

# **Me, Myself, and You: Friendships in Adolescence**

Maarten Selfhout



# **Me, Myself, and You: Friendships in Adolescence**

Ikke, Ikke en de Rest: Vriendschappen in de  
Adolescentie

(met een samenvatting in het Nederlands)

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Maarten Herman Walter Selfhout

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Promotor: Prof. Dr. W. H. J. Meeus

Co-promotor: Dr. S. J. T. Branje

Leden beoordelingscommissie:

Prof. Dr. W. Vollebergh

Prof. Dr. R. C. M. E. Engels

Prof. Dr. H. Stattin

Prof. Dr. M.A.G. van Aken

Prof. Dr. H. M. Koot



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*Voor Mam en Opa*



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## **Chapter 1.**

### **General Introduction**

## Chapter 1. General Introduction

Friendships form an intricate part of our social world, especially in adolescence (Brown, Eicher, & Petrie, 1986; Bukowski & Kramer, 1986; Hartup, 1996). Although some adolescents may remain friendless, most have friends throughout adolescence, even those who are less popular than others (Bukowski & Newcomb, 1984; Kupersmidt & Coie, 1990; Laursen, Bukowski, Aunola, & Nurmi, 2007). Overall, increasingly more time is spent with friends in adolescence, and friendships are thought to have important functions in adolescent development (e.g., Bukowski & Kramer, 1986; Haynie & Osgood, 2005; Kandel, 1978b; Newcomb & Bagwell, 1995; Parker & Asher, 1993; Persson, Kerr, & Stattin, 2007).

At the same time as friendships gain importance in adolescence, developing a sense of individuality and identity becomes more salient as well (Grotevant & Cooper, 1986; Grotevant & Cooper, 1998; Hodges, Finnegan, & Perry, 1999; Sullivan, 1953). Adolescents start to explore their own identities (Erikson, 1963; Meeus, Iedema, & Maassen, 2002), personality traits (McCrae & Costa, 1994), and individual preferences (Arnett, 1991; Bennet, 2001). Further, adolescents tend to differentiate in their development of emotional and behavioral problem behaviors (Broidy et al., 2003; Lansford et al., 2006; Reinecke, 2006). How are adolescents' traits, preferences, and problem behaviors connected to friendships in adolescence? They might play a role in the way adolescent friendships are formed, or *friendship formation*. At the same time, friendships themselves may affect adolescents' traits, preferences, and problem behaviors. This process is referred to as *friendship socialization*.

The general aim of the current dissertation is twofold: To study the importance of traits and preferences in friendship formation, and to study friendship quality and friends' behaviors in adolescents'

behavioral and emotional development. Relationships between individuals, such as friendships, may involve three different levels of social complexity (Hinde, 1997): the individual level, the dyadic level, and the group level. Adolescents' traits, preferences, and behaviors may be connected to friendships on each of these three levels. On the individual level, one's own traits and perceptions of traits may have important functions in friendships. On the dyadic level, perceptions of friendships and actual similarity between two persons in traits, preferences, and behaviors may have a role in friendships. On the group level, the peer context in which friendship choices and interactions take place may be important in friendships.

Because the most commonly used approach to gain insight in these processes is to focus on the two persons that are friends (Bukowski & Kramer, 1986; Gifford-Smith & Brownell, 2003; Newcomb, Bukowski, & Bagwell, 1999), we will start discussing the function of traits and preferences in adolescents' choices of friends on the dyadic level. Next, we discuss the role of traits and preferences in friendship formation on the individual and group level. Finally, we discuss what functions friends' behaviors and friendship quality have in friendship socialization on the dyadic level.

## **1.1 Traits and Preferences in Friendship Formation**

### **1.1.1 The Dyadic Level and Friendship Formation**

Many of our everyday life ideas and phrases about friendship formation are based on the idea that people become friends with others who are similar to them. For example, literally millions of relationship websites are largely based on the idea of connecting people with similar interests, personalities, and activities, because similarity is

assumed to be a good basis for relationships (Wellman, Quan-Haase, Witte, & Hampton, 2001). Especially since Byrne and Nelson's (1965) publication concerning the *similarity-attraction hypothesis*, a large amount of studies has suggested that similar people tend to become befriended more than dissimilar people (e.g., Byrne, 1971; Byrne & Nelson, 1965; Kandel, 1978a; Morry, 2006; Newcomb & Bagwell, 1995). As a stereotypical example, Tom could be seen as a typical extravert: he is talkative, sociable, and tends to directly approach others. Sean is equally extraverted as Tom, and therefore tends to interact in similar ways as him. Both Tom and Sean may find this similar way of interacting pleasurable and more effective. This may give them a high chance to develop a friendship. Therefore, similarity in Extraversion between Tom and Sean, or a match on the dyadic level, enhances friendship formation.

This example contains, in a nutshell, what the "Law of attraction" (Byrne & Nelson, 1965) entails: *actual* similarity may enhance interaction between two individuals, increasing the chance that this dyad develops into a friendship. Actual similarity is typically defined as "true" similarity between individuals: the way two persons really are similar in traits and preferences. Especially personality traits (McCrae & Costa, 1994) and music preferences (Arnett, 1991; Bennet, 2001) have been suggested to function as individual markers that differentiate adolescents from one another. Given the increasing importance of individuality in adolescence (Grotevant & Cooper, 1986; Grotevant & Cooper, 1998; Hodges et al., 1999; Sullivan, 1953), adolescents may tend to form friendships with others who have similar traits and preferences. In sum, adolescents may form friendships with others who show actual similarity in individual traits and preferences.

To summarize, personality traits and music preferences on the dyadic level may have important functions in friendship formation.

Surprisingly, few empirical studies longitudinally examine what role individual traits and preferences have in adolescents' choices of friends. Therefore, little knowledge exists concerning functions of similarity in personality traits and musical preferences in the formation of adolescent friendships.

### 1.1.2 Individual level: Perceptions of Traits

Although friendships traditionally are defined as involving two persons, it may not be the case that only similarity in traits and preferences between two persons is important in friendship formation. On the individual level, individuals' own perceptions of others may affect friendship choices. We focus here on adolescents' own perceptions of their own and others' personality traits.

