Adolescent Social Roots of Adult Loneliness

Joseph Stuart Tan
Wilmington, Delaware

B.A., Haverford College, 2012, M.A., University of Virginia, 2015

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Committee:
Joseph P. Allen, Ph.D., Chair
Noelle M. Hurd, Ph.D., M.PH
Joanna Lee Williams, Ph.D.
Robert E. Emery, Ph.D.

Abstract

This study used longitudinal, multimethod data from a community sample to examine the relationships between adolescent social experiences and adult loneliness. First, it was hypothesized that close relationship experiences in adolescence will be more predictive of adult loneliness than broad peer group acceptance. Latent growth curve analyses showed that close friendship competence in adolescence predicted lower initial levels of loneliness in adulthood, while broad peer group acceptance did not significantly predict either initial levels of loneliness in adulthood or growth in loneliness. The results suggest that the social skills that an adolescent requires to be seen as competent in close friendships may serve as an effective foundation for connecting with others an adult, while the importance of broad peer group acceptance might be bounded to adolescence, at least in terms of loneliness.

Next, it was hypothesized that adolescents who display delays in the transition of relationship function will be lonelier as adults. Latent growth curve analyses showed no evidence for differences in engagement with parents versus with close friends or differences in self-disclosure with parents versus with close friends predicting loneliness. Analyses showed that more growth in close friendship intimacy during adolescence was found to marginally predict less loneliness at the initial time of assessment in adulthood. However, no evidence was found for either romantic relationship engagement or being in a romantic relationship predicting the loneliness intercept or slope. Results suggest further support for the importance of adolescent close relationships for adult loneliness**.**

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Introduction

Loneliness and its clinical significance

Loneliness, also referred to as perceived social isolation, is defined as a discrepancy between an individual's preferred social relations and their actual relations (Peplau & Perlman, 1982). Multiple perspectives can be used to conceptualize loneliness: evolutionary theories view loneliness as the motivation to repair social disconnection (Cacioppo et al., 2006); a cognitive accounting of loneliness focuses on the mismatch between preferred social relations and actual relations (Gierveld, 1998); and a relationship-focused perspective emphasizes unmet social needs (Archibald, Bartholomew, & Marx, 1995). Regardless of how loneliness is conceptualized, it is clear that a significant number of people experience it across the lifespan. Over one-third of adolescents and young adults report experiencing loneliness at least some of the time; in adulthood, prevalence rates as high as 45% have been reported, and 15%-25% of older adults report experiencing loneliness for months or longer (Qualter et al., 2015).

Over the last 15 years, evidence has accumulated pointing to loneliness as a risk factor in serious health problems. Loneliness has been associated with a 26% higher likelihood of mortality in a meta-analysis that included 70 studies (Holt-Lunstad, Smith, Baker, Harris, & Stephenson, 2015). A meta-analysis of 23 longitudinal studies (180,000 participants in the studies covered) found an association between loneliness and coronary heart disease (Valtorta, Kanaan, Gilbody, Ronzi, & Hanratty, 2016). Other physical health outcomes associated with loneliness include high blood pressure, diminished immunity, poor sleep quality, and obesity (S. Cacioppo, Grippo, London, Goossens, & Cacioppo, 2015; Hawkley & Capitanio, 2015). Loneliness has even been associated with abnormal ratios of circulating white blood cells and

expression of genes involved in the inflammatory response (Cacioppo et al., 2015), though it should be noted that this finding is only inconsistently reported (Mezuk et al., 2016).

Similarly, the list of mental health correlates of loneliness is lengthy, including social anxiety, impulsivity, and suicidal ideation (S. Cacioppo et al., 2015). Depression in particular has been studied as a correlate of loneliness, with lonely individuals exhibiting maladaptive coping strategies, such as rumination, which is also common in the experience of depression (Vanhalst, Luyckx, Teppers, & Goossens, 2012). Although loneliness and depression are related, they are distinct phenomena. Cross-lagged analyses are mixed on the direction of prediction, but do not suggest significant overlap between the two constructs (Lasgaard, Goossens, & Elklit, 2011; Vanhalst et al., 2012). Linkages between loneliness and mental health problems appear throughout the lifespan. Individuals experiencing chronically high or increasing levels of loneliness from childhood to early adolescence also exhibit social skill deficits, aggression, depression, and suicidal ideation in middle adolescence (Schinka, van Dulmen, Mata, Bossarte, & Swahn, 2013). Later in life, loneliness is associated with cognitive decline and dementia, a finding backed up by prospective longitudinal studies (Hawkley & Cacioppo, 2010).

Adolescent social development and loneliness

Given the physical and mental health consequences of loneliness, it is crucial for interventions aiming to reduce loneliness to reach individuals before it develops. Successful delivery of these interventions would be greatly enhanced by a well-formed understanding of the development of loneliness. Adolescence is a stage during which factors that may point towards the development of loneliness might be unearthed. It is a time of tremendous challenges and changes, particularly those that either are in the social realm or that are likely to affect it. These socially-consequential changes include physical maturation, changes in perspective taking,

identity exploration, changes in companions, and changes in autonomy and individuation (Laursen & Hartl, 2013). The ways in which adolescents navigate these changes can have consequences for both the connections they are able to form with those around them and for their perceived connectedness to those around them.

Recently, descriptive work on adolescent loneliness has established a picture of the ways that adolescents experience it. Research examining trajectories of loneliness during adolescence has shown that significant changes in loneliness occur during this time for some, with between 30-40% of individuals increasing or decreasing in loneliness by one standard deviation during adolescence (Qualter et al., 2013; Vanhalst, Goossens, Luyckx, Scholte, & Engels, 2013). Other work has examined multiple domains of loneliness (e.g. with respect to parents, with respect to peers) in conjunction with individual preferences for being alone, finding that loneliness in both domains and preferences for being alone are related to lower scores on various self-esteem measures (Maes, Vanhalst, Spithoven, Van den Noortgate, & Goossens, 2015). Experience sampling research found that lonely adolescents were more responsive to social threat and social reward on a daily basis, in that they had more negative affect when feeling judged by their companions, but more positive affect when around company who made them feel accepted (van Roekel, Goossens, et al., 2014). Although this descriptive work is certainly valuable, a complementary approach to understanding the development of loneliness is to not only study lonely adolescents, but to also examine adolescence as a staging ground for developing the capabilities to ward off loneliness in adulthood (vs. become susceptible to it).

Past research has established several potential predictors of higher levels and a trajectory of increase in loneliness in adolescence, such as aggression, depression, and poor social skills (Schinka et al., 2013). A meta-analysis of predictors of loneliness in adolescence found large

effect sizes for gender (boys were lonelier), shyness, self-esteem, and depression, and medium effect sizes for low levels of social support, social anxiety, maternal expressiveness, and paternal expressiveness (Mahon, Yarcheski, Yarcheski, Cannella, & Hanks, 2006). Personality traits and other temperamental factors have also been examined as predictors of loneliness, with low agreeableness and high desire for autonomy predicting greater peer- and parent-related loneliness, and low extraversion predicting greater peer-related loneliness (Teppers et al., 2013).

Understanding different sources of loneliness during adolescence is a distinct research question from finding aspects of adolescence that might predict loneliness developing into adulthood. Behaviors that predict loneliness in adolescence might also predict loneliness in adulthood, but it is possible that adolescent-era predictors might be explaining features of loneliness that are specific to adolescence and that do not necessarily persist into adulthood. Expectations for normative social experiences change from adolescence to adulthood, as intimate friendships and romantic relationships supplant peer group acceptance to become more important to individuals (Qualter et al., 2015). These changes in expectations should then lead to changes in what constitutes perceived social isolation. For example, an individual whose main social experiences consist of group activities like seeing movies or going to the mall likely feels connected to others at 13, but if the same individual still is only going to the mall in groups at 23 and hasn't dated or formed a close friendship, he or she might feel left out, compared to his or her peers. Thus, understanding adolescent predictors of adult loneliness is a discrete question from understanding predictors of loneliness within adolescence. The former question is important given that many of the negative health and mental health correlates of loneliness have been found in adulthood. To begin to understand adolescent predictors of adult loneliness, it is

crucial to identify aspects of adolescent social development that are associated with the features of loneliness specific to adulthood.

Close friendships vs. broad peer group acceptance

Different types of peer relationships in adolescence might predict adolescent loneliness vs. adult loneliness. Adolescence is the first time connections are being formed to large groups of peers, known as crowds, as peer groups in childhood are often small (Brown & Larson, 2009). Likewise, adolescence is the first time intimacy becomes an important component of close peer relationships (Buhrmester & Furman, 1987). Individual differences in the types of peer relationships that individuals experience in adolescence might forecast the future likelihood of experiencing loneliness. Having more of one type relative to another might reflect individual differences in priorities in forming connections to others, or perhaps differences in underlying social skills, both of which might be consequential for the experience of loneliness.

With regards to loneliness in adolescence, it seems that both close relationships and acceptance by the broader peer group are related to aspects of loneliness. In a study using sociometric methods to capture peer group relationships and actor-partner independence models to capture close peer relationships, loneliness was related to fewer reciprocal relationships and unilateral-received friendships (i.e. someone else nominates the adolescent as a friend and it is not reciprocated) (Lodder, Scholte, Goossens, & Verhagen, 2015). In the same study, loneliness was also related to perceiving one's best friendship as being lower quality, despite best friends of lonely adolescents not reporting similar perceptions. A separate sociometric study also found that having more reciprocal liking with peers was related to less loneliness (Woodhouse, Dykas, & Cassidy, 2012). Taken together, these studies suggest that lonely adolescents struggle in both

close and broad peer group relationships, as they are not a popular choice for friendships, but also have a particularly negative view of their closest relationships.

Other research points at the differential importance of broad peer group relationships vs. close relationships over the course of adolescence. In early adolescence, social status within the peer group is important to adolescents and appears to be specifically related to loneliness, as a lack of friends and peer rejection both predict loneliness (Brown & Larson, 2009; Vanhalst, Luyckx, & Goossens, 2014). As adolescents approach late adolescence, intimate friendships (and later, romantic relationships) become more central and are then thought to be more salient when it comes to loneliness (Qualter et al., 2015). In a sample of late adolescents, friendship closeness was found to be related to lower levels of loneliness (Chow, Ruhl, & Buhrmester, 2015). Based on this, we might expect close relationship experiences in adolescence, especially during late adolescence, to be more predictive of adult loneliness than relationship experiences with the broader peer group. No research, however, has examined this directly.

Evidence from other domains of long-term social functioning may inform expectations for how close friendships and broad peer group acceptance might be associated with adult loneliness. Early adolescents who seek out short-term success with peers and short-term popularity with the peer group by attempting to impress peers with pseudomature behavior (e.g. precocious romantic involvement, minor delinquency) have long-term difficulties in close relationships (Allen, Schad, Oudekerk, & Chango, 2014). Closeness in adolescent friendships predicted 10-year relative decreases in depressive symptoms, self-worth, and social anxiety, while broad relationships (e.g. popularity) predicted relative increases in social anxiety (Narr & Allen, 2016). Rejection from the peer group in adolescence has been found to predict middle adult life satisfaction, but *only* if the rejected individual also did not participate much in dyadic

friendships (Marion, Laursen, Zettergren, & Bergman, 2013). These longitudinal studies provide evidence that close relationships in adolescence might be more predictive of long-term functioning than broad peer group acceptance, and so it might follow that close relationships would also be expected to be more predictive of loneliness in adulthood.

Social transitions during adolescence

How adolescents proceed through (or do not proceed through) developmental transitions in their social world might also be linked to loneliness. The primary social transition during adolescence includes two significant shifts in companion identity: in early adolescence, individuals shift from mainly interacting with their parents to increasingly interacting with their peers. As adolescence progresses, romantic partners also become more central in individuals' lives (Collins & Laursen, 2004; Collins, Welsh, & Furman, 2009). These changes in companionship have implications for various social behaviors during adolescence. In adolescence, peers' opinions become more valued and peers begin to rival adults in influence on adolescents' attitudes and activities (Brown & Larson, 2009). Changes are evident in the function of nonparental relationships as well, as romantic relationships fulfill attachment functions to a greater degree than nonromantic friendships do in late adolescence (Markiewicz, Lawford, Doyle, & Haggart, 2006; Trinke & Bartholomew, 1997). By the end of adolescence, an individual's social world has now become more robust and diverse in terms of companions, with relationships with parents, peers, and romantic partners all providing a variety of functions.

At the same time as companionship changes are occurring, there is also change in the amount of autonomy an adolescent expresses, as they seek to individuate themselves from their parents (Laursen & Hartl, 2013). Adolescents begin to push boundaries with their parents, disagreeing more with them, disclosing less information to them, and simply not obeying some

of their rules (McElhaney, Allen, Stephenson, & Hare, 2009). Adolescents also establish some physical distance from their family, spending less time at home as they get older (Laursen & Hartl, 2013). Through this process, adolescents begin to establish themselves as independent.

These changes in companionship and autonomy during adolescence might matter for loneliness because they may provide ways for adolescents to compare themselves to others and see if they are "on-track" developmentally. If an adolescent is the last one among her peer group to form a romantic relationship, she may see herself as being "behind" everyone else, subsequently perceive herself as being different from her peers, and then feel more isolated from them. Feeling "behind" might even extend to situations where there still is observable social contact, such as if an adolescent is spending a weekend with their parents as opposed to being engaged in activities with peers (Laursen & Hartl, 2013). In terms of autonomy, the ways that adolescents use their relationships with their parents, peers, and romantic partners might define their perceptions of being "on-track" or "behind." Adolescents who are still relying on their parents to solve their problems while their peers are attempting to handle challenges independently from parents may feel behind. In addition to prompting perceived isolation from peers, not being "on-track" in terms of making social transitions might also signal underlying deficits in the ability to make connections with others, and thus forecast future difficulties.

Some evidence suggests the possibility of these social transitions playing a role in the development of loneliness. A study using an experience sampling method to assess moment-to-moment loneliness experienced by adolescents found that being in the company of parents did not reduce loneliness after being alone while being in the company of friends did (van Roekel, Scholte, Engels, Goossens, & Verhagen, 2014). In late adolescence, when "on-track" individuals would be expected to engage in romantic relationships, being romantically involved was related

to being less lonely (Chow et al., 2015). These studies suggest that adolescents internalize normative changes in companion identity, in that having experiences that don't line up with these changes is related to more loneliness. Although no study has directly examined social transitions and their relationship to loneliness, especially in terms of autonomy, it seems reasonable to expect that difficulties in managing these social transitions might predict later loneliness.

Social self-perception

In addition to social experiences that adolescents have, the ways they internalize those experiences also appear likely to be consequential for later loneliness. As reviewed earlier, lonely adolescents see their best friendships as lower in quality than their best friends themselves do, suggesting that biases in perception of relationships are related to being lonely (Lodder et al., 2015). Similarly, individuals who are more sensitive to rejection have been found to also be lonelier, as they tend to withdraw from social contact (Watson & Nesdale, 2012). Additionally, adolescents' sense of self-esteem has been shown to be a predictor of loneliness (Vanhalst, Luyckx, Scholte, Engels, & Goossens, 2013). Targeting maladaptive social cognitions, which include negative perceptions about the self in social interactions has been found to be the most effective intervention for loneliness (S. Cacioppo et al., 2015). Given the associations between self-perception and loneliness, it appears important to consider how adolescents' self-perceptions might modify the relationship between their actual social experiences and loneliness.

Gender differences in loneliness

Whether gender differences in loneliness exist or not is an unresolved question. Mahon and colleagues (2006) identified gender (specifically being male) as a sizable predictor of loneliness with a meta-analysis, a finding with which Heinrich and Gullone (2006) concurred in a review of the literature. In a review of the literature, Qualter and colleagues (2015) concluded

that it was unclear whether there were gender differences in loneliness. Conversely, it is well-established that throughout adulthood, females have more sizeable and diverse social networks than males (Ajrouch, Blandon, & Antonucci, 2005; Antonucci, Akiyama, & Lansford, 1998; McLaughlin, Vagenas, Pachana, Begum, & Dobson, 2010). It is possible that whatever accounts for these gender differences in establishing and maintaining relationships might also affect the experience of loneliness. Therefore, it is important to probe whether gender interacts with adolescent social experiences to predict adult loneliness.

Research Questions and Hypotheses

The proposed study aims to identify aspects of adolescent social development that may forecast the experience of loneliness in adulthood. To accomplish this, the following research questions will be addressed with multi-method, multi-reporter data from a socio-demographically heterogeneous sample of 184 adolescents, their parents, their peers, and their romantic partners followed across a 17-year span:

1. Do close relationship experiences differentially predict loneliness as compared to broad peer group acceptance?
    a. **Hypothesis I: Close relationship experiences will be more predictive of adult loneliness than broad peer group acceptance.**
2. Do relative delays in the transition of relationship functions during adolescence predict loneliness?
    a. **Hypothesis II: Adolescents who display delays in the transition of relationship function will be lonelier as adults.**
3. Does an adolescent's self-perception of their ability to connect to others add anything to prediction of adult loneliness **over and above other predictors**?

4. Does gender moderate any of these relationships?

Method

Participants and Procedure

The proposed study will analyze data from a sample of 184 adolescents followed from ages 13 to 29, as well as their parents, close friends, and romantic partners. Participants were recruited from the seventh and eighth grades of a public middle school drawing from suburban and urban populations in the Southeastern United States. Participants were originally approached to serve either as primary participants (i.e. target teens), or as collateral informants (i.e. close peers of target teens). Of those approached, 63% of teens and their families agreed to participate. The final community sample of participants was diverse in terms of socioeconomic status and racial/ethnic identity, with adolescents identifying themselves as 58% Caucasian, 29% African-American, and 13% as from other or mixed ethnic groups. Adolescents' mothers reported a median family income in the $40,000 to $59,999 range during the first year of the study (18% of the sample reported annual family income less than $20,000, and 33% reported annual family income greater than $60,000). This sample was similar to the population of the larger community in terms of both socioeconomic status and racial/ethnic background.

