particular subgroups of adolescents exist that do not follow these normative trends. In addition, future studies could investigate whether changes in different loneliness dimensions are associated with one another. No prior longitudinal work has focused on the development of parent-related loneliness, affinity for aloneness, or aversion to aloneness. However, one cross-sectional cohort study suggested that parent-related loneliness and affinity for aloneness gradually increased across adolescence, whereas aversion to aloneness gradually decreased (Marcoen & Goossens, 1993). Thus, future longitudinal studies should do well to verify these hypothesized changes in the different loneliness dimensions. Note that our results regarding peer-related loneliness confirmed the hypothesized decreasing trend across adolescence suggested in that specific study (i.e., Marcoen & Goossens, 1993).

In addition to these normative developmental trends, we expect different trajectories for different subgroups of adolescents regarding parent-related loneliness, affinity for aloneness, and aversion to aloneness. Regarding parent-related loneliness, adolescents explore their social environment while trying to maintain a close relationship with their parents (Goossens, Marcoen, van Hees, & van de Woestijne, 1998). However, finding this balance can be difficult (Beyers, Goossens, Vansant, & Moors, 2003), and distancing oneself too quickly and radically from one's parents may result in parent-related loneliness. Furthermore, essential life choices have to be made, such as the timing of leaving the parental home, which affects psychosocial adjustment (Kins & Beyers, 2010), and possibly parent-related loneliness. As these processes take on a different form for different adolescents, we expect inter-individual variation in the course of parent-related loneliness through adolescence.

Similarly, we expect inter-individual variation regarding the development of positive and negative attitudes towards being alone. Children typically have a negative attitude towards spending time alone, whereas adolescents gradually start to experience the positive and restorative functions of solitude. Indeed, time spent alone can stimulate introspection, self-reflection, self-regulation, increased creativity, and greater insight (e.g., Goossens, 2006; Larson, 1990; Long & Averill, 2003; Suedfeld, 1982). However, the timing of this process may differ for different adolescents and may depend on specific personality characteristics and the social context. Indeed, some adolescents may never develop the ability to fruitfully spend time alone, and show a strong increase in aversion to solitude across adolescence. Other

adolescents may show a particularly strong increase in affinity for aloneness and may even prefer spending time alone over spending time in the company of others.

We suggest future studies to integrate the different loneliness dimensions in joint trajectories, rather than examining the development of peer-related loneliness, parent-related loneliness, and attitudes towards being alone in isolation. Indeed, we expect important interplay between the development of the four loneliness dimensions. For example, as mentioned in Chapter 7, lonely adolescents may develop an affinity towards aloneness as a defense mechanism to cope with their loneliness. By defining oneself as a person who likes spending time alone, the gap between their actual and ideal social network may narrow, and their feelings of loneliness may decrease across time. Alternatively, an increasing aversion to aloneness may be accompanied by increased feelings of loneliness, due to the fact that these adolescents cannot cope with the increased time spent alone in adolescence (Larson, 1990). Moreover, it would be interesting to investigate whether increases in aversion to aloneness are always accompanied by decreases in affinity for aloneness. Given that the two attitudes towards solitude are only moderately correlated concurrently (Marcoen et al., 1987; Teppers et al., 2012), we hypothesize that – for some individuals – both can develop independently across time.

A final suggestion for future studies is to investigate the development of loneliness in adolescents who face additional, non-normative challenges. For example, loneliness has been investigated in samples of adolescents with a wide range of specific vulnerabilities, including adolescents with autism spectrum disorders (e.g., Bauminger & Kasari, 2000; Lasgaard, Nielsen, Eriksen, & Goossens, 2010), ADHD (e.g., Heiman, 2005), mental and/or physical disabilities (e.g., Howell, Hauser-Cram, & Kersh, 2007; Rokach, Lechcier-Kimel, & Safarov, 2006), and adolescents with chronic health problems including diabetes (e.g., Storch et al., 2004) and cardiovascular diseases (e.g., Luyckx, Goossens, Missotten, & Moons, 2011). Although these are very different subgroups of adolescents, they all face non-normative difficulties in addition to dealing with the normative (social) developmental tasks in adolescence, which can make them particularly vulnerable for loneliness. To the best of our knowledge, no studies thus far have examined loneliness trajectories in such vulnerability samples. It would be interesting for future studies to investigate, for example, whether the percentage of chronic lonely adolescents is larger in vulnerability samples compared to the normative population. Similarly, identifying antecedents and consequences of the different loneliness trajectories could be vital, particularly those antecedents and consequences that are

related to the specific vulnerabilities of these adolescents. For example, future research could investigate whether variables such as illness coping, perceived health, relationships with doctors and nurses, and quality of life can distinguish between the different loneliness trajectories in samples of chronically ill adolescents.

Of course, the suggestion to replicate our findings in samples of adolescents with specific vulnerabilities also applies to all other findings emerging from the present dissertation. Recent work has started to investigate such questions. For example, as noted, our cross-lagged results regarding loneliness and depressive symptoms have been replicated in a sample of adolescents with congenital heart diseases (Luyckx et al., 2012). Moreover, the association between peer experiences (i.e., friendship quantity and friendship quality) and loneliness has been examined in a recent study comparing (a) typically developing adolescents, (b) adolescents with motor and/or sensory disabilities, and (c) adolescents with autism spectrum disorder (Bossaert, Colpin, Pijl, & Petry, 2012). The latter subgroup of adolescents was found to be more lonely than the other two subgroups. Furthermore, the three subgroups were found to differ in the correlation between peer experiences and loneliness. Specifically, the correlation between loneliness and friendship quantity only reached significance in the subgroup of typically developing adolescents. In addition, the correlation between loneliness and friendship quality was absent in the subgroup of adolescents with autism spectrum disorder, whereas this correlation was significant in the subgroups of typically developing adolescents and the adolescents with motor and/or sensory disabilities (Bossaert et al., 2012). Although these studies are a first step in the direction of replicating our findings in samples of adolescents with specific vulnerabilities, more research on this topic is needed to generalize our findings.

5. General conclusion

Throughout the different empirical chapters of this dissertation, we have gained new insights in the developmental course of loneliness through adolescence, its antecedents and consequences, and underlying mechanisms in these associations. To acquire these insights, we applied different state-of-the art statistical techniques (e.g., latent growth curve modeling, latent class growth analyses, cross-lagged path analyses, longitudinal mediation), used multi-informant data (i.e., self- and peer-reported data), and replicated our main findings in different samples. In addition to addressing significant gaps in previous literature, findings from the present dissertation also raised new questions, which have the potential to stimulate future studies. That way, we hope that the present dissertation contributes to the continuing development of loneliness research and theory.

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