The way others in relationships are perceived by individuals is not always entirely grounded in reality (Funder & Colvin, 1991; Kenny, Albright, Malloy, & Kashy, 1994). To take up our example of Tom and Sean: although Sean may *seem* equally extraverted as Tom, he may actually be hiding his more introverted side. Nevertheless, this may lead Tom to *perceive* Sean as equally extraverted. This perception of similarity may guide Tom's behaviors more than actual similarity between him and Sean, and eventually lead to the formation of a friendship between them. Further, Tom may start to perceive Sean as a more extraverted person because he is befriended with him: he may ignore the dissimilarities between him and Sean because of his belief that friends are supposed to be similar.

This example contains what has been suggested regarding *perceived similarity* (Hoyle, 1993; Morry, 2005; Morry, Kito, Martens, Marchylo, & Stevens, 2005), or similarity between two persons according to one person. Perceptions of similarity might create a feeling of recognition, self-confirmation, and self-

reassurance; this could then lead to more attraction through higher enjoyment of interactions (Berg & Clark, 1986). At the same time, however, the direction of effects may be the other way around: According to the *attraction-similarity hypothesis*, higher attraction enhances perceptions of similarity (Hoyle, 1993; Morry, 2005; Morry et al., 2005). Because of the persistent idea that friends *should* be similar in traits, any dissimilarity in traits may cause a cognitive imbalance that is countered by illusions of similarity (Morry, 2005). In sum, perceptions of similarity, rather than actual similarity, may be important in the formation of friendships. At the same time, adolescents may start to perceive more similarity due to the formation of a friendship as well.

To summarize, adolescents' own perceptions of similarity in traits may be more important in friendship formation than actual similarity between adolescents and others. Nevertheless, longitudinal studies comparing the importance of perceived similarity in personality traits to actual similarity in personality traits in friendship formation have not been performed yet. Therefore, relatively little is known about the importance of perceptions of traits in adolescents' choices of friends.

### 1.1.3 Group Level: Peers' Perceptions and Social Networks

Peers surrounding the two individuals who may become friends might have an additional influence on their friendship choices. The previously explained example of Tom's choice of Sean as a friend does not develop in isolation of other peers: Tom may befriend not only Sean, but Rutger as well. Rutger, in turn, may become friends with Sean, because he gets to know Sean through his friend Tom. This triad may be extended as well: Rutger may be befriended with Ernst, who therefore becomes friends with the others as well. In short,

friendships seem to be embedded within a larger social network of interconnected dyadic friendships and groups (Carrington, Scott, & Wasserman, 2005; Wasserman & Faust, 1994). Recent studies have indicated that individuals tend to base their friendship choices on the structure of social network as a whole, over and above friendship choices between two persons (e.g., Snijders, 2001; Snijders, Steglich, & Schweinberger, 2007). Therefore, examining the role of traits and preferences in friendship networks as a whole may be a more realistic approach regarding friendship formation than focusing exclusively on friendship dyads or one individual in the dyad.

Further, peers may have ideas about what friendships should be like, and these ideas may affect adolescent friendship choices. Social Comparison Theory (Festinger, 1954) has stressed the way peers influence individuals' thinking, in particular under conditions of uncertainty. According to this theory, when there is doubt about the appropriateness of certain preferences, individuals will compare their own preferences to peers' ideas and try to confirm these preferences (Baron, Hoppe, Linneweh, & Rogers, 1996). Therefore, peers' perceptions on individuals might affect the social choices an adolescent makes. In short, adolescents' choices of friends may be partially determined by how peers judge similarity between people as well. This type of similarity is called *peer-rated similarity*. Peer-rated similarity may be the norm to which adolescents tend to conform, influencing adolescents to form friendships with certain others.

In sum, there may be influences from the peer group that affect friendship formation, over and above the importance of the individual level and dyadic level. Both the structure of the social network of friendships as a whole and the way peers perceive adolescents' individual traits may partially determine how individuals form friendships.

#### 1.1.4 Integrating the Individual, Dyad, and Group Levels

The prior discussion indicates that traits and preferences may have different functions in friendship formation at the individual, dyadic, and group level. More specifically, individual traits and preferences may become important in friendship formation through each of these levels. Nevertheless, these levels do not exist in isolation from one another; the processes occurring on each level may affect each other as well. For example, how similar two adolescents actually are in personality traits may affect how adolescents perceive each other. Thus, to get a more comprehensive view on how traits and preferences function in adolescent friendship formation, the individual, dyadic, and group level need to be examined simultaneously.

#### 1.1.5 Overall and Specific Similarity

Adolescents may form friendships according to both specific and overall similarity in traits and preferences. Regarding the Big Five personality traits, specific similarity refers to similarity in one of these five personality traits. To take our earlier example, Tom and Sean could be highly similar only in Extraversion, which may be most important for how they interact and approach one another. Therefore, Tom and Sean become friends only because of similarity in Extraversion. Similarity in other specific traits may not matter as much for the choices of friends. Thus, specific similarity may be most important in adolescents' choices of friends, because specific traits and preferences may be expressed in certain social behaviors (Asendorpf & Wilpers, 1998; Denissen & Penke, 2008a). Therefore, similarity in a specific characteristic (i.e., *specific similarity*) may enhance friendship formation.

On the other hand, overall similarity in characteristics may be additionally important in friendship formation, irrespective of any specific similarity. To take the example again, Tom may be very extraverted, mildly neurotic, quite agreeable, and not at all conscientious, and open for new experiences. Although Sean is not as highly extraverted as Tom, he tends to show the same pattern *across* all the Big five traits. It may be this pattern that makes their total personality traits match, which makes their interaction more easy and predictable and eventually leads to friendship formation. Similarity in overall personality traits is labelled *overall similarity*.