Participants were recruited via an initial mailing to all parents of students in the school describing the study, along with follow-up contact efforts at school lunches. Families that indicated interest were subsequently contacted by phone. All participants provided informed assent before each interview session, and parents provided informed consent. Once participants reached 18, they gave informed consent for themselves. Interviews took place in private offices within a university academic building. The same assent/consent procedures were used for

peers/romantic partners as target individuals. All participants were fully debriefed and written procedures for handling unusual problems (e.g. responding to seriously depressed or suicidal participants) were established and tested. The study has retained over 98% of the original sample, as of the most recent phase of the study. Proactive measures have been taken to minimize attrition by compensating the subjects well, making interviews relaxed, having interviewers establish rapport with the participants, and obtaining extensive tracking information.

Target individuals participated a number of times throughout the course of the study, with various interaction partners. At participant ages 13 and 16-18, target individuals participated with their parents in both observational and reported assessments. At participant ages 13-18, target individuals were asked to nominate their closest peer to take part in the study. Close peers were described as "people you know well, spend time with, and whom you talk to about things that happen in your life." For individuals who had a hard time naming close peers, it was explained that naming their "closest" peer did not mean that they were necessarily close to this peer in an absolute sense, but that they were close to this peer relative to other acquaintances they might have. By asking the individual to nominate a peer at each assessment, this provided an accurate picture of their current close peer relationships in mid to late adolescence, and avoided repeated assessments of a peer whom the teen had grown apart from.

At a later assessment, target individuals who were in a romantic relationship of three months or longer were asked to participate. Data were collected over a three-year period when individuals were ages 17-19, with each eligible dyad participating only one time over that three-year period. Of the 184 participants in the original sample, 126 participated with their romantic partners. The three-month relationship criterion was established in order to ensure that individuals were involved in substantial and clearly identifiable romantic relationships.

Individuals' relationships with their romantic partners averaged about 14 months in duration, (M = 14.39 months, SD = 13.31 months).

The final set of assessments occurred when individuals were age 23 and continued yearly until individuals were age 28. These assessments were primarily self-reported questionnaires. Six participants provided no information at any of these adult assessments. Attrition analyses comparing these participants to the participants who completed at least one of the adult assessments found no significant difference in any of the study variables that were assessed in adolescence.

Participants' data were protected by a Confidentiality Certificate issued by the U.S. Department of Health and Human Services, which further protects information from subpoena by federal, state, and local courts. Participants, their parents, their closest peers, and romantic partners were paid for their participation. If necessary, transportation and childcare were provided.

Measures

For a simplified overview of all proposed constructs and measures, see Table 1. For copies of questionnaire-based measures, please see the appendices.

Loneliness

Loneliness in adulthood. Loneliness in adulthood was assessed with the self-report UCLA Loneliness Scale (Russell, 1996), annually from age 23 to age 28. Participants reported on their own symptoms of loneliness. The scale consisted of 20-items scores on a four-point Likert scale from "never" to "often." An example item was "I feel as if nobody really understands me." Internal consistency for this scale was excellent (Cronbach's α's = .96-.97).

Self-reported social acceptance in adolescence. For ages 13-18, participants how socially accepted they were on the Social Acceptance subscale of the Self-Perception Profile for Adolescents (Harter, 1988). Reporters were asked to answer how true each item on the subscale was for them. An example item from the subscale was "Some teens are really hard to like." This subscale consisted of four items scored on a four-point Likert scale from "really not true" to "really true." Internal consistency for the subscale was good (Cronbach's α's = .75-.81).

Markers of close friendship quality

Peer report of close friendship competence. At participant ages 13-15, participants' best friends reported on participants' experiences in close friendships on the Close Friendship subscale of the Self-Perception Profile for Adolescents (Harter, 1988). Reporters were asked to answer how true each item on the subscale was for the participant. An example item from the subscale was "Some teens don't have a really close friend to share things with." This subscale consisted of four items scored on a four-point Likert scale from "really not true" to "really true." Reports of close friendship were aggregated across the three assessments to provide a more stable characterization of the participant. Internal consistency for the subscale was good over the three assessments (Cronbach's α's = .67-.74).

Observed supportive behaviors with peer. Adolescents participated in a 6-minute support-seeking task with their peers at ages 13-18. During the task, the adolescents asked for help with a "problem they were having that they could use some advice or support about." Typical topics for the interactions included problems with peers or siblings, raising money, or deciding about joining sports teams. These interactions were coded using the Supportive Behavior Coding System (Allen et al., 2001), which was based on several related systems (Crowell et al., 1998; Julien et al., 1997). Both the target adolescents and their peers were

assessed for the degree to which they stayed engaged, both verbally and non-verbally, with each other. Each interaction was coded (on a 0-4 scale) using an average of the scores obtained by two trained raters blind to other data from the study. Dyadic scores for the interactions were obtained by combining the individual scores for the target teen and their interaction partner. Interrater reliability was fair to good for the peer interactions (intraclass *r's* = .61-73; Cicchetti & Sparrow, 1981).

Markers of broad peer group acceptance

Popularity. Adolescent popularity was assessed using a limited nomination sociometric procedure from ages 13 to 15. Each adolescent, their closest friend and two other target peers named by the adolescent were asked to nominate up to 10 peers in their grade with whom they would "most like to spend time on Saturday night". This study used grade-based nominations (e.g., students could nominate anyone in their grade at school) rather than classroom based nominations due to the age and classroom structure of the school that all participants attended. As a result, instead of friendship nominations being done by 15 to 30 children in a given classroom, each target teen's nominations were culled from among 72 to 146 mid-adolescents (depending on the target teen's grade level). Unlike the classroom nominations, these nominators comprised approximately 38% of the entire student population in these grades. Nevertheless, the large number of raters for each target teen (in essence, each target teen received a yes/no nomination from each nominator in his/her grade) means that this subsample of nominators is likely to yield fairly reliable estimates of popularity for each target teen. This approach has been previously validated with both children and adolescents (Bukowski, Gauze, Hoza, & Newcomb, 1993), and it has high one-year stability (r=.77), and strong links to relevant social behavior (Allen, Porter, McFarland, Marsh, & McElhaney, 2005; Allen, Porter, &

McFarland, 2006). The raw number of like nominations each teen received was standardized within grade level before being added to the main data set as the primary measure of popularity following the procedure described in Coie, Dodge, and Coppotelli (1982). Standardized nominations were aggregated across the three assessments.

Peer-rated social acceptance. For ages 13-15, participants' best friends reported on how socially accepted participants were on the Social Acceptance subscale of the Self-Perception Profile for Adolescents (Harter, 1988). This measure was identical to the self-report version described above, except that reporters were asked to answer how true each item on the subscale was for the participant. Reports of social acceptance were aggregated across the three assessments. Internal consistency for the subscale was good for the three assessments (Cronbach's α's = .77-.83).

Markers of social transition

Observed engagement and self-disclosure with parents and peers. In addition to support-seeking interactions with peers (described above), participants were observed in support-seeking interactions with parents at age 13, and from ages 16-18. Engagement in the parent interactions was coded with the same coding system used for the peer interactions. Participant depth of self-disclosure during the support-seeking interaction was also coded for both parent and peer interactions. The most disclosing statement from the participant during the interaction, as judged by trained coders, was rated from 0-4 based on the affect displayed, how controversial the statement is socially, and the degree to which the participant was made vulnerable through the self-disclosure. For the ages 16-18 interactions with parents, some participants only were observed once during this timeframe, so scores were aggregated across the three assessments. Reliabilities were good for self-disclosure with peers (age 13 interclass r = .73, ages 16-18

interclass *r* 's= .71-.75) and good for self-disclosure with parents (age 13 interclass *r* = .87, ages 16-18 interclass *r* = .62). Reliability ranged from good to excellent for engagement with parents (age 13 interclass *r* = .77, ages 16-18 interclass *r's* = .77-.96).

Intimacy in peer relationships. Intimacy displayed in peer relationships from ages 13 to 18 was assessed with the Intimate Exchange subscale of the Friendship Quality Questionnaire (Parker & Asher, 1993). Both participants and their close peers reported on this subscale at each assessment. An example item from the subscale was "We always tell each other our problems." Dyadic scores for intimacy were obtained by combining the individual scores for the participant and their close peer at each assessment. Internal consistency for the subscale ranged from good to excellent over the six assessments (Cronbach's α's = .86-.92).

Observed engagement with romantic partners. At age 18, participants who were in romantic relationships of three months or longer took part in observed support-seeking interactions of the same format as those described above. Typical topics for the interactions with romantic partners included career choices, problems with parents, problems with friends, and moving. Engagement was coded with the same coding system used in the parent and peer interactions, and dyadic scores were created once again. Interrater reliability was fair for the romantic partner interactions (intraclass *r* = .54).

Social self-concept

Rejection sensitivity. Participants' level of rejection sensitivity was assessed using the Rejection Sensitivity Questionnaire (Downey & Feldman, 1996). Rejection sensitivity was collected yearly between the ages of 16 and 18. The measure consists of 18 hypothetical situations in which rejection by a significant other is possible (e.g., "You ask a friend to do you a big favor"). For each situation, participants were first asked to indicate their degree of concern

or anxiety about the outcome of the situation (e.g., "How concerned or anxious would you be over whether or not your friend would want to help you out?) on a 6-point scale ranging from 1 *(very unconcerned)* to 6 *(very concerned)*. Participants were then asked to indicate the likelihood that the other person would respond in an accepting manner (e.g., "I would expect that he/she would willingly agree to help me out") on a 6-point scale ranging from 1 *(very unlikely)* to 6 *(very likely)*. An overall rejection sensitivity score was obtained by weighting the expected likelihood of rejection by the degree of anxiety or concern about the outcome of the request. An *overall rejection sensitivity score* was computed by summing the expectation of rejection by concern ratings for each situation and then dividing by the total number of situations. Studies have found that the Rejection Sensitivity Questionnaire has sound psychometric properties (Downey, Feldman, & Ayduk, 2000; Downey & Feldman, 1996). Internal consistency for each subscale was very good (Cronbach's α for Total Rejection Sensitivity = .87 at age 16, .88 at age 17, .90 at age 18).

Valuing popularity. Participants reported on how much they valued popularity at ages 13 to 15 using a values measure created for the broader longitudinal study. Participants reported how important each item on the measure was to them. An example item for valuing popularity was "How important is it to you to be admired by other kids?" Participants reported on a three-point Likert scale. Scores were aggregated across the three assessments. Reliabilities ranged from fair to good for this measure (Cronbach's α's = .63-.71).

Social comparison. Participants' engagement in social comparison was assessed at age 18 with the Iowa-Netherlands Comparison Orientation Measure. Items did not carry a valence in either direction; example items included "I always pay a lot of attention to how I do things compared with how others do things," and "I often compare how I am doing socially (e.g., social

skills, popularity) with other people." Participants reported on a five-point Likert scale on the eleven-item measure. Reliability for this scale was good (Cronbach's α = .86).

Post-hoc analyses: Adult relationship mediators

For the post-hoc analyses testing adult mediators of any relationships between the adolescent constructs and adult loneliness, indicators of adult close relationship quality were assessed.

Closeness of close friendship. Closeness of the close friendship was assessed at age 23 with a measure created for the broader longitudinal study. Participants' close friends were asked "How close of a friend is [participant]?" Close friends reported on a five-point Likert scale from 1 (not very close) to 5 (best friend).

Romantic relationship satisfaction. Romantic relationship satisfaction was assessed at age 23 with the Relationship Assessment Scale (Hendrick, Dicke, & Hendrick, 1998). Participants reported on their satisfaction in their current romantic relationship through seven items. An example item was "How well does your partner meet your needs?" Participants reported on a five-point Likert scale. Reliability for this scale was good (Cronbach's α = .88).

Table 1. Overview of primary constructs and measures

Construct Task/Measure (Type of Measure)	Reporter: Participant Age
Loneliness	
Perceived social acceptance (Q)	TN: 13-18
Loneliness (Q)	TN: 23-28
Markers of close friendship quality	
Close friendship competence (Q)	CP: 13-15
Dyadic engagement (O)	TN and CP: 13-15
Markers of broad peer group acceptance	
Popularity (S)	PG: 13-15
Social acceptance (Q)	PG: 13-15
Markers of social transition	
Engagement and self-disclosure with parents and peers (O)	TN: 13, 16-18

Intimacy (Q) Engagement (O)	TN and CP: 13-18 TN and RP: 18
Social self-concept Rejection sensitivity (Q) Valuing popularity (Q) Social comparison (Q)	 TN: 16-18 TN: 13-15 TN: 18
Adult relationship mediators Closeness of close friendship (Q) Romantic relationship satisfaction (Q)	 CP: 23 TN: 23

Note. TN = Participant; CP = Close Peer; PG: Peer Group; RP = Romantic Partner; Q = Questionnaire; O = Observational; S = Sociometric.

Analytic Plan

All analyses were conducted in R 3.2.0. Growth curves were constructed with the package "lavaan" (Rosseel, 2012), while using full information maximum likelihood methods to address potential biases due to missing data in longitudinal analyses. Model fit of the growth curve models was assessed using the chi-square statistic, comparative fit index (CFI), the Tucker Lewis Index (TLI), the root-mean-square error of approximation (RMSEA), and the standardized root-mean-square residual (SRMR). For significant associations, post-hoc analyses examining mediation were conducted. Mediation was assessed using bias-corrected bootstrapped confidence intervals around the indirect effect (MacKinnon, Fairchild, & Fritz, 2007). Mediation was indicated by the 95% confidence interval of the specific indirect effect not including 0.

Research Question 1: Do close friendship experiences differentially predict loneliness as compared to broad peer group acceptance?

First, exploratory factor analysis was used to examine if there was a latent factor underlying the various methods of assessing close peer relationship quality and broad peer group acceptance. Any appropriate latent factors were to be carried forward into the rest of the analyses that use these variables; otherwise, each method of assessing close peer relationship quality and

broad peer group acceptance was kept as a separate predictor of loneliness. Conditional latent growth curves were constructed for adult loneliness, with both close peer relationship quality and broad peer group acceptance examined as predictors of the initial level of adult loneliness (loneliness at age 23) and change in loneliness in adulthood (from ages 23 to 28). To do this, an unconditional latent growth curve for loneliness was estimated to provide information on individual differences in both loneliness at age 23 and change in loneliness from ages 23 to 28. Next, close peer relationship quality and broad peer group acceptance predictors were added to the model to predict the intercept and slope components of the latent growth curve (see Figure 1). Although loneliness was not directly assessed in adolescence, self-reported social acceptance was used as a control in the model to approximate baseline loneliness in adolescence. Family income in adolescence was also used as a control in this model.

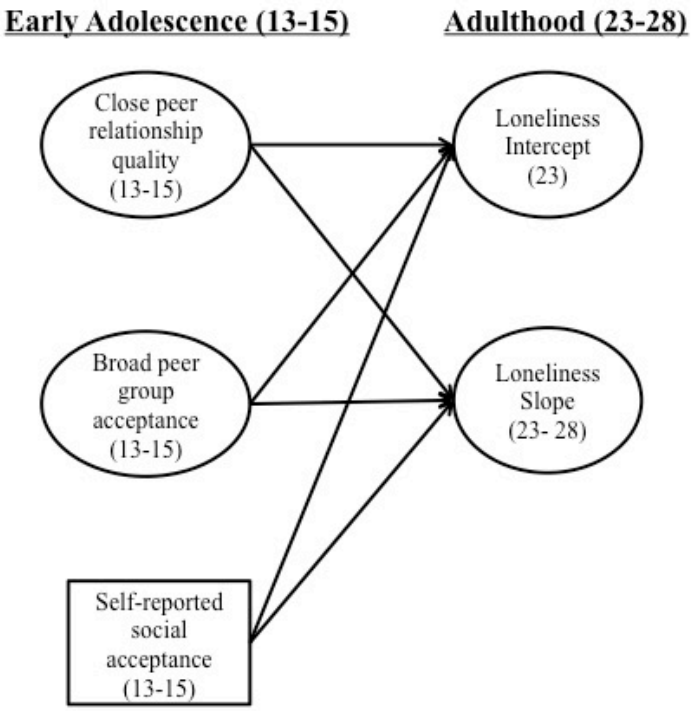


Figure 1. Proposed model for Research Question 1.

Research Question 2: Do relative delays in the transition of relationship functions predict loneliness?

To answer this question, delays in the transition of relationship functions were operationalized in multiple ways. Observationally, I compared adolescent engagement and self-disclosure in support-seeking interactions with their parents and their peers at two time-points, early adolescence (age 13) and late adolescence (ages 16-18). To operationalize a delay in the transition of relationship functions, a standardized difference score was created for both self-disclosure and engagement with both parents and peers. In this case, a delay meant that an

adolescent is displaying more engagement and more self-disclosure with their parents than their peers in late adolescence. The late adolescence difference score was then be examined as a predictor of the initial level of adult loneliness and change in loneliness in adulthood, using conditional latent growth curve analysis as described above, with family income and self-reported social acceptance in adolescence as controls (See Figure 2). To test whether the overall difference between behaviors with parents and peers (regardless of when it occurs) was important rather than the delay in the transition of relationship functions for loneliness, the difference scores at age 13 were used as predictors of loneliness as well.