The point is: both specific similarity and overall similarity in individual traits may be important in friendship formation. To get a comprehensive view of the functions of individual traits and preferences, the importance of both specific and overall similarity in adolescents' choices of friends needs to be examined. Therefore, it is important to consider both of these approaches to get a complete overview concerning the role of similarity in traits and preferences in friendship formation. An overview of the terminology used in the current dissertation regarding similarity is presented in Table 1.1. From this point onwards, the word "similarity" refers to all these similarity types taken together, unless stated otherwise.

Table 1.1

*Similarity Terminology*

Term	Level	Conceptual meaning	Example
Actual similarity	Dyadic	Similarity between two person's according to each person's own rating	Tom's traits according to Tom and Sean's traits according to Sean
Perceived similarity	Individual	Similarity between two persons according to one person's perception	Tom's and Sean's traits according to Tom
Peer-rated similarity	Group	Similarity between two persons according to peers	Tom 's and Sean's traits according to peers
Specific similarity	-	Similarity between two persons in a specific domain	Tom's and Sean's Extraversion
Overall similarity	-	Similarity between two persons across different (sub) domains	Tom's and Sean's Big Five personalities

## 1.2 Research Questions Friendship Formation

### 1.2.1 Similarity in Music Preferences in Friendship Formation

*To what extent do adolescents form friendships with others who have similar specific and similar overall musical preferences?*

To address the extent to which adolescents form friendships with others based on their and others' individual preferences, we first examined whether friends were truly similar in specific and overall music preferences. Next, we examined the role of similarity in musical preferences in friendship formation. More specifically, we retrospectively studied the pairs of individuals that became friends one year later, to examine whether these pairs of individuals were more similar in musical preferences than random pairs. This would indicate that these individuals formed their friendship partially because of similarity in music preferences. Actual similarity in both specific and overall music preferences was studied. The former refers to how similar best friends were in the specific music styles Elite, Rock, Urban, and Popular; the latter refers to how similar best friends were across all specific music preferences. Thus, in Chapter 2, the functions of individual preferences in friendship formation on the dyadic level were examined.

### 1.2.2 Similarity in Specific Personality Traits in Friendships

*To what extent are adolescent friends similar in specific Big Five personality traits?*

Before examining friendship formation processes explaining why friends are similar in traits, we have to establish that friends

are really similar in personality traits. Therefore, we compared the actual similarity in friends to similarity in randomly paired adolescents regarding the five specific personality traits Extraversion, Agreeableness, Neuroticism, Openness, and Conscientiousness. Similarity in two specific traits, namely Extraversion and Agreeableness, may be particularly linked to social behaviors and social reputation among peers (e.g., Denissen & Penke, 2008a; Jensen-Campbell et al., 2002). If friends are indeed more similar in these personality traits than randomized pairs, this supports the idea that specific similarity in individual traits is found in friendships. Thus, in Chapter 3, we examined the role of personality traits in friendships on the dyadic level.

### 1.2.3 Specific Personality Traits and Friendship Formation

*To what extent do adolescents form friendships with others based on specific personality traits?*

We examined the importance of specific personality traits in friendship formation on the dyadic, the individual, and the group level. On the dyadic level, we examined whether adolescents form friendships with others who match their own specific personality traits. Over and above these effects of similarity in personality on friendship formation, adolescents' personality traits may directly determine adolescents' social behaviors and social reputation. Finally, the group structure in which friendship are formed may determine who becomes friends with who. Specifically, as friendships seem to be embedded within a larger social network of interconnected dyadic friendships and groups (Carrington et al., 2005; Wasserman & Faust, 1994), the existing structure of the network of friendships as a whole may affect friendship formation. Therefore, we addressed the importance of the

individual level and the group level additionally to the dyadic level in Chapter 4.

Thus, to study the extent to which personality traits predict friendship formation, we examined to what extent personality traits directly (i.e., individual level) as well as similarity in personality traits (i.e., dyadic level) predicted the formation of friendships. By using a social network approach, we examined the social network of friendships as whole (i.e., group level), instead of focusing exclusively on friendship dyads. The role of specific personality traits in friendship formation was examined on the individual, the dyadic, and the group level.

#### 1.2.4 Overall Personality Traits and Friendship Formation

*To what extent do adolescents form friendships with others based on overall personality traits?*

In Chapter 5, the function of overall similarity in personality traits in friendship formation was examined simultaneously at the individual, dyadic, and group level. In this study, we focused on role of the *overall* pattern across all five Big Five personality traits in the formation of friendships. At the individual level, perceptions of similarity in overall personality may determine friendship choices. At the dyadic level, actual similarity in overall personality traits may enhance friendship formation. Finally, on the group level, how peers view similarity between two adolescents may determine whether these adolescents become friends. In order to assess the unique contribution of individual traits on all these three levels, we studied whether these three types of similarity in overall personality traits predicted friendship formation simultaneously. This way, we were able to examine on which level similarity in personality traits is more

important for the way adolescents form friendships.

### **1.3 Friendship Socialization: Friendship Quality and Friends' Behaviors**

After friendship formation, friendships may become important in the development of adolescents' problematic behaviors. Two characteristics of friendships may affect this development: friendship quality and friends' behaviors. We will discuss the role of both these characteristics of friendships in the development of behavioral problems and emotional problems.

#### **1.3.1 Friendship Quality**

Adolescents' emotional development may be affected by perceptions of friendship quality (e.g., Bukowski & Kramer, 1986; Furman & Buhrmester, 1985; Hartup, 1996; Parker & Asher, 1993). Although perceptions primarily function on the individual level, quality of friendships is an aspect of the dyadic relationship between friends as well (Hinde, 1997). Therefore, perceptions of friendship quality concern both the individual and the dyadic level. One aspect of friendship quality is the perception of closeness between the adolescent and the friend, such as support, intimacy, commitment, and warmth.

Perceptions of closeness between adolescents may inhibit the development of delinquent behaviors (Junger-Tas, 1992; Lansford, Criss, Pettit, Dodge, & Bates, 2003; Rankin, 1976; Swenson, 2004). Perceptions of high closeness in relationships with important others, such as friends, may protect adolescents from developing delinquent behaviors, because the conventional norm among these others is usually not to be delinquent (Hirschi, 1969). Performing

delinquent behaviors will increase the chance of losing this high quality relationship, and therefore makes adolescents refrain from delinquent acts. Thus, perceptions of closeness to friends might be important in the development of adolescent delinquency.

Perceptions of friendship quality may additionally have direct and indirect effects on adolescents' depression (Coyne & Downey, 1991; Hale, 2001; Rudolph et al., 2000). Perceptions of higher closeness in friendships might decrease depressive feelings because adolescents perceive they can depend on their friends, which in itself may decrease negative feelings (Borelli & Prinstein, 2006; Prinstein, Borelli, Cheah, Simon, & Aikins, 2005). Furthermore, perceptions of closeness to friends have been suggested to buffer against negative environmental influences in adolescents' emotional development (Buhrmester & Furman, 1987; Bukowski & Kramer, 1986; Hartup, 1996; Rudolph, 2002), indicating that perceptions of closeness may be indirectly important in adolescent depression as well. In recent years, especially concern over effects of Internet use on adolescents' depression has increased (e.g., Caplan, 2003; Gross, 2004; Kraut et al., 1998; Weiser, 2001). Adolescents with close, high quality friendships have been suggested to be unaffected by adverse effects of the Internet, because they are not as dependent on the Internet to find friendships (Valkenburg & Peter, 2007a, 2007c; Wolak, Mitchell, & Finkelhor, 2003). Therefore, it could be that adverse effects of Internet use on adolescents' depression may be buffered by good quality of friendships. In sum, perceptions of closeness in friendships may directly and indirectly affect the development of adolescent depression.

Next to perceptions of closeness, perceptions of individuality may also have a function inside friendships, and these perceptions may affect the development of depression as well. Individuation refers to the process by which social individuals become differentiated from

the other and has been described as a hallmark of the developing adolescent (Sullivan, 1953). Being respected in one's individuality by friends has been suggested to reduce depressive feelings because it may improve a depressed adolescent's self-image (Hammen, Rudolph, Weisz, Rao, & Burge, 1999; Huffman, 2001; Rudolph, Hammen, & Burge, 1997). This indicates that taken into account individuality next to closeness into the friendship may give more insight into how adolescents develop in terms of depressive feelings.

Thus, adolescents' own perceptions of friendships may directly and indirectly affect adolescents' development of emotional and behavioral problems. Although perceptions of friendships primarily concern the closeness between the adolescent and his or her friend, perceptions of individuality in friendships may additionally have salient functions in adolescent development.

### 1.3.2 Friends' Behaviors

Behaviors of friends may become salient in how adolescents' problem behaviors develop over time. Numerous studies stress the importance of friends' delinquent behaviors in the development adolescent delinquent behaviors (e.g., Fergusson, Swain-Campbell, & Horwood, 2002; Kandel, 1978a; Landsheer & Van Dijkum, 2005; Warr, 2002). For example, spending time with delinquent friends may increase exposure to delinquent beliefs and norms, and thereby increase adolescent delinquent behaviors (Sutherland, 1947; Sutherland & Cressy, 1978). This suggests that delinquent behaviors of adolescents at the individual level may increase because friends' delinquent behaviors are transferred within the friendship. Because this reasoning pertains to the specific match between friends' own behaviors and adolescents' own behaviors in adolescent development, these processes occur at the dyadic level.

Nevertheless, because of a lack of long-term longitudinal studies, little is known about functions of friends' delinquency in the *development* of adolescent delinquency from early to middle adolescence. This is important because functions of friends might differ for short-term and long-term development (Brendgen, Vitaro, & Bukowski, 2000; Dumas, Neese, Prinz, & Blechman, 1996). Therefore, the role of delinquent behaviors of friends in the development of adolescent delinquency needs to be examined.

### 1.3.3 Combining Individuality, Connectedness, and Friends' Behaviors

Because both friends' characteristics and perceptions of friendship quality may affect behavioral and emotional problems, these two characteristics of friendships need to be studied simultaneously to see what their unique and combined functions in adolescent development are. What is more important for adolescent behavioral and emotional development: perceptions of friendship quality, or behaviors of friends? Additionally, studying both these aspects together may help determine interactions of friends' characteristics and friendship quality on adolescent development. As an example, consider two relationships: A) Sam has a highly delinquent friend John and perceives high closeness to him; B) Mark is also befriended with John, but perceived low closeness to him. It seems that in the first friendship, John's delinquent behaviors may be more transferred because he is more close to Sam. Mark, in contrast, may be unaffected by John's behavior because they are not as close. In other words: behaviors of friends may interact with perceptions of closeness in the friendship to affect adolescent delinquency. Thus, simultaneously studying the role of friends' behaviors and friendship quality may provide more insight into how friendships affect adolescents' problem behaviors.

Further, several broad developmental theories (e.g., Baumrind & Black, 1967; Bowlby, 1973) emphasize that optimal adaptation within close relationships involves use of a partner not only as a source of closeness, but also as a secure base for individual exploration. This may extend to friendships as well: for friends to be truly supportive to adolescents when facing depressive feelings, adolescents may need to feel that they are close to their friends, while at the same time need to feel that they are respected as an individual. In sum, to help us understand what the functions of friendships in the development of adolescents are, both friends' behaviors and perceptions of friendship quality need to be examined in the development of behavioral and emotional problems.

## **1.4 Research Questions Friendship Socialization**

### 1.4.1 Depression and Friendship Quality

*What is the combined importance of individuality and closeness within adolescent friendships in the development of adolescent depression?*

In Chapter 6, we examined the development of two dimensions of friendship quality: perceived closeness and perceived individuality in adolescent friendships. We used a person-centred approach to be able to cluster adolescents in different friendship types on the basis of their developmental trajectories from early to late adolescence. Next, differences in the development of depression according to friendship types were examined. To test gender differences in friendship types and in developmental differences in depression according to friendship types, we examined models separately for boys and girls.