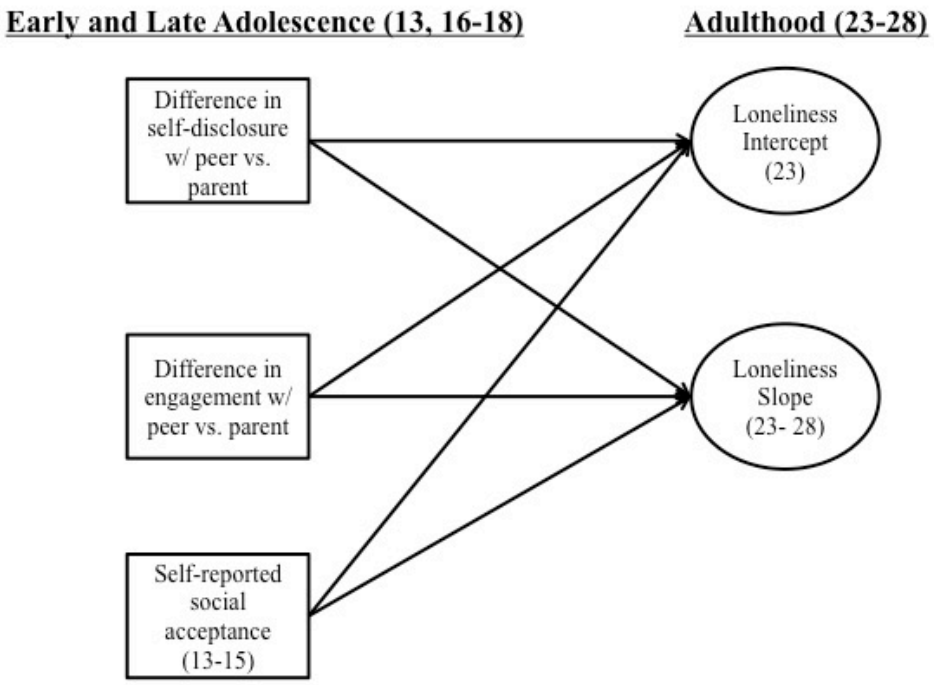


Figure 2. Proposed model 1 for Research Question 2

Intimate exchange with close friends over the course of adolescence was examined as a marker of transition of relationship functions to peers. Growth over time in the display of intimate exchange in peer relationships would represent peer relationships taking on more adult functions during adolescence. A latent growth curve was estimated for intimate exchange with close friends during adolescence (ages 13-18) such as described above for loneliness. Growth in intimate exchange as represented by the slope parameter of the growth curve was used as a predictor of adult loneliness, for which a growth curve was estimated simultaneously, as described above (See Figure 3). As with the other models, self-reported social acceptance was used as a control to approximate baseline loneliness in adolescence, and family income was controlled for.

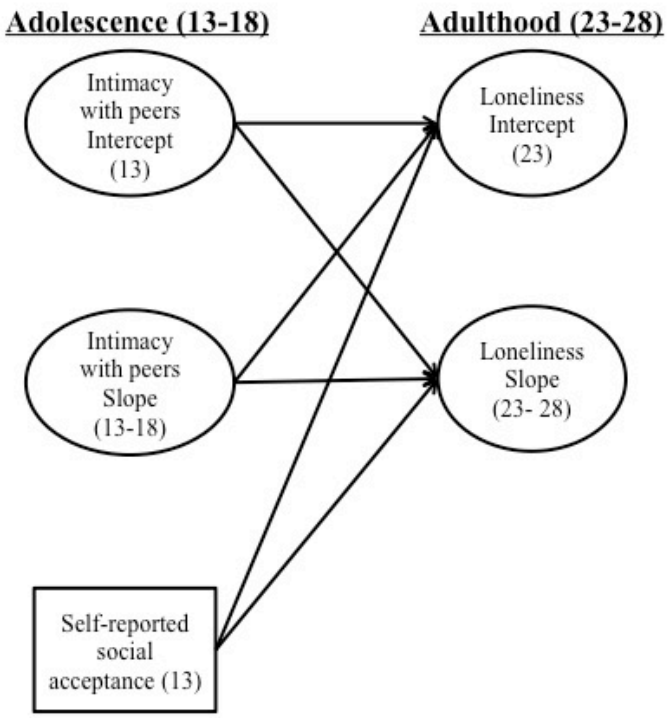


Figure 3. Proposed model 2 for Research Question 2

In late adolescence, support provided by romantic partners was used as another indicator of how well adolescents have navigated the transition of relationship functions. Support was defined both by observational and reported behaviors. Presence of a romantic relationship in late adolescence was examined as a potential predictor of loneliness in adulthood. Conditional latent growth curve analyses were again used to test support provided by romantic partners and the presence of a romantic relationship as a predictor of adult loneliness (See Figure 4). As with the other models, self-reported social acceptance was used as a control to approximate baseline loneliness in adolescence, and family income was also controlled for.

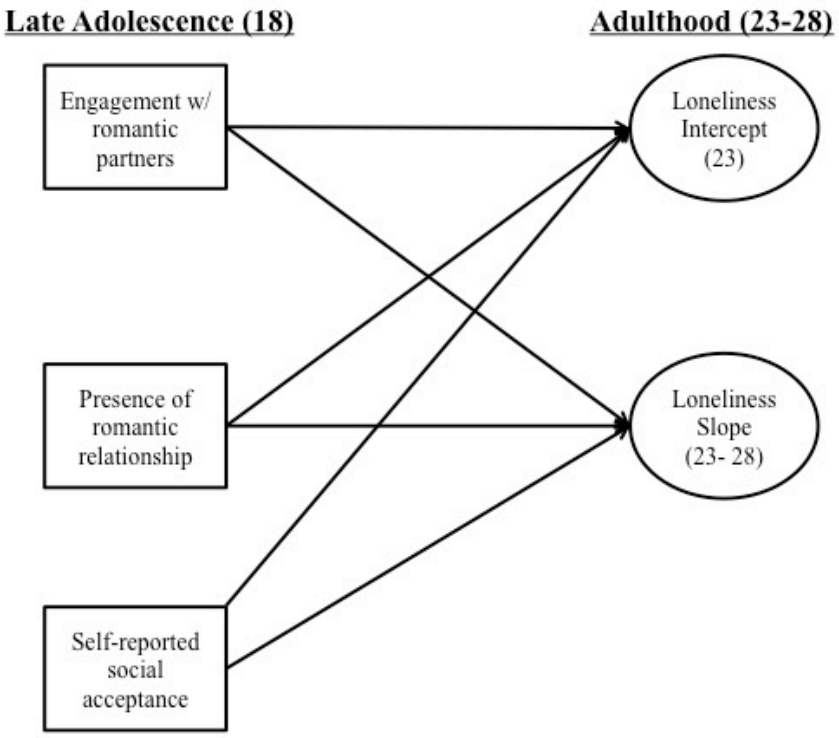


Figure 4. Proposed model 3 for Research Question 2

Research Question 3: Does an adolescent's self-perception of their ability to connect to others add anything to prediction of adult loneliness ***over and above other predictors****?*

For all models used in the above analyses, markers of social self-perception (rejection sensitivity, social comparison, valuing popularity, valuing close relationships) were added as predictors to examine if these markers explained any additional variance in adult loneliness over and above the other predictors. For each model, only the markers of social self-perception that were measured at the same time as at least one of the original predictors were added. When there

were multiple markers of social self-perception measured at the same time as the original predictors, each marker was added separately to the model.

Research Question 4: Does gender moderate any of these relationships?

For each analysis described above except for the multivariate growth curve analysis for intimacy predicting loneliness, gender was examined as a moderator by testing for interactions between gender and each potential predictor of loneliness through the creation of interaction terms. Each interaction was examined separately.

For the multivariate growth curve analysis for intimacy predicting loneliness, since an interaction term with the growth curve for intimacy cannot be created, a multigroup analysis with gender as the grouping variable was conducted.

Results

Descriptive Statistics

Table 1 displays means, standard deviations, and ranges for variables used in the Hypothesis I analyses. Table 2 displays intercorrelations of Hypothesis I variables. Notably, when gender was included as the only predictor of loneliness, it did not significantly predict either initial levels of loneliness or growth in loneliness over time

Table 1
Means, Standard Deviations, and Ranges for Hypothesis I Variables

Variable	*M*	*SD*	*Range*
1. Family income	6.10	1.96	1.00-8.00
2. Loneliness (23)	11.61	12.34	0.00-55.00
3. Loneliness (24)	11.77	12.88	0.00-53.00
4. Loneliness (25)	12.89	13.35	0.00-60.00

Variable	*M*	*SD*	*Range*
5. Loneliness (26)	12.34	13.83	0.00-60.00
6. Loneliness (27)	10.81	12.40	0.00-54.00
7. Loneliness (28)	10.29	11.88	0.00-57.00
8. Peer engagement	2.47	0.53	0.75-3.92
9. Close friendship competence	13.42	1.87	7.50-16.00
10. Popularity	0.91	1.14	-0.72-4.21
11. Social acceptance (peer-report)	13.03	2.19	4.00-16.00
12. Social acceptance (self-report)	13.18	2.34	5.33-16.00
13. Depression	5.80	4.57	0.00-26.75
14. Valuing popularity	5.90	1.46	3.00-9.00

Table 2
Simple Correlations for Hypothesis I Variables

Variable	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1. Family income	-.11	.03	.04	.02	-.02	-.04	.15	.20**	.07	.38**	-.09	.00	-.08	-.04
2. Gender	--	.02	.02	-.03	.00	-.11	-.05	.16*	.14	-.06	-.03	-.06	.10	.19*
3. Loneliness (23)		--	.60**	.54**	.49**	.58**	.57**	.13	-.27**	-.05	-.17*	-.33**	.41**	-.06
4. Loneliness (24)			--	.67**	.65**	.45**	.59**	.11	-.16*	.01	-.18*	-.36**	.26**	-.03
5. Loneliness (25)				--	.61**	.61**	.70**	.08	-.22**	.03	-.19*	-.39**	.26**	-.02
6. Loneliness (26)					--	.58**	.62**	-.01	-.11	-.11	-.14	-.33**	.17*	.03
7. Loneliness (27)						--	.71***	.13	-.16*	-.05	-.08	-.25**	.16*	.04
8. Loneliness (28)							--	.03	-.14	.01	-.17*	-.34**	.26**	-.06
9. Peer engagement								--	.01	.30**	-.03	-.03	-.06	.05
10. Close friendship competence									--	.18*	.48**	.11	-.06	.05
11. Popularity										--	.27**	.25**	-.18*	.03
12. Social acceptance (peer-report)											--	.40**	-.08	.10
13. Social acceptance (self-report)												--	-.45**	.21*
14. Depression													--	.06
15. Valuing popularity														--

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

Unconditional Latent Growth Curve Analyses: Loneliness

An unconditional latent growth curve analysis was first conducted to determine the shape of the developmental trajectory of participants' experiences of loneliness during adulthood (See Figure 5). The LGCA consisted of six repeated measures of participants' experiences of loneliness during adulthood and resulted in good fit indices (χ^2 (16) = 40.20; CFI = .95; TLI = .95; RMSEA = .092, SRMR = .061). A nonsignificant negative mean for the slope factor (μ = -.25, p = .160) indicated that the overall group reported no significant change in loneliness over time. However, significant variance components in both the intercept (ψ = 98.67, p < .001) and the slope (ψ = 2.04, p = .002) factors indicated that there were significant individual differences in both initial levels and growth in participants' loneliness. Finally, no significant relationship between intercept and slope factors (r = -.24, p = .16) was found. Figure 6 displays each individual's experience of loneliness over time and a smoothed conditional mean for the full sample.

Figure 5
Unconditional Latent Growth Curve Model of Loneliness.

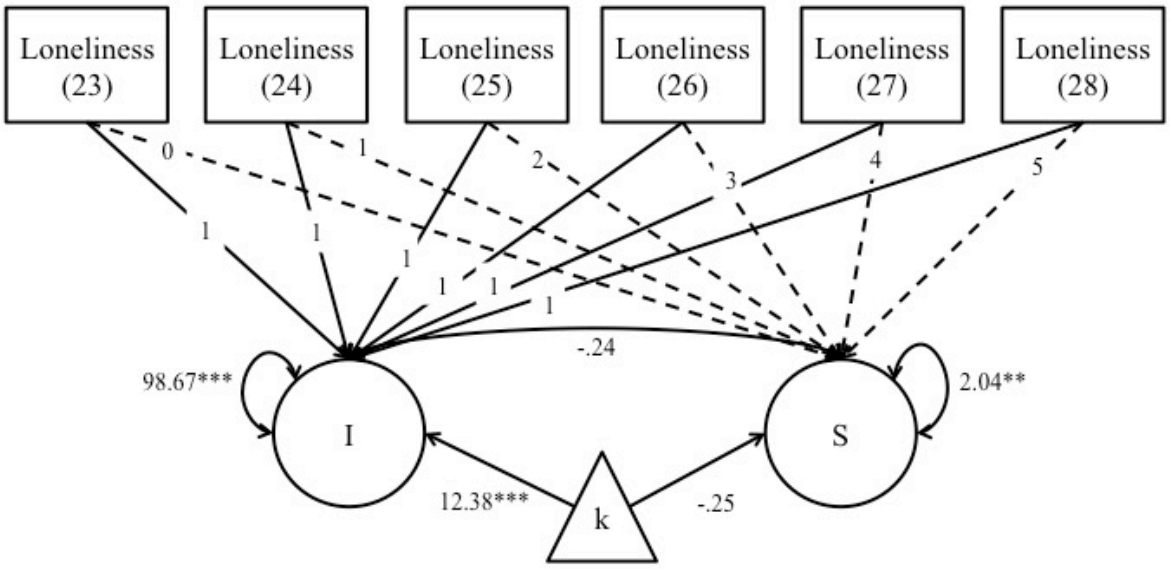
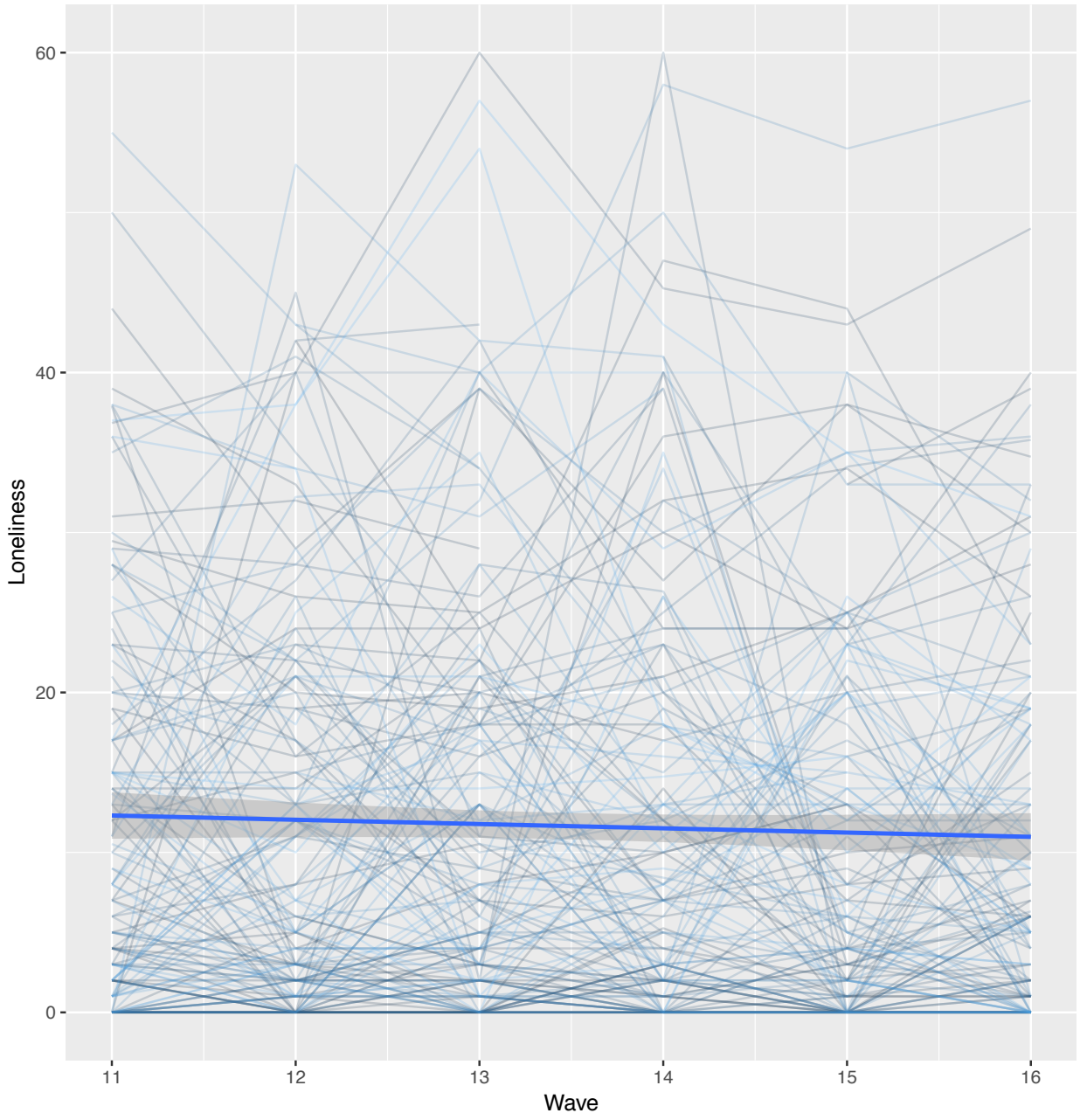


Figure 6
Individual Trajectories of Loneliness with Smoothed Conditional Mean



Hypothesis I: Close relationship experiences will be more predictive of adult loneliness than broad peer group acceptance.

Conditional Latent Growth Curve Model: Broad Peer Group Acceptance and Close Friendship Experiences Predicting Loneliness.

I examined the possibility of a factor underlying both the broad peer group acceptance measures and the close friendship experiences predictors, but correlational analyses suggested that there was not considerable overlap between these two types of relational experiences. Therefore, for the conditional latent growth curve model, I included each predictor without combining them or estimating any latent factors.