### 1.4.2 Internet Use, Friendship Quality, and Emotional Adjustment

*To what extent does friendship quality moderate effects of Internet use on depression and social anxiety?*

In Chapter 7, we examined longitudinal effects of Internet use on depression and social anxiety. We differentiated between two types of Internet use, namely communication based Internet use (i.e., Instant Messaging, or chatting through chat-programs such as MSN) and non-communication based Internet use (i.e., surfing). Both these types of Internet use were used simultaneously to predict changes in depression and social anxiety over a one-year period. To study the moderating role of friendship quality in these effects, we examined whether effects of perceived friendship quality interacted with effects of the two Internet types on depression and social anxiety.

### 1.4.3 Adolescent Delinquency and Friends' Behaviors

*What is the relative and combined importance of perceived friendship quality and friends' delinquency in the development of adolescents' delinquency?*

In Chapter 8, the unique and combined relevance of friends' delinquency and perceptions of friendship quality in the development of adolescent delinquency were examined. Adolescents and their best friends were followed from early to middle adolescence in both their delinquency and perceptions of friendship quality. Gender differences in effects of friendship quality and friends' delinquency on subsequent adolescents' delinquency were examined. Finally, the two approaches were combined by examining the interactions between friendship quality and friends' delinquency on adolescent delinquency.

## 1.5 Designs and Data Collections

In the current dissertation, data were used from two different longitudinal projects: the CONflict And Management Of Relationships study (CONAMORE) (Meeus et al., 2005; chapters 2, 3, 6, 7, and 8) and My First Year project (chapters 4 and 5). We will discuss the design and used measures separately for each of these projects.

### 1.5.1 CONAMORE samples and design

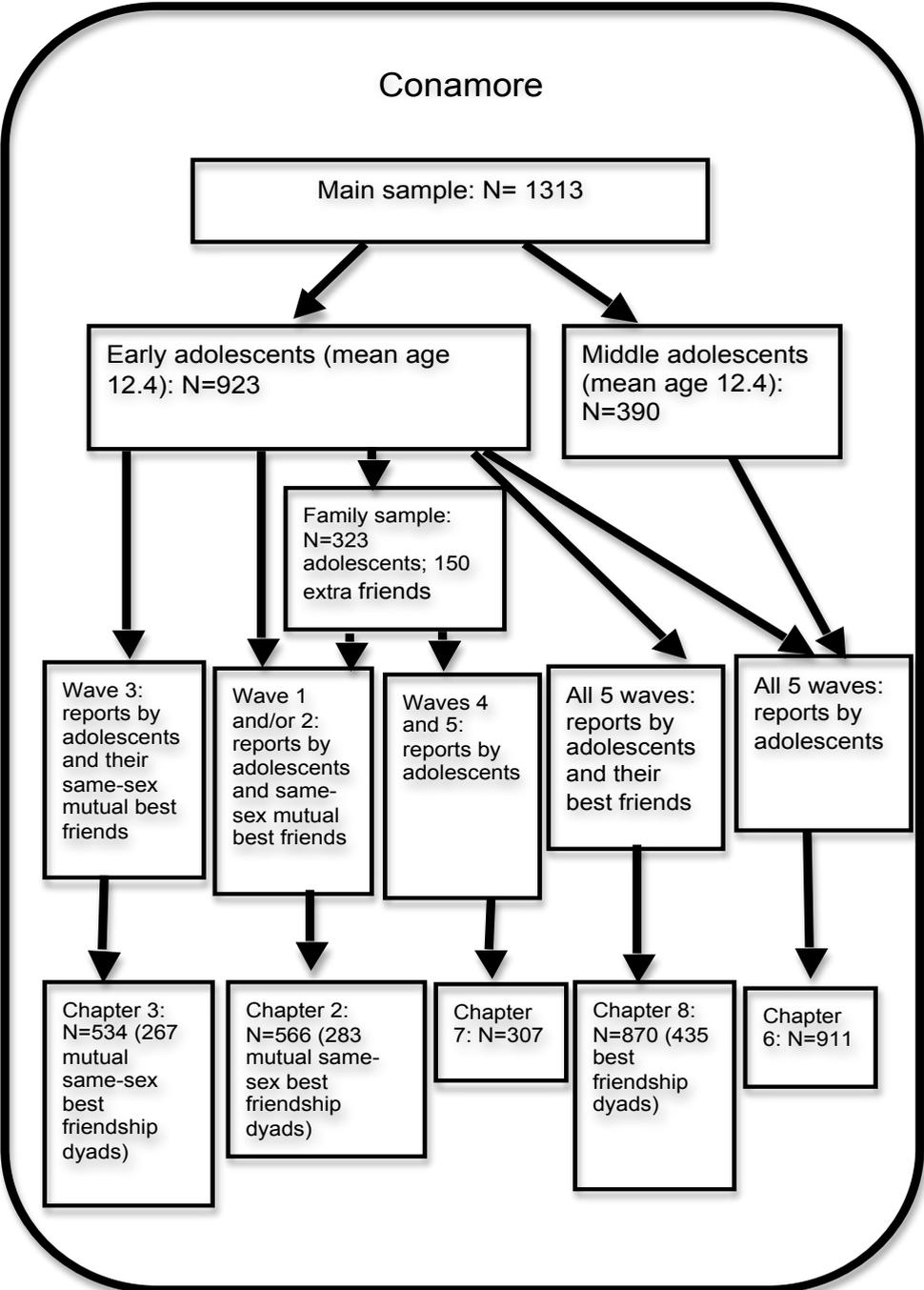
CONAMORE is a longitudinal study that examines the relationships of Dutch adolescents with parents and peers as well as their emotional states. In CONAMORE, best friendships were studied by letting adolescents nominate one best friend at each measurement. Requirements for selecting friendships were different for each research question according to data-analysis, questionnaires, and measurements used. Figure 1.1 provides an overview of the selected samples from CONAMORE for each study. Best friendships were selected from both the main sample and the family sample of CONAMORE. Below, a description of each of these samples is provided.