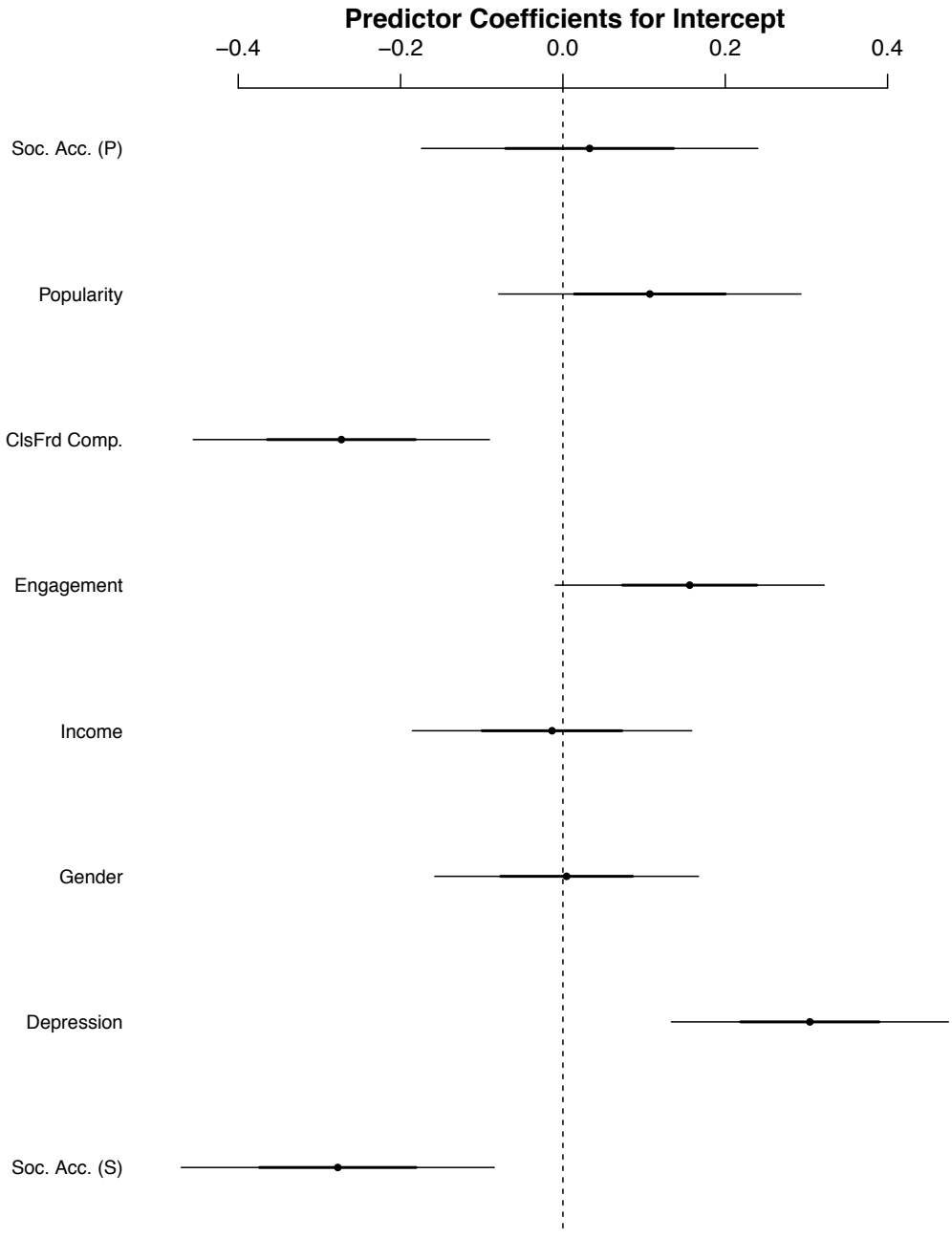
The model demonstrated good model fit (χ^2 (48) = 80.90; CFI = .94; TLI = .92; RMSEA = .061, SRMR = .039). Several of the control variables predicted loneliness, as both self-reported social acceptance and depression in adolescence predicted the intercept of the loneliness growth curve. Self-reported social acceptance was related to less loneliness (β = -.28, p = .004) at the initial time of assessment in adulthood, and depression was related to more loneliness (β = .30, p < .001). Depression in adolescence was also predictive of the slope of the growth curve, such that participants reporting more depression in adolescence reported decreases in loneliness over time relative to the overall pattern of change in loneliness across the entire sample (β = -.30, p = .030). Participant gender and family income did not predict either the intercept or the slope of the loneliness growth curve.

Looking at the close friendship experiences, close friends' reports of the participants' close friendship competence in adolescence significantly predicted the intercept of the loneliness growth curve, such that participants seen as more competent in adolescence reported less loneliness at the initial time of assessment in adulthood (β = -.27, p = .003). Dyadic engagement

in interactions with close friends did not significantly predict the intercept of the loneliness growth curve. Neither type of close friendship experience significantly predicted the slope of the loneliness growth curve.

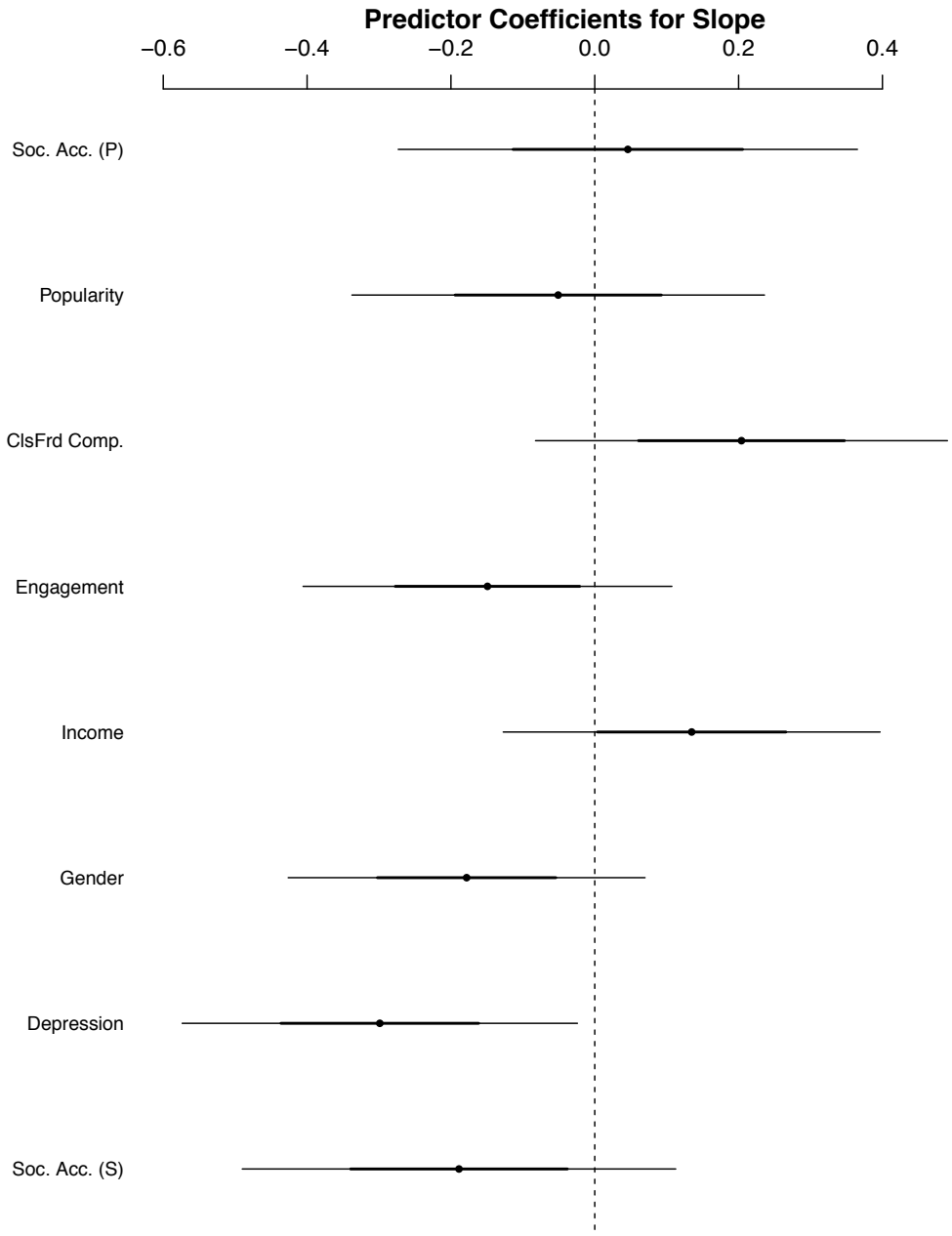
Looking at the broad peer group acceptance predictors, neither participants' sociometric popularity or close friends' reports of participants' social acceptance significantly predicted either the intercept or slope of the loneliness growth curve. The standardized coefficients from the conditional latent growth model for broad peer group acceptance and close friendship experiences predicting loneliness are presented in Figure 7 (for the intercept), and Figure 8 (for the slope); coefficients for both significant and nonsignificant predictors are displayed and coefficients for control variables are displayed.

Figure 7
Predictor Coefficients for Intercept of Loneliness Conditional Growth Model for Hypothesis I



Note. All coefficients standardized. Bolded lines denote 1 SE around the coefficient, regular lines denote 2 SEs. Soc. Acc. (P) = peer-reported social acceptance; ClsFrd Comp. = close friendship competence; Soc. Acc. (S) = self-reported social acceptance.

Figure 8
Predictor Coefficients for Slope of Loneliness Conditional Growth Model for Hypothesis I



Note. All coefficients standardized. Bolded lines denote 1 SE around the coefficient, regular lines denote 2 SEs. Soc. Acc. (P) = peer-reported social acceptance; ClsFrd Comp. = close friendship competence; Soc. Acc. (S) = self-reported social acceptance.

Conditional Latent Growth Curve Model: Adding Self-Perception of Ability to Connect to Broad Peer Group Acceptance and Close Friendship Experiences Predicting Loneliness.

To examine if an adolescent's self-perception of their ability to connect to others added anything to the prediction of adult loneliness over and above broad peer group acceptance and close friendship experiences, valuing popularity was included in the conditional latent growth curve model. Valuing popularity did not significantly predict either the intercept or the slope of the loneliness growth model, and close friendship competence continued to significantly predict the intercept of the growth model, such that participants seen as more competent in adolescence reported less loneliness at the initial time of assessment in adulthood ($\beta = -.27$, $p = .003$).

Conditional Latent Growth Curve Model: Gender Moderation of Broad Peer Group Acceptance and Close Friendship Experiences Predicting Loneliness.

Gender moderation was tested for by including interactions between gender and each broad peer group acceptance and close friendship experience predictor in the conditional latent growth curve model. No evidence of gender moderation was found, as none of the interactions significantly predicted either the intercept or slope of the loneliness growth curve.

Post-Hoc Analyses: Mediation in Adulthood

To examine if the association between close friendship competence in adolescence and initial levels of loneliness in adulthood was mediated by adult relationship experiences, aspects of both close friendships and romantic relationships in adulthood were tested as mediators. Mediation was tested using bias-corrected bootstrapped confidence intervals around the indirect effect, wherein the 95% confidence interval around the indirect effect would signal evidence for mediation (MacKinnon et al., 2007). Closeness of close friendships at the same time-point at which initial levels of loneliness was assessed did not mediate the association between close

friendship competence in adolescence and loneliness. Romantic relationship satisfaction at the same time-point as initial levels of loneliness did not mediate the association between close friendship competence and loneliness.

Summary of Hypothesis I Findings

When comparing close friendship experiences to broad peer group acceptance as predictors of loneliness, it was found that close friendship competence in adolescence predicted lower initial levels of loneliness in adulthood. Dyadic engagement in interactions with close friends and both indicators of broad peer group acceptance did not significantly predict initial levels of loneliness in adulthood, and no indicator of close friendship experiences or broad peer group acceptance significantly predicted growth in loneliness. Valuing popularity did not significantly predict loneliness in adulthood. No evidence of gender moderation of any significant relationships between predictors and loneliness was found. Neither closeness of close friendships or romantic relationship satisfaction in adulthood mediated the relationship between close friendship competence in adolescence and initial levels of loneliness in adulthood.

Hypothesis II: Adolescents who display delays in the transition of relationship functions from parents to peers will be lonelier as adults.

Descriptive Statistics

Table 3 displays means, standard deviations, and ranges for variables used in the Hypothesis II analyses. Tables 4, 5, 6 display intercorrelations of Hypothesis II variables, separated by the analysis they were used in.

Table 3
Means, Standard Deviations, and Ranges for Hypothesis II Variables

Variable	*M*	*SD*	*Range*
1. Depression (13)	5.07	4.30	0.00-25.25
2. Depression (18)	5.03	6.08	0.00-32.00
3. Social comparison	36.24	8.83	13.00-55.00
4. Engagement diff. (13)	-0.02	1.15	-3.64-3.61
5. Self-disclosure diff. (13)	0.04	1.35	-3.39-2.97
6. Engagement diff. (18)	-0.01	1.03	-2.83-2.86
7. Self-disclosure diff. (18)	-0.03	1.16	-3.97-2.70
8. Intimacy (13)	18.08	4.59	6.50-25.00
9. Intimacy (14)	18.69	4.68	5.00-25.00
10. Intimacy (15)	21.38	5.49	7.00-30.00
11. Intimacy (16)	22.44	5.42	8.00-30.00
12. Intimacy (17)	21.99	5.38	8.00-30.00
13. Intimacy (18)	23.39	4.84	6.00-30.00
14. RP Engagement	2.79	0.66	1.00-4.00
15. Rejection sensitivity	8.09	3.06	1.11-20.00

Note. Variables common with Hypothesis I analyses displayed in Table 1.

Table 4
Simple Correlations for Hypothesis II Variables

Variable	9.	10.	11.	12.	13.	14.	15.	16.	17.
1. Family income	.09	.08	-.06	-.03	-.04	.05	.27**	-.11	.08
2. Gender	.07	-.01	-.05	-.02	-.19**	-.15*	.10	.06	.10
3. Loneliness (23)	.18*	.00	.10	.16	-.03	-.03	-.04	.20*	.32**
4. Loneliness (24)	.02	.05	.01	.08	-.02	-.02	.01	.15	.23**
5. Loneliness (25)	.09	.03	.08	.18*	-.12	-.12	-.02	.14	.40**
6. Loneliness (26)	.08	-.08	.00	.06	.03	.03	.02	.07	.29**
7. Loneliness (27)	.01	-.01	.24*	.20*	.04	.04	.02	.06	.22*
8. Loneliness (28)	.02	.07	.01	.12	-.06	-.06	.09	.17*	.35**
9. Engagement diff. (13)	--	.29**	.26**	.17	-.08	.02	-.18*	.02	-.09
10. Self-disclosure diff. (13)		--	.13	.26**	.05	.05	-.17	.30**	.01
11. Engagement diff. (18)			--	.24**	-.05	.01	-.26**	-.01	-.05
12. Self-disclosure diff. (18)				--	-.06	.04	-.01	.10	.14
13. Valuing popularity					--	-.01	.14	.11	-.10
14. Rejection sensitivity						--	.17	.24**	.27**
15. Social comparison							--	.12	.12
16. Depression (13)								--	.30**
17. Depression (18)									--

*$p < .05$. **$p < .01$.
Note. Intercorrelations for variables 1-8 are represented in Table 2.

Table 5
Simple Correlations for Hypothesis II Variables

Variable	14.	15.	16.	17.	18.	19.
1. Family income	.10	.02	-.04	-.11	.03	-.07
2. Gender	.41**	.43**	.50**	.59**	.51**	.40**
3. Loneliness (23)	-.11	-.10	-.15	-.12	-.21*	-.14
4. Loneliness (24)	-.05	-.10	-.15	-.13	-.28**	-.15
5. Loneliness (25)	-.16*	-.05	-.15	-.13	-.16	-.07
6. Loneliness (26)	-.10	-.13	-.10	-.07	-.15	-.13
7. Loneliness (27)	-.18*	-.16	-.16	-.14	-.20*	-.09
8. Loneliness (28)	-.20*	-.15	-.23**	-.26**	-.19*	-.14
9. Valuing popularity	.04	.03	-.02	.01	.08	-.17*
10. Rejection sensitivity	-.09	-.20*	-.31**	-.23**	-.23**	-.30**
11. Social comparison	.13	.26**	.07	.03	.17	.04
12. Depression (13)	-.10	-.07	-.22**	-.08	-.11	-.14
13. Depression (18)	.02	.11	.00	-.05	.08	-.02
14. Intimacy (13)	--	.45**	.57**	.44**	.36**	.34**
15. Intimacy (14)		--	.64**	.58**	.56**	.42**
16. Intimacy (15)			--	.69**	.59**	.57**
17. Intimacy (16)				--	.65**	.59**
18. Intimacy (17)					--	.61**
19. Intimacy (18)						--

*$p < .05$. **$p < .01$.
Note. Intercorrelations for variables 1-8 are represented in Table 2, variables 9-13 in Table 4.

Table 6
Simple Correlations for Hypothesis II Variables

Variable	14.	15.
1. Family income	.09	-.06
2. Gender	-.06	.15*
3. Loneliness (23)	.01	-.08
4. Loneliness (24)	-.06	-.10
5. Loneliness (25)	.09	-.01
6. Loneliness (26)	-.35**	.02
7. Loneliness (27)	-.10	-.04
8. Loneliness (28)	-.11	-.04
9. Valuing popularity	-.05	.05
10. Rejection sensitivity	.05	-.16*
11. Social comparison	.18	-.01
12. Depression (13)	-.28	-.10
13. Depression (18)	.12	.04
14. Romantic partner engagement	--	--
15. Presence of romantic relationship		--

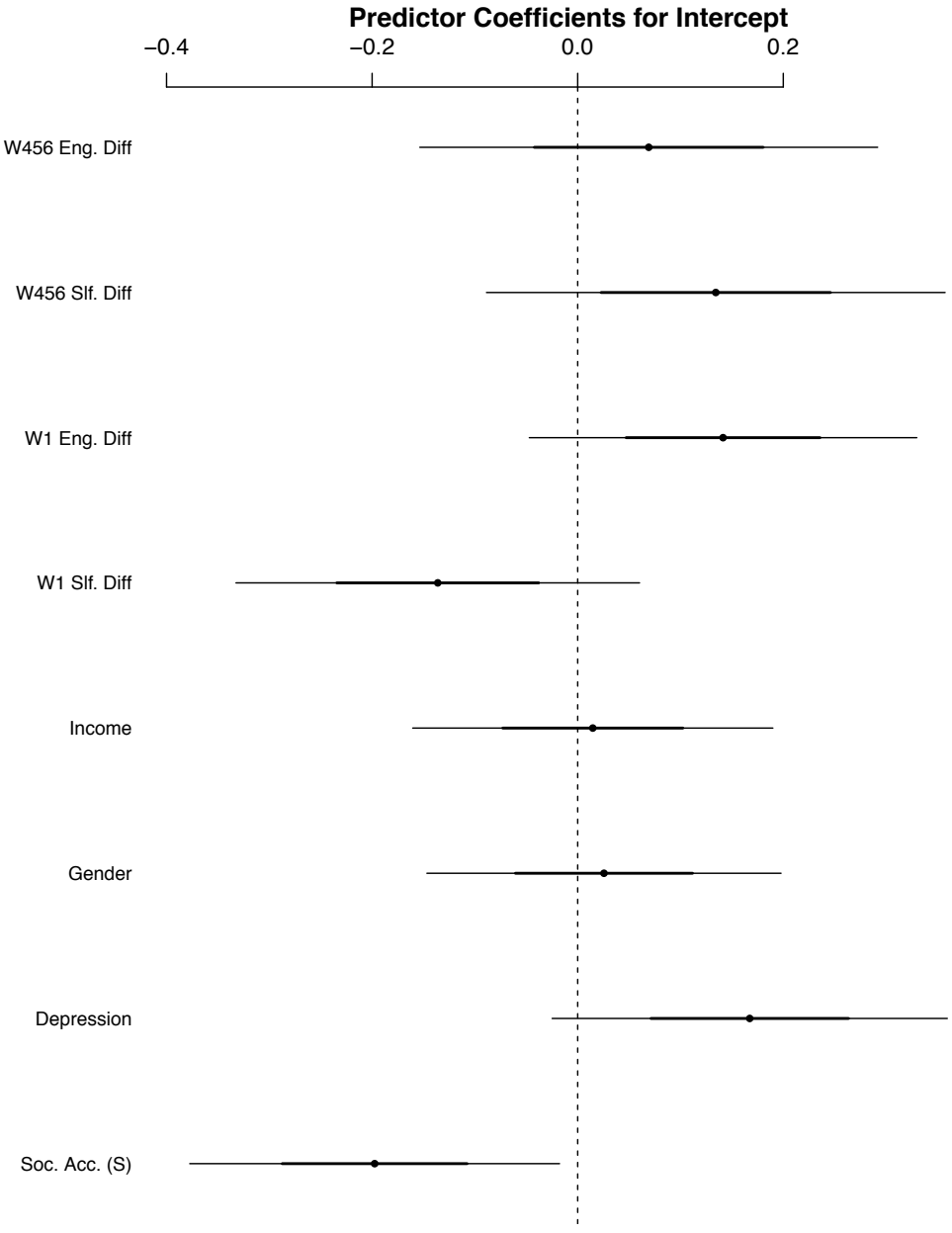
*$p < .05$. **$p < .01$.
Note. Intercorrelations for variables 1-8 are represented in Table 2, variables 9-13 in Table 4.

Conditional Latent Growth Curve Model: Differences in Engagement and Self-disclosure with Parents versus with Close Friend Predicting Loneliness.

The model demonstrated good model fit (χ^2 (48) = 80.14; CFI = .94; TLI = .92; RMSEA = .060, SRMR = .041). Looking at the controls, self-reported social acceptance in adolescence predicted the intercept of the loneliness growth curve. Self-reported social acceptance was related to less loneliness (β = -.24, p = .030) at the initial time of assessment in adulthood, but it did not significantly predict the slope. Depression, participant gender and family income did not significantly predict either the intercept or the slope of the loneliness growth curve.

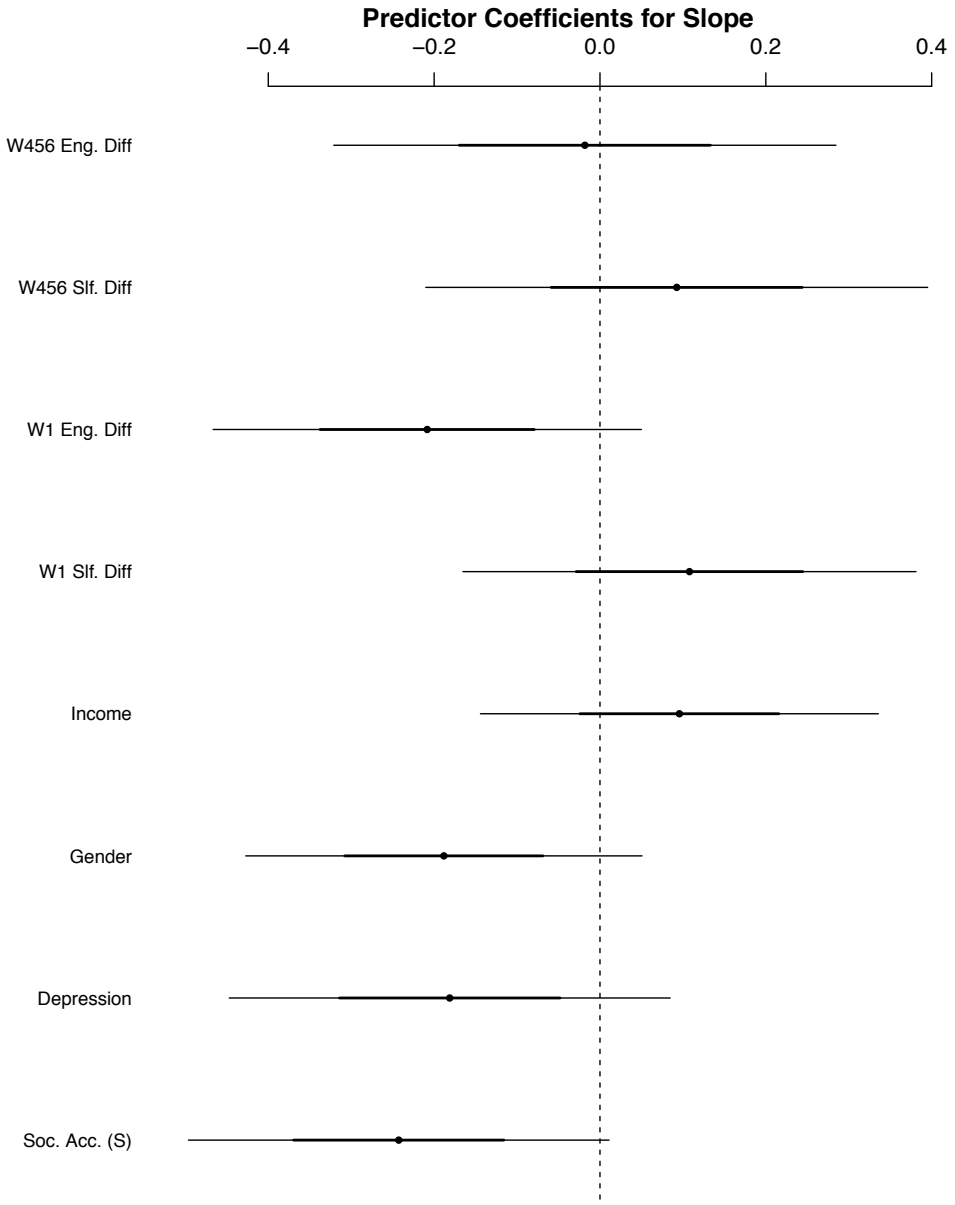
No evidence was found for differences in engagement with parents versus with close friends or differences in self-disclosure with parents versus with close friends predicting either the intercept or the slope of the loneliness growth curve. The standardized coefficients from the conditional latent growth model for differences in engagement and self-disclosure with parents versus close friend predicting loneliness are presented in Figure 9 (for the intercept), and Figure 10 (for the slope); coefficients for both significant and nonsignificant predictors are displayed and coefficients for control variables are displayed.

Figure 9
Coefficients for Differences in Engagement and Self-Disclosure Predicting Intercept of Loneliness



Note. All coefficients standardized. Bolded lines denote 1 SE around the coefficient, regular lines denote 2 SEs. W456 Eng. Diff = difference in engagement with peer vs. mother at ages 16-18; W456 Slf. Diff = difference in self-disclosure disclosure with peer vs. mother at ages 16-18; W1Eng. Diff = difference in engagement with peer vs. mother at age 13; W1Slf. Diff = difference in self-disclosure with peer vs. mother at age 13; Soc. Acc. (S) = self-reported social acceptance.

Figure 10
Coefficients for Differences in Engagement and Self-Disclosure Predicting Slope of Loneliness

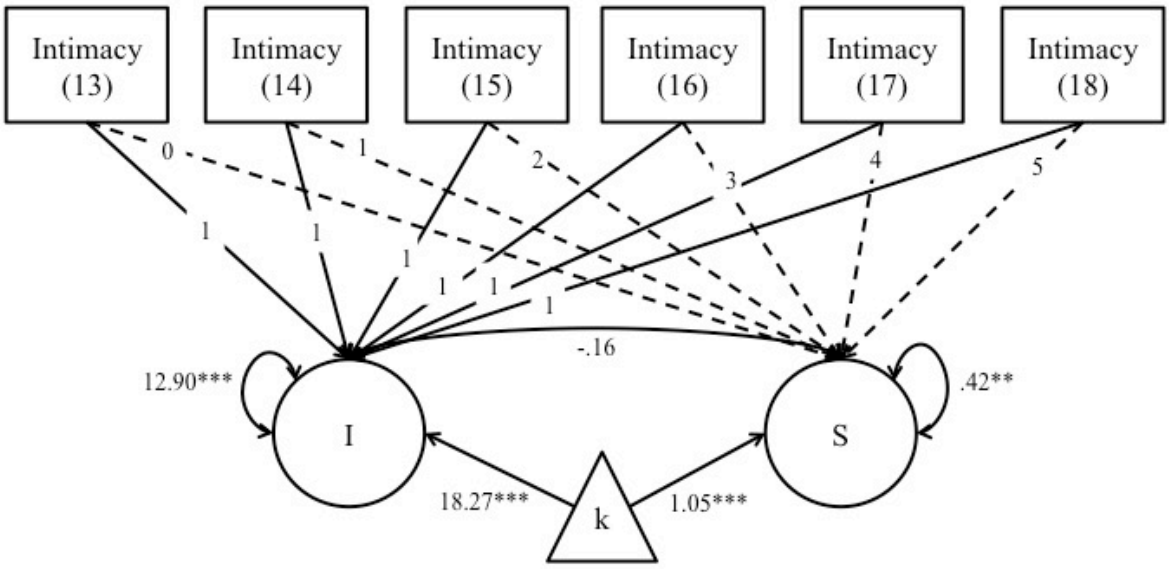


Note. All coefficients standardized. Bolded lines denote 1 SE around the coefficient, regular lines denote 2 SEs. W456 Eng. Diff = difference in engagement with peer vs. mother at ages 16-18; W456 Slf. Diff = difference in self-disclosure disclosure with peer vs. mother at ages 16-18; W1Eng. Diff = difference in engagement with peer vs. mother at age 13; W1Slf. Diff = difference in self-disclosure with peer vs. mother at age 13; Soc. Acc. (S) = self-reported social acceptance.

Unconditional Latent Growth Curve Model of Intimacy in Close Friendships.

An unconditional latent growth curve analysis was first conducted to determine the shape of the developmental trajectory of participants' dyadic experiences of intimacy in close friendships during adolescence (See Figure 11). The LGCA consisted of six repeated measures of participants' dyadic experiences of intimacy in close friendships during adolescence and resulted in acceptable fit indices (χ^2 (16) = 75.85; CFI = .86; TLI = .87; RMSEA = .14, SRMR = .12). A significant positive mean for the slope factor (μ = 1.05, $p < .001$) indicated that the overall group reported positive significant change in dyadic intimacy in close friendships during adolescence. Significant variance components in both the intercept (ψ = 12.90, $p < .001$) and the slope (ψ = 0.42, p = .001) factors indicated that there were significant individual differences in both initial levels and growth in participants' dyadic intimacy in close friendships. Finally, no significant relationship between intercept and slope factors (r = -.16, p = .29) was found.

Figure 11
Unconditional Latent Growth Curve Model of Intimacy in Close Friendships.

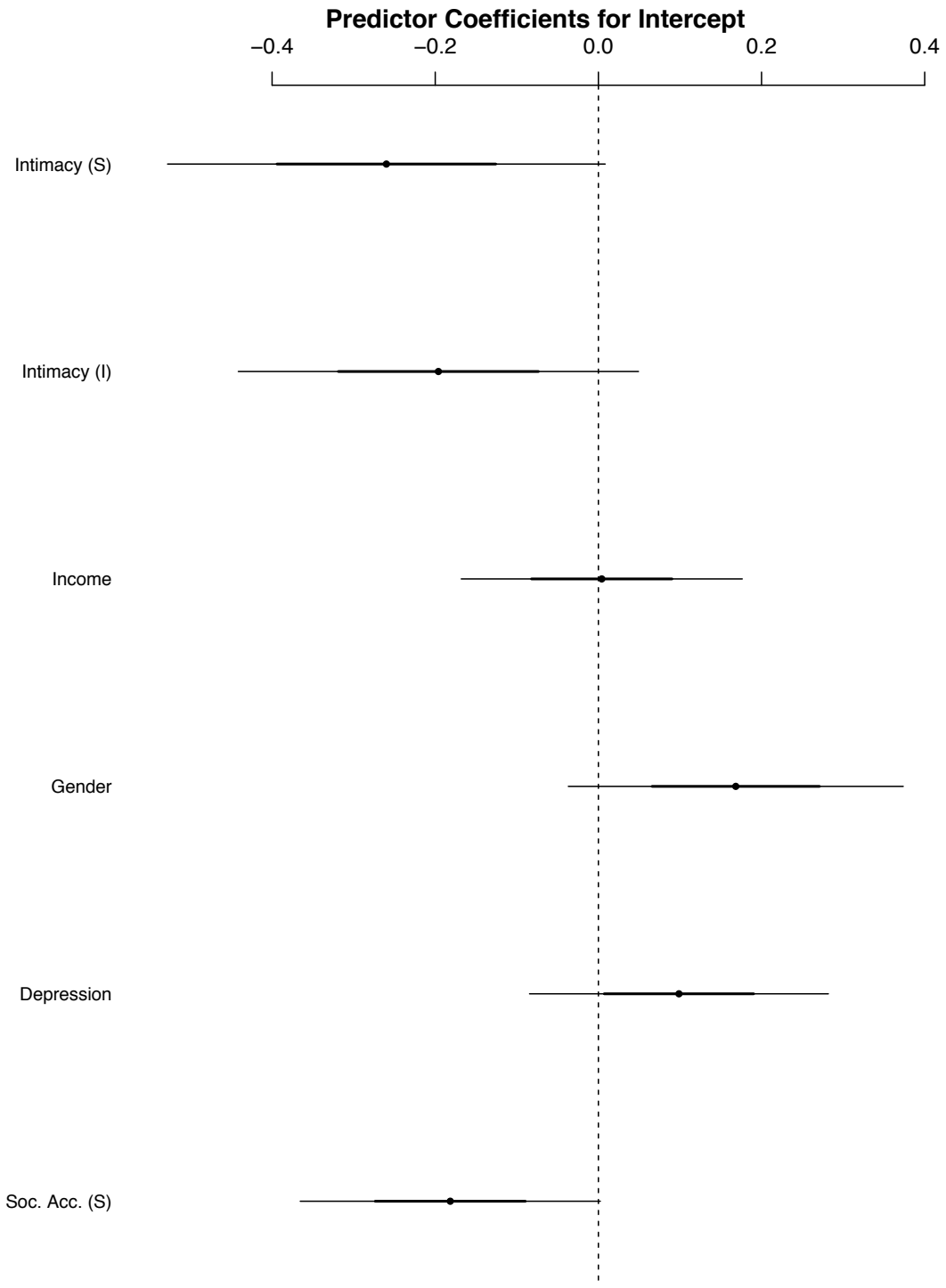


Multivariate Latent Growth Curve Model: Growth in Intimacy in Close Friendships Predicting Loneliness.

The model demonstrated acceptable model fit (χ^2 (104) = 280.03; CFI = .83; TLI = .81; RMSEA = .10, SRMR = .12). Looking at the controls, self-reported social acceptance in adolescence predicted the intercept of the loneliness growth curve. Self-reported social acceptance was related to less loneliness (β = -.18, p = .048) at the initial time of assessment in adulthood, but it did not significantly predict the slope. Depression, participant gender and family income did not significantly predict either the intercept or the slope of the loneliness growth curve.