*Main sample.* In the main sample of CONAMORE, a total of 1313 adolescents participated at five annual measurements. These adolescents were selected from various high schools located in the province of Utrecht, The Netherlands. At each wave, a battery of questionnaires was filled out by each participant inside classrooms. The total sample consists of 923 early adolescents (mean age 12.4 years,  $SD = 0.6$ , ranging from 10-15 years) and 390 middle adolescents (mean age 16.7 years,  $SD = 0.8$ , ranging from 16-20 years). The ethnic composition of the main sample was 89.3% Dutch and 10.7% ethnic

minorities. 40.7% of the adolescents were in high schools preparing for lower level tertiary education or lower level jobs, and 59.3% were in high schools preparing for college or university. These adolescents were asked to nominate a single best friend at each wave, who could not be a sibling or girl/boyfriend.

*Family sample.* At the first measurement of the main sample, the Dutch early adolescents received a letter including an invitation to participate with both parents during annual home-visits. Thus, ethnic minorities were excluded from participating. Of the families invited, 491 families initially agreed to participate. Due to our restriction of including only two-parent Dutch families, 90 one-parent families who agreed to participate were not able to take part in the family sample. For financial reasons, 323 families were randomly selected from the 401 two-parent families to participate from Wave 2 onwards. The family sample was used to include additional best friends that did not participate in the main sample. From Wave 2 onwards, best friends were additionally contacted if 2 criteria were met: 1) these best friends were nominated by adolescents of the family sample 2) these best friends did not already participate in the main sample. 95.4% of these additional friends returned questionnaires that were sent by post.

Figure 1.1 Friendship sample selection from CONAMORE



### 1.5.2 CONAMORE Measurements

*Best friendships.* Adolescents were asked to nominate one best friend, who was not a sibling or romantic partner. In all studies that used CONAMORE data, adolescents were selected if the following criteria were met: 1) they nominated best friends at any of the waves 2) best friends were unique: that is, best friends could not additionally be included as target adolescents, and best friends could only be nominated once at the wave(s) in question. This was done to avoid double entry of the data at each wave. Of the 1313 adolescents participating in CONAMORE, 10.7% had the same best friend across all five measurements, 21.3% had the same best friend only across four measurements, 20.4% had the same best friend only across three measurements, 31% had the same best friend only across 2 measurements, 13.5% changed friends every measurement, and 3.1% did not report any best friendships at all. Regarding gender composition of friendship dyads, 66.2% of the adolescents had same-sex friendships in all measurements, 16% had mixed-sex friendships in 1 measurement, 8.6% had mixed-sex friendships in 2 measurements, and 9.2% had mixed-sex friendships in 3 to 5 measurements.

*Problem behaviors.* Adolescent aggression was assessed with the Direct and Indirect Aggression Scales (Björkqvist, Lagerspetz, & Österman, 1992). Subjects were asked to indicate on four-point scales (1 = *never*, 4 = *very often*) how often they display the behavior described when they are mad at someone from their class. The Direct Aggression Scale consists of 5 items (e.g., “I kick the other one”). The Indirect Aggression Scale consists of 12 items (e.g., “I try to make the other one jealous”). A summed, total score was computed from items of both the Indirect and Direct Aggression scale to form a score for aggression.

Regarding delinquency, respondents were asked to indicate on four-point scales how many times they had committed 14 minor offences (e.g., such as “Taken something from a shop without paying”) in the previous twelve months (1 = *never*, 2 = *once*, 3 = *two or three times*, 4 = *four times or more*).

Adolescent depression was assessed with the Children’s Depression Inventory (CDI; Kovacs, 1992). The items were scored on a 3-point scale, ranging from *false*, through *a bit true*, to *true*. The CDI consists of 27 items (e.g., “I’m sad all the time”).

Social anxiety was measured by the Social Anxiety subscale of the revised version of the Screen for Child Anxiety Related Emotional Disorders (SCARED; Hale, Raaijmakers, Muris, & Meeus, 2005). The 4 items (e.g., “I do not like to be around people I do not know”) were scored on a 3-point scale, ranging from *almost never*, through *sometimes*, to *often*.

*Personality traits.* The personality dimensions Extraversion, Agreeableness, Conscientiousness, Emotional Stability and Openness to Experience were measured using the shortened Dutch version of the Big Five questionnaire (Goldberg, 1992). The adolescents judged whether the 30 items applied to themselves on a 7-point scale (1 = *absolutely agree*, 7 = *absolutely disagree*). Extraversion assesses the extent to which the person actively engages the world or avoids intense (social) experience (e.g., “talkative”). Agreeableness assesses the interpersonal nature of the person and can range from warm and committed to others (e.g., “friendly”) to antagonistic. Conscientiousness assesses the degree of organization, persistence, and motivation during the fulfilment of goal-directed task behaviors (e.g., “systematic”). Emotional Stability assesses the extent to which the person is emotionally stable or plagued by unpleasant experiences and distressing emotions (e.g., “nervous”). Openness to Experience

assesses the depth, complexity, and quality of a person's mental and experiential life along with the flexibility of his or her information processing (e.g., "versatile").

*Media preferences.* Adolescents' music preferences were assessed by means of the Music Preference Questionnaire (MPQ; Sikkema, 1999). The 13 items of the scale represent the major music dimensions in contemporary music. Subjects were asked to indicate on five-point Likert scales (1 = *very bad*, 5 = *very good*) the extent to which they liked each of the music genres listed. Four music dimensions were identified. *Elite* was defined by the genres classical, gospel, and jazz; *Rock* was defined by rock, punk, gothic, and heavy metal music; *Popular/Dance* was defined by pop music/charts, trance, and club-house; *Urban* was defined by rap/hip-hop, R&B, and reggae.

To measure Internet use, participants were first asked to make an estimation of the average weekly frequency spent chatting or surfing on a five-point scale, ranging from "*never*", through "*less than once a week*", through "*about once a week*", through "*several times a week*", to "*every day*". Further, participants estimated how much time on average they spent on an average weekly session of surfing and IM-ing on a four-point scale, ranging from *shorter than half an hour*, through *half an hour to an hour*, through *longer than an hour*, to *longer than two hours*.