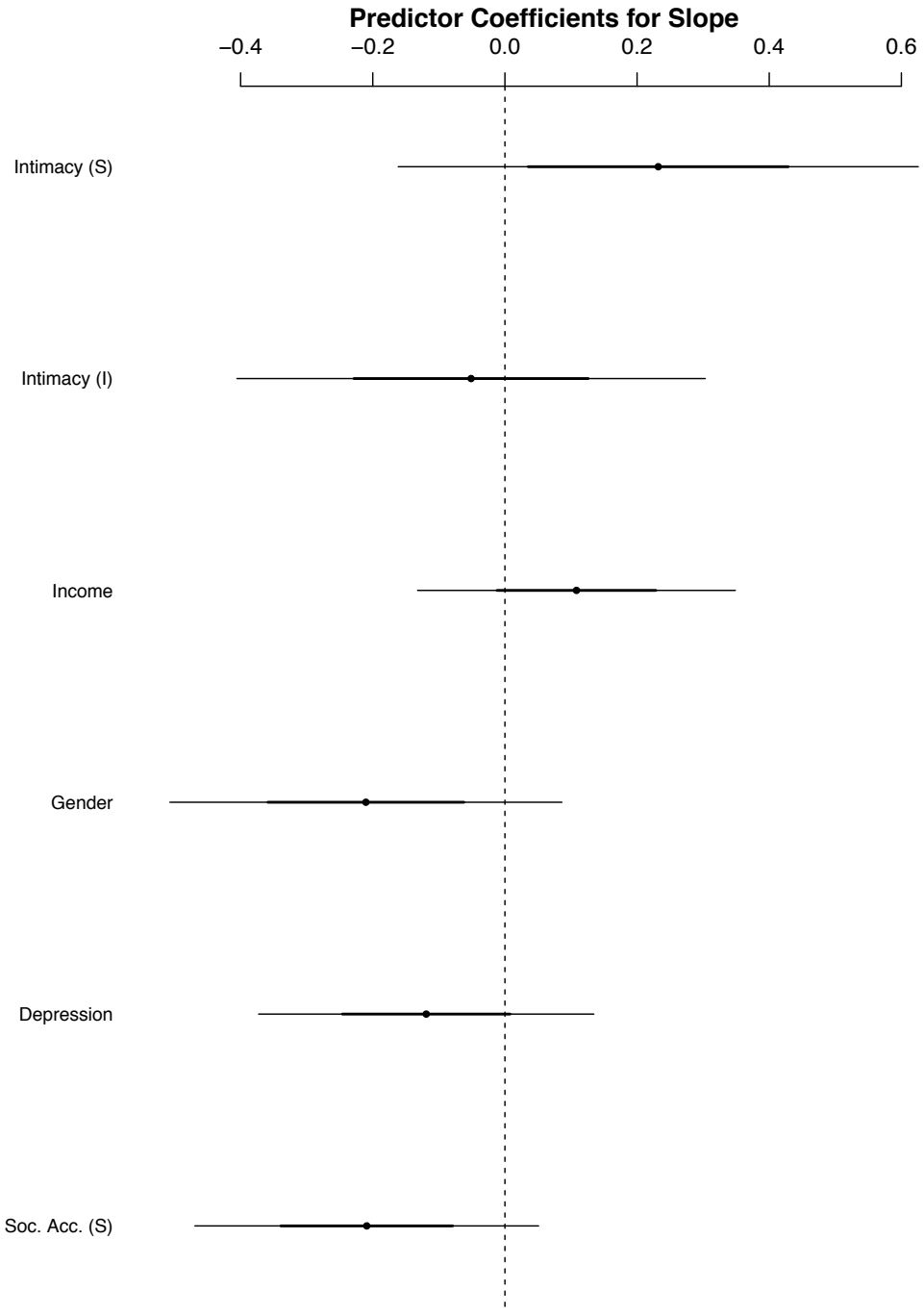
Looking at the ways that the intercept and the slope of the intimacy growth curve predicted the loneliness growth curve, the slope parameter of the intimacy growth curve marginally significantly predicted the intercept of the loneliness growth curve. More growth in close friendship intimacy during adolescence was related to less loneliness ($\beta = -.26$, $p = .053$) at the initial time of assessment in adulthood. The slope parameter of the intimacy growth curve did not predict the slope of the loneliness growth curve. The intercept parameter of the intimacy growth curve was not significantly related to the intercept or slope of the loneliness growth curve. The standardized coefficients from the multivariate latent growth model for growth in close friendship intimacy during adolescence predicting loneliness in adulthood are presented in Figure 12 (for the intercept), and Figure 13 (for the slope); coefficients for both significant and nonsignificant predictors are displayed and coefficients for control variables are displayed.

Figure 12
Coefficients for Growth in Intimacy Predicting Intercept of Loneliness



Note. All coefficients standardized. Bolded lines denote 1 SE around the coefficient, regular lines denote 2 SEs. Intimacy (S) = slope of intimacy in close friendships growth curve; Intimacy (I) = intercept of intimacy in close friendships growth curve; Soc. Acc. (S) = self-reported social acceptance.

Figure 13
Coefficients for Growth in Intimacy Predicting Slope of Loneliness



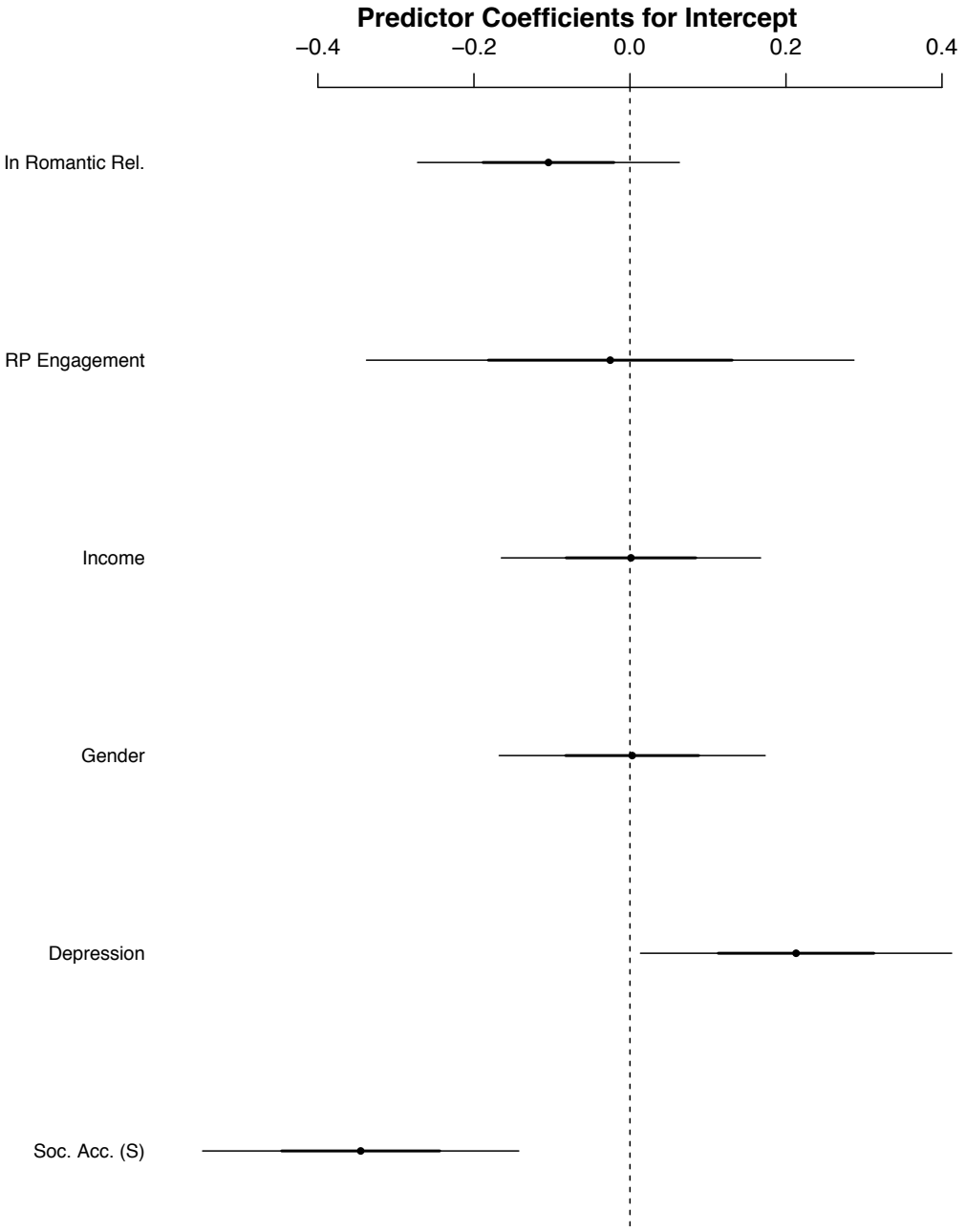
Note. All coefficients standardized. Bolded lines denote 1 SE around the coefficient, regular lines denote 2 SEs. Intimacy (S) = slope of intimacy in close friendships growth curve; Intimacy (I) = intercept of intimacy in close friendships growth curve; Soc. Acc. (S) = self-reported social acceptance.

Conditional Latent Growth Curve Model: Romantic Relationship Involvement Predicting Loneliness.

The model demonstrated good model fit (χ^2 (40) = 71.29; CFI = .94; TLI = .92; RMSEA = .065, SRMR = .049). Looking at the controls, self-reported social acceptance in late adolescence and depression in late adolescence predicted the intercept of the loneliness growth curve, but neither significantly predicted the slope. Self-reported social acceptance was related to less loneliness (β = -.35, p = .001) at the initial time of assessment in adulthood, while depression was related to more loneliness (β = .21, p = .033). Participant gender and family income did not significantly predict either the intercept or the slope of the loneliness growth curve.

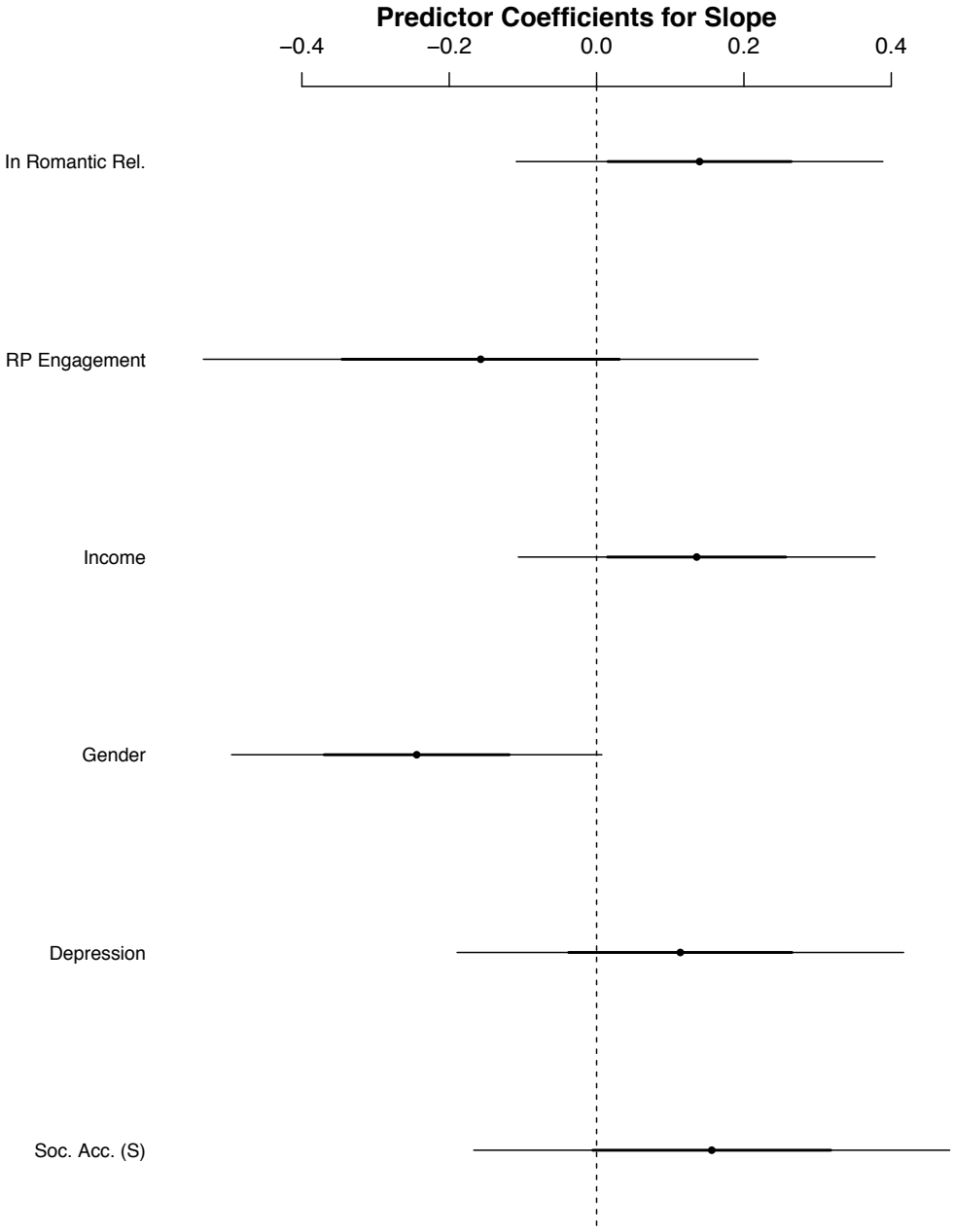
No evidence was found for either romantic relationship engagement or being in a romantic relationship predicting the intercept and the slope of the loneliness growth curve. The standardized coefficients from the conditional latent growth model for romantic relationship engagement and being in a romantic relationship predicting loneliness are presented in Figure 14 (for the intercept), and Figure 15 (for the slope); coefficients for both significant and nonsignificant predictors are displayed and coefficients for control variables are displayed.

Figure 14
Coefficients for Romantic Relationship Involvement Predicting Intercept of Loneliness



Note. All coefficients standardized. Bolded lines denote 1 SE around the coefficient, regular lines denote 2 SEs. Soc. Acc. (S) = self-reported social acceptance.

Figure 15
Coefficients for Romantic Relationship Involvement Predicting Slope of Loneliness



Note. All coefficients standardized. Bolded lines denote 1 SE around the coefficient, regular lines denote 2 SEs. Soc. Acc. (S) = self-reported social acceptance.

Conditional Latent Growth Curve Model: Adding Self-Perception of Ability to Connect to Differences in Engagement and Self-disclosure between Parents and Close Friend Predicting Loneliness.

To examine if an adolescent's self-perception of their ability to connect to others added anything to the prediction of adult loneliness over and above differences in engagement and self-disclosure between parents and close friend, valuing popularity, rejection sensitivity, and social comparison were included separately in the conditional latent growth curve model. Valuing popularity, rejection sensitivity, and social comparison did not significantly predict either the intercept or the slope of the loneliness growth model. Similar to the model without the self-perception predictors, differences in engagement with parents versus with close friends or differences in self-disclosure with parents versus with close friends did not significantly predict either the intercept or the slope of the loneliness growth curve in any of the models.

Multivariate Latent Growth Curve Model: Adding Self-Perception of Ability to Connect to Growth in Intimacy in Close Friendships Predicting Loneliness.

To examine if an adolescent's self-perception of their ability to connect to others added anything to the prediction of adult loneliness over and above growth in intimacy in close friendships during adolescence, valuing popularity, rejection sensitivity, and social comparison were included separately in the multivariate latent growth curve model. Valuing popularity, rejection sensitivity, and social comparison did not significantly predict either the intercept or the slope of the loneliness growth model. The slope parameter of the intimacy growth curve continued to marginally significantly predict the intercept of the loneliness growth curve, such that more growth in close friendship intimacy during adolescence was related to less loneliness.

Conditional Latent Growth Curve Model: Adding Self-Perception of Ability to Connect to Romantic Relationship Involvement Predicting Loneliness.

To examine if an adolescent's self-perception of their ability to connect to others added anything to the prediction of adult loneliness over and above romantic relationship involvement and romantic relationship engagement, rejection sensitivity and social comparison were included separately in the conditional latent growth curve model. Rejection sensitivity and social comparison did not significantly predict either the intercept or the slope of the loneliness growth model. Similar to the model without the self-perception predictors, romantic relationship engagement and being in a romantic relationship did not significantly predict the intercept and the slope of the loneliness growth curve.

Conditional Latent Growth Curve Model: Gender Moderation of Differences in Engagement and Self-disclosure between Parents and Close Friend Predicting Loneliness.

Gender moderation was tested for by including interactions between gender and each difference in engagement and self-disclosure predictor in the conditional latent growth curve model. No evidence of gender moderation was found, as none of the interactions significantly predicted either the intercept or slope of the loneliness growth curve.

Multivariate Latent Growth Curve Model: Gender Moderation of Growth in Intimacy in Close Friendships Predicting Loneliness.

Gender moderation was tested by including gender as a group variable in a multigroup analysis for the multivariate latent growth curve model. In the multigroup analysis, a model that constrained the parameters for the slope of the intimacy growth curve predicting the intercept and slope of the loneliness growth curve to be equal across groups was compared to a model that

allowed the parameters to be freely estimated. No evidence of gender moderation was found, as the fit of one model was not significantly different from the other.

Conditional Latent Growth Curve Model: Gender Moderation of Romantic Relationship Involvement Predicting Loneliness.

Gender moderation was tested for by including interactions between gender and each romantic relationship predictor in the conditional latent growth curve model. No evidence of gender moderation was found, as none of the interactions significantly predicted either the intercept or slope of the loneliness growth curve.

Post-hoc Analyses

Post-hoc analyses tested the possibility that simple changes in both self-disclosure to parents and self-disclosure to peers during adolescence predict loneliness in adulthood. Difference scores to represent these changes from early adolescence to late adolescence were created and used as predictors of the loneliness growth curve. Neither changes in self-disclosure to parents nor self-disclosure to peers during adolescence significantly predicted loneliness in adulthood.