*Perceptions of friendship quality.* The Network of Relationship Inventory (NRI; Furman & Buhrmester, 1985) was used to measure Support, Conflict, and Dominance. Participants were asked to answer questions about relationship characteristics on a five-point scale (1 = *never*, 5 = *always*). This questionnaire contained 24 questions, measuring Support (e.g., "How often do you turn to your best friend for support with personal problems?"), Dominance ("How often does

your best friend get you to do things his/her way?”), and Conflict (e.g., “How much do you and your best friend get upset with or mad at each other?”).

The Balanced Relatedness scale (Shulman, Laursen, Kalman, & Karpovsky, 1997) was used to measure the perception of to what extent friend’s respect adolescents’ individuality in friendships. The adolescents judged whether the 7 items (e.g., “My best friend respects my decisions”) applied to themselves on a 4-point scale (1 = *absolutely agree*, 4 = *absolutely disagree*).

Perceived closeness was assessed with the commitment scale of the Investment Model Scale (Rusbult, Martz, & Agnew, 1998). Participants judged whether the 4 items (e.g., “I want the relationship with my best friend to stay good”) applied to themselves on a 5-point scale (1 = *absolutely disagree*, 5 = *absolutely agree*).

Perceived constructive problem solving was measured with two subscales of the Conflict Resolution Style Inventory (CRSI) of Kurdek (1995). The first subscale “Problem Solving” consisted of five items pertaining to constructive problem solvings (e.g., “Try to find resolutions that are acceptable for the both of us”). The second subscale “Engagement” consisted of five items pertaining to non-constructive problem solvings during conflict with my best friend (e.g., “Attacking him/her personally”). These items were recoded so that higher scores reflected more constructive problem solving. Participants were asked to report to what extent these items applied to themselves when having a conflict with their best friend on a 5-point scale ranging from (1 = *absolutely disagree*, 5 = *absolutely agree*).

### 1.5.3 My First Year Sample and Design

For both Chapter 4 and 5, data were used from the longitudinal round-robin project “My First Year”. This project examined the

development of personality traits, friendship choices, and emotional development among freshmen attending the Utrecht University. A total of 489 Psychology freshmen had been randomly assigned to one of the 20 introduction groups ranging between 16 and 24 individuals for educational purposes. The two studies in question concern data from 205 individuals who completed questionnaires every month over five waves. The majority of this final sample of late adolescents ( $M = 18.9$  years,  $SD = 1.6$ ) was female ( $n = 168$ ; 82%) and of Dutch origin ( $n = 189$ ; 92%).

#### 1.5.4 My First Year Measures

*Single item Big Five inventory.* The ultra-short revised Ten Item Personality Inventory (TIPI-r; Denissen, Geenen, Selfhout, & Van Aken, 2008a; Gosling, Rentfrow, & Swann, 2003) was used in Chapter 3 and 4. The revised questionnaire reduced the original 10 unipolar items to 5 bipolar items. Participants rated both themselves and their peers on these items, using a 1 (extremely like the left adjective pair) to 7 (extremely like the right adjective pair) scale.

*Friendship intensity.* Friendship intensity was measured at each wave by asking each participant to indicate to what degree they were friends with each of their group members on a continuous scale, ranging from 1 = *Far acquaintance* to 7 = *Best friend*.

*Communication.* Communication was measured by asking participants to indicate how much they had spoken to each of their group members during the last week on a scale ranging from 1 = *Never* to 7 = *Very often*.

**1.6 Outline of Dissertation**

In the next seven chapters, each of the research questions is addressed (see Table 1.2). The last chapter includes a summary of all results from the chapters and a general discussion of these results. Next, references, summaries (English and Dutch), and my Curriculum Vitae are presented.

**Table 1.2**  
**Overview of Chapters, Variables, Levels of Relationship, Waves, and Sample**

<i>Chapter</i>	<i>Dependent Variable</i>	<i>Independent Variable(s)</i>	<i>Level</i>	<i>Waves</i>	<i>Sample</i>
2	Friendship Formation	Actual similarity in specific and overall preferences	Dyadic	2	566 friendship dyads (M=12.9)
3	-	Actual similarity in specific traits	Dyadic	1	543 friendship dyads (M=14.6)
4	Friendship Formation	Specific traits	Individual	5	205 freshmen (M=18.9)
		Actual similarity in specific traits	Dyadic		
		Structure of peer network	Group		

*Table 1 continues*

Table 1 continued

Chapter	Dependent Variable	Independent Variable(s)	Level	Waves	Sample
5	Friendship Formation	Perceived similarity overall traits Actual similarity overall traits Peer-rated similarity in overall traits	Individual Dyadic Group	5	205 freshmen (M=18.9)
6	Depression	Perceived friendship quality	Ind/Dyad	5	911 adolescents (M=12.4)
7	Depression & Social Anxiety	Internet use	Individual	2	307 adolescents (M=15.2)
8	Delinquency	Perceived friendship quality Friends' delinquent behaviors Perceived friendship quality	Ind/Dyad Dyadic Ind/Dyad	5	435 friendship dyads (M=13.0)

*Note.* Waves = number of measurements used. *M*= mean age of participants (at first measurement, if several)



**Chapter 2.**

**Similarity in Music Preferences and  
Friendship Formation<sup>1</sup>**

*“Are we not formed, as notes of music are,  
For one another, though dissimilar?”*  
~Percy Bysshe Shelley

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<sup>1</sup> Selfhout, M., Branje, S., Ter Bogt, T., & Meeus, W. (2009). The role of music preferences in the formation and stability of best friendships. *Journal of Adolescence*, 32, 95–107.

### **Abstract**

The current study examines the role of similarity in music preferences in the formation and discontinuation of friendships over a one-year period. Questionnaire data were gathered from 283 Dutch same-sex mutual best friends (Mean age = 12.97) in two waves with a one-year interval. Results show consistent evidence for high similarity in specific music dimensions among friends at both waves. Moderate similarity was found in the overall patterning of preferences for music genres at both waves, even after controlling for similarity in social background. Specific music similarity in more non-mainstream music dimensions and overall music similarity at Wave 1 were related to selecting a new friend at Wave 2. However, similarity in music preferences was not related to the discontinuation of an existing friendship at Wave 2. Thus, results suggest that similarity in music preferences is related to friendship formation, and not to friendship discontinuation.