Summary of Hypothesis II Findings

When examining delays in the transition of relationship functions from parents to peers as a predictor of loneliness, no evidence was found for differences in engagement with parents versus with close friends or differences in self-disclosure with parents versus with close friends predicting loneliness. When looking at close friendship intimacy as a marker of the transition of relationship functions from parents to peers, more growth in close friendship intimacy during adolescence was found to marginally predict less loneliness at the initial time of assessment in adulthood (i.e., the intercept). However, no evidence was found for either romantic relationship

engagement or being in a romantic relationship predicting the loneliness intercept or slope. Looking at social self-perception predictors, rejection sensitivity and social comparison did not significantly predict loneliness in adulthood. No evidence of gender moderation of any significant relationships between predictors and loneliness was found.

Discussion

This dissertation used a multi-method, multi-reporter, longitudinal design to examine two major questions: 1) Do close relationship experiences differentially predict loneliness as compared to broad peer group acceptance?; and 2) Do relative delays in the transition of relationship functions during adolescence predict loneliness? Within these research questions, this dissertation investigated if adolescent's self-perception of their ability to connect to others added anything to prediction of adult loneliness over and above other predictors, and if gender moderated any of the relationships between adolescent predictors and adult loneliness. As hypothesized, close relationship experiences were more predictive of loneliness than broad peer group acceptance. Evidence for the role of the transition of relationship functions during adolescence as it related to loneliness was mixed, as only intimacy in close friendships was somewhat predictive of adult loneliness.

Close friendships vs. broad peer group acceptance

Qualities of close friendship as predictors of loneliness. Results support the hypothesis that qualities of close friendship in adolescence would predict adult loneliness. Close friendship competence in early adolescence predicted initial levels of loneliness in adulthood, though dyadic engagement in close friendships did not significantly predict initial levels of loneliness in adulthood, and neither predictor was related to change in loneliness throughout adulthood.

Associations between qualities of close friendship and loneliness in adolescence have been established previously (Chow et al., 2015; Lodder et al., 2015); the results extend these associations from adolescence to adulthood. These results were consistent with the theory that intimate relationships (i.e. close friendships and romantic relationships) become more central and salient for loneliness during adolescence, but this theory had not previously been empirically supported (Qualter et al., 2015).

One way to interpret these results is to consider how they inform our understanding of what constitutes loneliness in adulthood. That close friendship competence in adolescence matters for loneliness in adulthood implies that the social skills that an adolescent requires to be seen as competent in close friendships may serve as an effective foundation for connecting with others an adult. These social skills include being able to establish warmth, trust, and reciprocity in the relationship, which together serve to promote emotional intimacy (Larson, Whitton, Hauser, & Allen, 2007). Being able to establish these qualities in relationships during adolescence might forecast successful connections in adulthood because these qualities also primarily characterize adult relationships. While in adolescence peer relationships can be formed both at the large group level and the dyadic level, in adulthood dyadic relationships dominate an individual's social world, especially once normative marital ages are reached (Qualter et al., 2015). Perhaps being more competent in close friendships in adolescence is an early marker of future success in the types of relationships that are prominent in adulthood, and through this success, loneliness is less likely to occur.

That close friendship competence and dyadic engagement did not predict loneliness in the same way might point to some specificity with how adolescent close friendship experiences are related to loneliness in adulthood. The two predictors were almost completely unrelated with

each other, suggesting that they were capturing very different aspects of close friendships. Dyadic engagement was measured through specific interactions within one relationship focused on a supportive behavior task, while close friendship competence was a more generalized assessment of the individual's close friendship skills, reported by the close friend. Neither is necessarily a more or less valid measure of close friendship experiences, but when the aim is to predict into adulthood, perhaps the generalized nature of the close friendship competence measure is more effective for capturing social skills that continue to be valuable in the long-term future.

Broad peer group acceptance as a predictor of loneliness. Results support the hypothesis that broad peer group acceptance in adolescence would not predict adult loneliness to the same degree that qualities of close friendship would. Broad peer group acceptance in adolescence, when measured through sociometric popularity and peer-rated social acceptance, did not significantly predict adult loneliness in either univariate or multivariate analyses. The lack of relationship between adolescent broad peer group acceptance and adult loneliness is markedly different from the negative relationship between the two constructs found in adolescence (Lodder et al., 2015; Woodhouse et al., 2012). However, the results are consistent with evidence from other areas of long-term social functioning showing that close relationships in adolescence are more predictive of long-term functioning than broad peer group acceptance (Allen et al., 2014; Marion et al., 2013; Narr & Allen, 2016).

These results suggest that the importance of broad peer group acceptance might be bounded to adolescence, at least in terms of loneliness. As mentioned before, this goes hand-in-hand with the idea that the broad peer group is more salient in adolescence than adulthood, where the primary relationships are dyadic and more intimate. During adolescence, broad peer

group acceptance is consequential: sociometric popularity is associated positively with adjustment and some prosocial behavior (but also some antisocial behavior), and negatively with loneliness (Allen et al., 2005; Brown & Larson, 2009; Lodder et al., 2015; Woodhouse et al., 2012). However, these results hint at the possibility that the skill set that leads to broad peer group acceptance in adolescence is not the same skill set that also successfully navigates adult relationships and leads to feeling connected in adulthood. It is not that aiming to become well-liked by a group or to attain high social status isn't a feature of adult life; adults still buy rounds of drinks for co-workers and covet leadership roles at workplaces. When it comes to connecting to others, however, pursuing these group-focused aims isn't the primary method for success in avoiding loneliness compared to establishing and maintaining intimate dyadic relationships, which seem to take a distinct skill set.

Post-hoc analyses. Post-hoc analyses testing adult close friendship and romantic relationship qualities as mediators of the association between adolescent close friendship competence and adult loneliness did not provide evidence for mediation by any of these qualities. The relationship qualities tested (closeness of close friendship and romantic relationship satisfaction) represent just a couple of possible ways to assess the quality of close relationships in adulthood, and they are both global measures of close relationship quality, unable to capture more specific aspects of close relationships. In terms of interpreting the mediation results, this means that when we consider the ways that close friendship competence in adolescence might lead to less loneliness in adulthood, just knowing how close an adult close relationship is likely isn't finely tuned enough to capture the mechanism at work. This doesn't rule out successful close relationships being the mediating mechanism; rather, it shifts the focus from nonspecific measures of close relationships to seeking out more narrow qualities of close

relationships that might be more specifically related to close friendship competence in adolescence.

The transition of relationship functions during adolescence

Differences in self-disclosure and engagement as predictors of loneliness. Contrary to what was hypothesized, a delay in transition of relationship functions from parents to peers, as measured by differences in self-disclosure and engagement with parents versus peers, did not predict loneliness in adulthood. Based on evidence showing that normative transitions from relying on parents to relying on peers occur during adolescence, it was theorized that delays in these transitions would result in individuals perceiving themselves as being behind their peers in social development, and thus at risk for loneliness (Laursen & Hartl, 2013). There was no direct evidence for this theorized relationship save for one study suggesting that during adolescence, being around parents after being alone did not reduce loneliness, while being around friends did (van Roekel, Scholte, et al., 2014).

There are multiple possible implications of these null findings if they actually reflect a lack of relationship rather than just a lack of statistical power. One is that the method of capturing delays in transition of relationship functions from parents to peers by comparing self-disclosure and engagement with parents versus peers does not accurately measure these delays, and therefore would not be expected to relate to loneliness in adulthood. This concern is mitigated in part by other research that has observed a tendency for adolescents to disclose less to parents as they become older (Daddis & Randolph, 2010). On the other hand, difference scores might not be best positioned to capture this developmental process, as parents do not necessarily drop out of their adolescent's life as peers begin to provide relationships functions that previously only parents provided; instead, they may play a more complementary role in

conjunction with peer relationships (Laursen & Collins, 2009). Optimal development may be more likely to include developing strong parent *and* peer relationships rather than developing peer relationships at the cost of parent relationships. Another possibility is that delays in transition of relationship functions were measured accurately and they are therefore not consequential for loneliness in adulthood. This possibility is difficult to evaluate, especially since there is little existing research on how the transition of relationship functions during adolescence relates to loneliness, but given the potential for measurement error, these results likely do not provide clear evidence for this possibility.

Intimacy in close friendships as a predictor of loneliness. While not as strongly related as hypothesized, growth in intimacy in close friendships during adolescence marginally significantly predicted lower initial levels of loneliness in adulthood. Over the course of adolescence, the sample as a whole increased significantly in intimacy in close friendships, which is consistent with the idea discussed earlier that dyadic relationships become more prominent during adolescence. That the growth in intimacy was marginally significantly related to loneliness is additional evidence of the importance of adolescent close relationships for adult loneliness, which was also provided by the close friendship competence results discussed earlier.

Why would intimacy be an important quality to develop in friendships, at least for warding off loneliness in the future? As discussed earlier, the warmth, trust, and reciprocity that comprises emotional intimacy in relationships are prominent characteristics of adult relationships (Larson et al., 2007). Additionally, growth in intimacy in close friendships may signify that these close friendships have become attachment bonds, which normatively occurs more often later in adolescence than earlier (Kobak, Rosenthal, Zajac, & Madsen, 2007). Adolescents able to develop the capacity to form new attachment bonds before adulthood are likely well-positioned

to form meaningful adult relationships that endure and provide attachment functions. Much like close friendship competence, growth in intimacy might be reflecting an adolescent's capacity and preparedness for establishing close relationships that protect from loneliness in the future.

Romantic relationship qualities as a predictor of loneliness. Contrary to what was hypothesized, neither dyadic engagement with romantic partners in late adolescence nor the presence of a romantic relationship in late adolescence significantly predicted loneliness in adulthood. It was expected that these indicators would predict loneliness given that romantic relationships in late adolescence are normative, so an absence of the relationship or a low-quality relationship might reflect difficulties in forming connections to others, or might provide an opportunity for negative social comparison to others (Laursen & Hartl, 2013). These results differ from past work which found that adolescents in romantic relationships were also less lonely, though that finding was cross-sectional (Chow et al., 2015).

The lack of support for this hypothesized relationship could come from imprecision in how romantic relationships are measured at this developmental point. Romantic relationship involvement in adolescence progresses along a continuum from being mostly affiliative in nature to being more characterized by intimacy (Connolly & McIsaac, 2009). In late adolescence, a romantic relationship for one individual could be fairly casual and companionship-based, while a romantic relationship for another individual the same age could look more like an adult romantic relationship in terms of the intimacy expressed. The latter type of relationship would theoretically better predict loneliness in adulthood, as it would be evidence of competency in adult relationships being developed, but the romantic relationship indicators captured by the current study are not able to distinguish casual romantic relationships from more serious relationships. Additionally, romantic relationships in adolescence have been found by several

studies to predict increasing depressive symptoms (Davila et al., 2009; Szwedo, Chango, & Allen, 2015), suggesting complexity to what romantic relationships at this developmental point signify.

Adolescent's self-perception of their ability to connect to others as predictor of loneliness

The results did not find that associations between the ways that adolescents perceived themselves in social situations and future loneliness after accounting for adolescents' actual social experiences. The possibility of social self-perception accounting for unique variance in adult loneliness over and above social experiences was explored due to past research demonstrating that biased social cognition and self-esteem in adolescence predict loneliness (Lodder et al., 2015; Vanhalst, Luyckx, et al., 2013; Watson & Nesdale, 2012). Including these self-perceptions in the models also did not substantively change the associations that were found between the actual adolescent social experiences and loneliness, suggesting that methods confounds were not affecting the results. These results also suggest that it really is the actual social experiences (as observed or reported by others) that matter for predicting loneliness, while how the individuals perceive these experiences or any predisposition they might have to perceive themselves negatively in social situations are not likely to predict loneliness.

Gender moderation

The results did not provide any evidence of gender moderation. Gender moderation was not specifically hypothesized, either globally or for specific relationships, but given that some past work has found gender differences in loneliness and that females have been shown to have more sizeable and diverse social networks than males, moderation was explored (Ajrouch et al., 2005; Antonucci et al., 1998; Mahon et al., 2006; McLaughlin et al., 2010). The current results show a lack of support for gender differences in how the adolescent predictors of loneliness

explored in this study relate to loneliness. In terms of main effects of gender on loneliness, gender was not a significant predictor of loneliness in any of the models, and when gender was included as the only predictor, it did not significantly predict either initial levels of loneliness or growth in loneliness over time.

Limitations and Conclusions

It is important to note a few limitations of the current study. First, the current study was nonexperimental, so it does not directly address questions of causation. Unobserved variables might account for the associations found between adolescent predictors of loneliness and adult loneliness, though the study attempted to account for confounding variables. Additionally, while nonexperimental, the study did employ a longitudinal design that allowed for capturing change over time in the constructs studied. Second, the current study did not assess loneliness in adolescence, which limited its ability to provide evidence of predictors of long-term change in loneliness. It is possible that the associations found between adolescent predictors of loneliness and adult loneliness merely represent associations with adolescent loneliness, though the study did utilize self-reported social acceptance as a proxy for loneliness. Future research might examine loneliness from adolescence to adulthood with the same measure, which might provide more insight about predictors of long-term change. Finally, the current study largely did not explore in-depth questions of *how* adolescent predictors of loneliness were related adult loneliness, save for the post-hoc analyses using global measures of close relationship quality. Future research should focus on this question of mechanism, perhaps by exploring adult close relationships in more detail, as far as how they relate to loneliness.

The current study is one of few explorations of how adolescent social experiences predict adult loneliness, rather than adolescent loneliness. The findings of the study point to close

relationship qualities in adolescence as being a key factor predicting loneliness in adulthood. Being seen as competent in close friendships and growing in intimacy with close friends over the course of adolescence were both identified as promising predictors of loneliness. The adolescent social world is multifaceted, containing multiple types of relationship partners, multiple levels of relationship size, and many different experiences that could be markers of future connections. The current study contributes to the loneliness literature by offering a sharper focus towards which of these potential markers are consequential for loneliness. Although causal hypotheses could not be directly assessed, if the adolescent experiences identified as consequential here did drive the association with loneliness and were found to replicate, this would then lead to several implications. The adolescent social experiences examined in this study would be natural targets for intervention with adolescents at risk of developing loneliness. Adolescents struggling to display competence in close friendships and establish intimate friendships could be identified and then exposed to corrective experiences, whether it might be therapy focused on interpersonal skills, or perhaps opportunities to engage with a wider group of peers who might be better matches in interests or personality and therefore easier to connect with. Interventions could be delivered in multiple contexts, as parents, peers, schools, and clinicians all likely have a role to play in terms of enhancing adolescents' ability to establish healthy close friendships and ward off future loneliness. Although the current study does not pinpoint the nature of adolescents' difficulties in close friendships, which would be important in deciding which intervention approaches would be most likely to be successful, it does provide potential guidance in identifying targets for screening that could then lead to early intervention to reduce loneliness in adulthood.

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Appendices

Appendix A – UCLA Loneliness Scale

Please check one box for each statement to indicate how often each of the statements is descriptive of you.

Often: "I often feel this way"
Sometimes "I sometimes feel this way"
Rarely "I rarely feel this way"
Never "I never feel this way"

	Often	Sometimes	Rarely	Never
1. I am unhappy doing so many things alone.	☐	☐	☐	☐
2. I have nobody to talk to.	☐	☐	☐	☐
3. I cannot tolerate being so alone.	☐	☐	☐	☐
4. I lack companionship.	☐	☐	☐	☐
5. I feel as if nobody really understands me.	☐	☐	☐	☐
6. I find myself waiting for people to call or write.	☐	☐	☐	☐
7. There is no one I can turn to.	☐	☐	☐	☐
8. I am no longer close to anyone.	☐	☐	☐	☐
9. My interests and ideas are not shared by those around me.	☐	☐	☐	☐
10. I feel left out.	☐	☐	☐	☐
11. I feel completely alone.	☐	☐	☐	☐
12. I am unable to reach out and communicate with those around me.	☐	☐	☐	☐
13. My social relationships are superficial.	☐	☐	☐	☐
14. I feel starved for company.	☐	☐	☐	☐
15. No one really knows me well.	☐	☐	☐	☐
16. I feel isolated from others.	☐	☐	☐	☐
17. I am unhappy being so withdrawn.	☐	☐	☐	☐
18. It is difficult for me to make friends.	☐	☐	☐	☐
19. I feel shut out and excluded by others.	☐	☐	☐	☐
20. People are around me but not with me.	☐	☐	☐	☐

Appendix B – Self-Perception Profile for Adolescents

The following questions describe different types of people. For each question, please select the type of person that is most like _____. You will then be asked to say how much that group is like _____. If you have any questions, please ask your interviewer.

Really True For My Friend	Sort of True For My Friend				Sort of True for My Friend	Really true for My Friend
1.		Some teens DON'T pressure other kids to do things	**BUT**	Some teens DO pressure other kids to do things.		
2.		It's important to some teens that a lot of kids like them	**BUT**	Some teens don't care if other kids like them.		
3.		Some teens find it HARD to make friends	**BUT**	Some teens find it's pretty EASY to make friends.		
4.		Some teens do things just because other kids do them	**BUT**	Some teens do not do things just because other kids do them.		
5.		Some teens have problems caused by drinking alcohol	**BUT**	Some teens don=t have problems caused by drinking alcohol.		
6.		Some teens feel that if they like someone (in a romantic way), that person WILL like them back	**BUT**	Some teens feel that if they like someone (in a romantic way), that person WON'T like them back.		
7.		Some teens DO set an example that other kids follow	**BUT**	Some teens DON'T set an example that other kids follow.		
8.		Some teens DO physically push other kids around	**BUT**	Some teens DON'T physically push other kids around.		
9.		Some teens ARE ABLE to make really close friends	**BUT**	Some teens find it HARD to make really close friends.		

10.		Some teens say mean things about other kids they don't like	**BUT**	Some teens DON'T say mean things about other kids they don't like.		
11.		Some teens are often disappointed with themselves	**BUT**	Some teens are pretty pleased with themselves.		
12.		Some teens are pressured by other kids	**BUT**	Some teens are NOT pressured by other kids.		
13.		Some teens pressure their friends to do things	**BUT**	Some teens DON'T pressure their friends to do things.		
14.		Some teens are pretty slow in doing their school work	**BUT**	Some teens can do their work more quickly.		
15.		Some teens are not worried about being teased and made fun of by other kids	**BUT**	Some teens are worried about being teased and made fun of by other kids.		
16.		Some teens do have a lot of friends	**BUT**	Some teens don't have very many friends.		
17.		Some teens do get a lot of ideas about what to wear, what to do, and how to act from their friends	**BUT**	Some teens don't get a lot of ideas about what to wear, what to do, and how to act from their friends.		
18.		Some teens OFTEN get out of control drinking alcohol	**BUT**	Some teens NEVER get out of control drinking alcohol.		
19.		Some teens are not going with (dating) the people they are really attracted to **___ *My friend is not dating yet.***	**BUT**	Some teens are going with (dating) the people they are really attracted to.		

20.		Some teens do things that make other kids want to be like them	**BUT**	Some teens don't do things that make other kids want to be like them.		
21.		Some teens never use violence to get what they want	**BUT**	Some teens often use violence to get what they want.		
22.		Some teens have a close friend they can share secrets with	**BUT**	Some teens don't have a close friend they can share secrets with.		
23.		Some teens won't let certain other kids hang out with them	**BUT**	Some teens let all kids hang out with them.		
24.		Some teens are not pressured by their friends	**BUT**	Some teens are pressured by their friends.		
25.		Some teens often tell their friends what to do	**BUT**	Some teens almost never tell their friends what to do.		
26.		Some teens do very well in their classwork	**BUT**	Some teens don't do very well in their classwork.		
27.		Some teens are not worried a lot about what other kids say behind their backs	**BUT**	Some teens are worried a lot about what other kids say behind their backs.		
28.		Some teens usually DON'T do whatever their friends do	**BUT**	Some teens usually DO whatever their friends do.		
29.		Some teens often get drunk	**BUT**	Some teens never get drunk.		
30.		Drugs cause some teens problems	**BUT**	Drugs do not cause some teens problems.		
31.		Some teens feel that people their age will like them (in a romantic way).	**BUT**	Some teens feel that people their age will not like them (in a romantic way).		

32.		Some teens do have a lot of ideas that other kids listen to.	**BUT**	Some teens don't have a lot of ideas that other kids listen to.		
33.		Some teens don't bully other kids.	**BUT**	Some teens do bully other kids.		
34.		Some teens do not usually make fun of other kids.	**BUT**	Some teens make fun of other kids a lot.		
35.		Some teens are happy with themselves most of the time.	**BUT**	Some teens are often not happy with themselves.		
36.		Some teens don't let other kids tell them what to do.	**BUT**	Some teens often let other kids tell them what to do.		
37.		Some teens never tell other kids what to do.	**BUT**	Some teens often tell other kids what to do.		
38.		Some teens have trouble figuring out the answers in school.	**BUT**	Some teens almost always figure out the answers in school.		
39.		Some teens do worry about fitting in with other kids.	**BUT**	Some teens don't worry about fitting in with other kids.		
40.		Some teens are popular with other kids their age.	**BUT**	Some teens are not popular with other kids their age.		
41.		Some teens do not try to be a lot like their friends.	**BUT**	Some teens try to be a lot like their friends.		
43.		Some teens are not copied by other kids	**BUT**	Some teens are copied by other kids.		
44.		Some teens get into a lot of physical fights.	**BUT**	Some teens hardly ever get into physical fights.		

45.		Some teens find it hard to make friends they can really trust.	**BUT**	Some teens are able to make friends they can really trust.		
46.		Some teens like the kind of person they are.	**BUT**	Some teens often wish they were someone else.		
47.		Some teens do tease other kids they don't like.	**BUT**	Some teens don't tease other kids they don't like.		
48.		Some teens don't do what their friends tell them to do.	**BUT**	Some teens usually do what their friends tell them to do.		
49.		Some teens never assault others (like jumping and mugging).	**BUT**	Some teens often assault others (like jumping and mugging).		
50.		Some teens feel that they are pretty smart.	**BUT**	Some teens wonder if they are smart.		
51.		Some teens feel that they are accepted by other kids their age.	**BUT**	Some teens wish that more kids their age accepted them.		
52.		Some teens usually don't go out with (date) people they would really like to go out with.	**BUT**	Some teens usually do go out with (date) people they really want to go out with.		
53.		Some teens don't have a friend that is close enough to share really personal thoughts and feelings with.	**BUT**	Some teens do have a friend that is close enough to share really personal thoughts with.		
54.		Some teens never gossip (tell stories about) kids they don't like.	**BUT**	Some teens do gossip (tell stories about) kids they don't like.		
55.		Some teens are very happy being the way	**BUT**	Some teens wish they		

		they are.		were different.		

Appendix C – Friendship Quality Questionnaire

For each item, decide how true the statement is for your friendship with your friend here with you today.
Circle your choice.

	Not At All True	A Little True	Somewhat True	Pretty True	Really True
1. We always spend free time at school together.	1	2	3	4	5
2. We get mad at each other a lot.	1	2	3	4	5
3. He tells me I am good at things.	1	2	3	4	5
4. He sticks up for me if others talk behind my back.	1	2	3	4	5
5. We make each other feel important and special.	1	2	3	4	5
6. We always pick each other as partners for things.	1	2	3	4	5
7. He says "I'm sorry" if he hurts my feelings.	1	2	3	4	5
8. He sometimes says mean things about me to other kids.	1	2	3	4	5
9. He has good ideas about things to do.	1	2	3	4	5
10. We talk about how to get over being mad at each other.	1	2	3	4	5
11. He would like me even if others didn't.	1	2	3	4	5
12. He tells me I am pretty smart.	1	2	3	4	5
13. We always tell each other our problems.	1	2	3	4	5
14. He makes me feel good about my ideas.	1	2	3	4	5
15. I talk to him when I'm mad about something that happened to me.	1	2	3	4	5
16. We help each other with chores a lot.	1	2	3	4	5
17. We do special favors for each other.	1	2	3	4	5
18. We do fun things together a lot.	1	2	3	4	5
19. We argue a lot.	1	2	3	4	5
20. We can count on each other to keep promises.	1	2	3	4	5
21. We go to each others' houses.	1	2	3	4	5

22. We always play together or hang out together.	**1**	**2**	**3**	**4**	**5**
23. He gives me advice with figuring things out.	**1**	**2**	**3**	**4**	**5**
24. We talk about the things that make us sad.	**1**	**2**	**3**	**4**	**5**
25. We make up easily when we have a fight.	**1**	**2**	**3**	**4**	**5**

FQQC2Y Page 2	**Not At All True**	**A Little True**	**Somewhat True**	**Pretty True**	**Really True**
26. We fight a lot.	**1**	**2**	**3**	**4**	**5**
28. We share things with each other.	**1**	**2**	**3**	**4**	**5**
29. He does not tell others my secrets.	**1**	**2**	**3**	**4**	**5**
30. We bug each other a lot.	**1**	**2**	**3**	**4**	**5**
31. We come up with good ideas on ways to do things.	**1**	**2**	**3**	**4**	**5**
32. We loan each other things all the time.	**1**	**2**	**3**	**4**	**5**
33. He helps me so I can get done quicker.	**1**	**2**	**3**	**4**	**5**
34. We get over our arguments really quickly.	**1**	**2**	**3**	**4**	**5**
35. We count on each other for good ideas on how to get things done.	**1**	**2**	**3**	**4**	**5**
36. He doesn't listen to me.	**1**	**2**	**3**	**4**	**5**
37. We tell each other private things.	**1**	**2**	**3**	**4**	**5**
38. We help each other with schoolwork a lot.	**1**	**2**	**3**	**4**	**5**
39. We tell each other secrets.	**1**	**2**	**3**	**4**	**5**
40. He cares about my feelings.	**1**	**2**	**3**	**4**	**5**

Appendix D – Valuing Popularity

We are interested in the types of behaviors and activities that are important to kids your age. Below is a list of different things that may or may not be important to you. Please read each one and decide how important each thing is to you, and then how important each thing is to your friends. Circle your choices.

	How Important Is It To YOU….		
	Not Very Important to Me	**Somewhat Important to Me**	**Very Important to Me**
1. To fit in with the crowd?	**1**	**2**	**3**
2. To have a reputation as someone who is "tough"?	**1**	**2**	**3**
3. To do well in school?	**1**	**2**	**3**
4. To dress like other kids in your group?	**1**	**2**	**3**
5. To be polite to teachers?	**1**	**2**	**3**
6. To be admired by other kids?	**1**	**2**	**3**
7. To have a boyfriend or a girlfriend?	**1**	**2**	**3**
8. To drink alcohol at parties?	**1**	**2**	**3**
9. To get good grades?	**1**	**2**	**3**
10. To be as different as possible from other kids?	**1**	**2**	**3**
11. To be sexually experienced (like kissing, touching, making out, or having sex)?	**1**	**2**	**3**
12. To stay out of trouble?	**1**	**2**	**3**
13. To belong to certain clubs at school?	**1**	**2**	**3**
14. To listen to the same music as others in your group?	**1**	**2**	**3**
15. To be liked by your teachers?	**1**	**2**	**3**
16. To be popular with a lot of different kids?	**1**	**2**	**3**
17. To do things on purpose to be	**1**	**2**	**3**

different from others in your group?			
18. To be good at certain sports?	**1**	**2**	**3**
19. To try to get away with things that are against the rules?	**1**	**2**	**3**

	How Important Is It To YOU….		
	<u>Not Very</u> Important to Me	**<u>Somewhat</u> Important to Me**	**<u>Very</u> Important to Me**
20. To be as sexually experienced (like kissing, touching, making out, or having sex) as other kids in your group?	**1**	**2**	**3**
21. To have other kids be a little afraid of you?	**1**	**2**	**3**
22. To smoke cigarettes?	**1**	**2**	**3**
23. To follow the rules at school?	**1**	**2**	**3**
24. To be accepted by other kids in your group?	**1**	**2**	**3**
25. To avoid school work whenever possible?	**1**	**2**	**3**

Appendix E – Rejection Sensitivity Questionnaire

Each of the items below describes things people sometimes ask of other people. Please imagine that you are in the situation. You will be asked to answer the following questions:

1. **How concerned or anxious would you be about how the other person would respond?**
2. **How do you think the other person would be likely to respond?**

1. <u>You ask someone you work with if they can fill you in on what happened at an important meeting that you missed.</u>

How concerned or anxious would you be over whether or not the person would want to fill you in?

☐ ☐ ☐ ☐ ☐ ☐

very unconcerned very concerned

I would expect that the person would willingly fill me in.

☐ ☐ ☐ ☐ ☐ ☐

very unlikely very likely

2. <u>You ask your boy/girlfriend to spend a weekend away together.</u>

How concerned or anxious would you be over whether or not he/she would want to spend a weekend away together?

☐ ☐ ☐ ☐ ☐ ☐

very unconcerned very concerned

I would expect that he/she would want to spend a weekend away together.

☐ ☐ ☐ ☐ ☐ ☐

very unlikely very likely

3. <u>You ask your parents for help deciding what you should pursue as a job or career.</u>

How concerned or anxious would you be over whether or not they would want to help you?

☐ ☐ ☐ ☐ ☐ ☐

very unconcerned very concerned

I would expect that they would want to help me.

☐ ☐ ☐ ☐ ☐ ☐

very unlikely very likely

4. <u>You ask someone you don't know well out on a date.</u>

How concerned or anxious would you be over whether or not the person would want to go out with you?

☐ ☐ ☐ ☐ ☐ ☐

very unconcerned very concerned

I would expect that the person would want to go out with me.

☐ ☐ ☐ ☐ ☐ ☐

very unlikely very likely

5. <u>Your boy/girlfriend has plans to go out with friends tonight, but you really want to spend the evening with him/her, and you tell him/her so.</u>

How concerned or anxious would you be over whether or not your boy/girlfriend would decide to stay in?

☐ ☐ ☐ ☐ ☐ ☐

very unconcerned very concerned

I would expect that he/she would willingly choose to stay in with me.

☐ ☐ ☐ ☐ ☐ ☐

very unlikely very likely

6. <u>You are strapped for money and ask your parents to help you out with a loan.</u>

How concerned or anxious would you be over whether or not your parents would help you out?

☐ ☐ ☐ ☐ ☐ ☐

very unconcerned very concerned

I would expect that my parents would not mind helping me out.

☐ ☐ ☐ ☐ ☐ ☐

very unlikely very likely

7. <u>You tell your boss that you have been having trouble with some of the material you've been working on and ask if he/she can help you with it.</u>

How concerned or anxious would you be over whether or not your boss would want to help you out?

☐ ☐ ☐ ☐ ☐ ☐

very unconcerned very concerned

I would expect that my boss would want to help me out.

☐ ☐ ☐ ☐ ☐ ☐

very unlikely very likely

8. <u>You approach a close friend to talk after doing or saying something that seriously upset him/her.</u>

How concerned or anxious would you be over whether or not your friend would want to talk with you?

☐ ☐ ☐ ☐ ☐ ☐

very unconcerned very concerned

I would expect that he/she would want to talk with me and try to work things out.

☐ ☐ ☐ ☐ ☐ ☐

very unlikely very likely

9. <u>You ask someone from work to do something with you that night</u>.

How concerned or anxious would you be over whether or not the person would want to do something with you?

☐ ☐ ☐ ☐ ☐ ☐

very unconcerned very concerned

I would expect that he/she would want to do something with me.

☐ ☐ ☐ ☐ ☐ ☐

very unlikely very likely

10. <u>You ask your parents if you can live at home for a while when they're not expecting it.</u>

How concerned or anxious would you be over whether or not your parents would want you to live at home?

☐ ☐ ☐ ☐ ☐ ☐

very unconcerned very concerned

I would expect that I would be welcome at home.

☐ ☐ ☐ ☐ ☐ ☐

very unlikely very likely

11. <u>You ask your friend to go on vacation with you.</u>

How concerned or anxious would you be over whether or not your friend would want to go with you?

☐ ☐ ☐ ☐ ☐ ☐

very unconcerned very concerned

I would expect that he/she would want to go with me.

☐ ☐ ☐ ☐ ☐ ☐

very unlikely very likely

12<u>. You call your boy/girlfriend after a bitter argument and tell him you want to see him/her.</u>

How concerned or anxious would you be over whether or not your boy/girlfriend would want to see you?

☐ ☐ ☐ ☐ ☐ ☐

very unconcerned very concerned

I would expect that he/she would want to see me.

☐ ☐ ☐ ☐ ☐ ☐

very unlikely very likely

13. <u>You ask a friend if you can borrow something of his/hers.</u>

How concerned or anxious would you be over whether or not your friend would want to loan it to you or not?

☐ ☐ ☐ ☐ ☐ ☐

very unconcerned very concerned

I would expect that he/she would willingly loan me it.

☐ ☐ ☐ ☐ ☐ ☐

very unlikely very likely

14. <u>You ask your parents to come to an important occasion with you.</u>

How concerned or anxious would you be over whether or not your parents would want to come?

☐ ☐ ☐ ☐ ☐ ☐

very unconcerned very concerned

I would expect that they would want to come.

☐ ☐ ☐ ☐ ☐ ☐

very unlikely very likely

15. <u>You ask your friend to do you a big favor.</u>

How concerned or anxious would you be over whether or not your friend would want to help you out?

☐ ☐ ☐ ☐ ☐ ☐

very unconcerned very concerned

I would expect that he/she would willingly agree to help me out.

☐ ☐ ☐ ☐ ☐ ☐

very unlikely very likely

16. <u>You ask your boy/girlfriend if he/she really loves you.</u>

How concerned or anxious would you be over whether or not your boy/girlfriend would say yes?

☐ ☐ ☐ ☐ ☐ ☐

very unconcerned very concerned

I would expect that he/she would answer yes sincerely.

☐ ☐ ☐ ☐ ☐ ☐

very unlikely very likely

17. <u>You go out to a party and notice someone on the other side of the room and then you ask them to dance.</u>

How concerned or anxious would you be over whether or not the person would want to dance with you?

☐ ☐ ☐ ☐ ☐ ☐

very unconcerned very concerned

I would expect that he/she would want to dance with me.

☐ ☐ ☐ ☐ ☐ ☐

very unlikely very likely

18. <u>You ask your boy/girlfriend to come home to meet your parents.</u>

How concerned or anxious would you be over whether or not your boy/girlfriend would want to meet your parents?

☐ ☐ ☐ ☐ ☐ ☐

very unconcerned very concerned

I would expect that he/she would want to meet my parents.

☐ ☐ ☐ ☐ ☐ ☐

very unlikely very likely

Appendix F - Iowa-Netherlands Comparison Orientation Measure

For each question, read the statement and decide whether or not you agree with it. Please check the box that corresponds with your choice.

	Strongly Disagree	Somewhat Disagree	Neither Agree not Disagree	Somewhat Agree	Strongly Agree
1. I often compare how my loved ones (romantic partners, family members, etc) are doing with how others are doing	☐	☐	☐	☐	☐
2. I always pay a lot of attention to how I do things compared with how others do things	☐	☐	☐	☐	☐
3. If I want to find out how well I have done something, I compare what I have done with how others have done.	☐	☐	☐	☐	☐
4. I often compare how I am Doing socially (social skill, popularity) with other people	☐	☐	☐	☐	☐
5. I am not the type of person who compares often with others	☐	☐	☐	☐	☐
6. I often compare myself with others with respect to what I have accomplished in life	☐	☐	☐	☐	☐
7.I often like to talk with others About mutual opinions and experiences	☐	☐	☐	☐	☐
8. I often try to find what others others think who face similar problems as I face	☐	☐	☐	☐	☐
9. I always like to know what Others in a similar situation Would do.	☐	☐	☐	☐	☐
10. If I want to learn more about something, I try to find out what others think about it.	☐	☐	☐	☐	☐
11. I never consider my situation In life relative to that of other people.	☐	☐	☐	☐	☐