## 2.1 Introduction

During adolescence, music becomes increasingly important in the personal and social lives of adolescents (Arnett, 1991; Ter Bogt, Raaijmakers, Vollebergh, Van Wel, & Sikkema, 2003). From early adolescence onwards, an increasing amount of time and money is spent on music affairs (Christenson & Roberts, 1998; Sikkema, 2005). Music preferences may play an important role in early adolescent interaction with peers, as music is listened to and shared with friends (Christenson & Roberts) and peer crowds often centre around certain musical preferences (Arnett, 1991; Bennet, 2001; Urberg, Degirmencioglu, Tolson, & Halliday-Scher, 2000). Although one study showed that similarity in music preferences plays an important role when undergraduates were given the task of getting acquainted (Rentfrow & Gosling, 2006) and this process may be even stronger for early adolescents (Rentfrow & Gosling, 2007; Ter Bogt, 2004), research on the role of music preferences in the formation and maintenance of early adolescents' best friendships is seriously lacking. The current study examines similarity in music preferences in early adolescents' mutual friendships and the longitudinal role of this similarity in the formation and stability of these friendships.

### *Similarity in Music Preferences in Adolescent Friendships*

Why would similarity in music preferences play an important role in early adolescent friendships? Several theoretical frameworks suggest that sharing musical preferences may be important in social relationships. First, several researchers (Tarrant, North, & Hargreaves, 2001) have applied Social Identity Theory (SIT; Tajfel, 1978) to the use of music preferences in individuals' identity within peer groups. SIT maintains that individuals gain a social identity

from the groups to which they belong and will therefore adopt similar preferences and habits to those of the individuals in their group in an attempt to foster self-esteem and feelings of belonging. As adolescent musical preferences often form the core of peer cliques and groups (Brown et al., 1986) and a musical preference is a valued and important dimension of adolescents' social identity (Tarrant et al., 2001), this perspective suggests that adolescent friends have similar music preferences because friends adopt each other's preferences.

Second, the similarity-attraction hypothesis (e.g., Byrne, 1971) and the perspective of assortative mating (Luo & Klohnen, 2005) suggest that individuals are most attracted to other people who have similar attitudes and values (e.g., Fehr, 2001), behaviors (Tolson & Urberg, 1993), and personality characteristics (Morry, 2005), and will select these similar others as friends and romantic partners. The 'filtering' perspective of Duck and Craig (Duck & Craig, 1978) uses the similarity-attraction hypothesis to suggest that directly observable information about other individuals provides the initial filter in the formation of friendships. As friendships progress, directly observable information is suggested to become less important in the stability of friendships. Because music preferences of early adolescents are often directly visible through clothing, hairstyle, and outward behavior associated with a music genre (Christenson & Roberts, 1998; Ter Bogt, 2000), similarity in music preferences can be expected to have an important role in the formation of best friendships. More specifically, music preferences of early adolescents provide unique visible cues concerning one's personality, life style, and values, and music preferences may therefore be used to select new friends (Rentfrow & Gosling, 2006, 2007).

Thus, adolescent friends are suggested to be similar in musical preferences because they select friends with similar music preferences and adopt their friends' music preferences, respectively.

In addition, the filtering perspective and the perspective of Rentfrow and Gosling suggests that similarity in music preferences may be especially important in adolescent friendship formation. Finally, the filtering perspective suggests that similarity in music preferences is less important in the instability of friendships.

Several studies examined similarity in music preferences between individuals. In a survey among college students (Rozin, Riklis, & Margolis, 2004), no differences were found in correlations of music preferences among self-selected roommates ( $r = .30$ ) and randomly paired roommates ( $r = .17$ ). Although this difference did not reach statistical significance, this may be due to the small sample size ( $n = 10$  for self-selected roommates). Furthermore, the relationship between roommates is likely to be more superficial than the relationship between best friends. In an experimental study, Knobloch, Vorderer and Zillmann (1999) showed that when adolescents perceive higher similarity in music preferences with a random adolescent, they have a higher desire to become “good friends” and share activities with this random adolescent. One study showed that music is the most common topic in conversations among unacquainted undergraduates given the task of getting acquainted (Rentfrow & Gosling, 2006). Furthermore, strangers’ perceptions of music preferences of each other were quite accurate and specific music preferences were found to be linked to specific personality traits (Rentfrow & Gosling, 2006, 2007). In addition, perceived music preferences correlated differently with personality, values, and personal quality than other cues, such as appearance, suggesting that music preferences provide unique cues during acquaintance processes (Rentfrow & Gosling, 2006). Thus, although these studies did not examine best friendships, they provide some evidence for an important role of similarity of music preferences in social networks.

Dutch adolescents’ music preferences can be clustered into

four main music dimensions (Delsing, Ter Bogt, Engels, & Meeus, 2007; Ter Bogt et al., 2003), namely the *Elite Dimension*, the *Rock Dimension*, the *Popular/Dance Dimension*, and the *Urban Dimension*. Each of these four music dimensions consist of specific music genres, e.g., classical music, heavy metal music, pop chart music, and hip-hop music, respectively. This pattern of four dimensions has been cross validated in different samples in the Netherlands (Ter Bogt et al., 2003). Furthermore, these dimensions show close resemblance to four music-dimensions dimensions found in the United States (Rentfrow & Gosling, 2003). Similarity in specific music dimensions is labelled *specific music similarity*. Adolescents' musical taste can not only be considered as preferences for a specific music dimension, but also as a pattern *across all* the music genres. For example, groups with differential patterns across the four mentioned dimensions were found among 12 to 24 year-old adolescents and adults: whereas some adolescents like *all* music genres, others prefer only one genre and dislike other genres, and other adolescents may like only two specific genres (Ter Bogt et al., 2003). Similarity in the overall pattern of music genres is labelled *overall music similarity*.

### *The Current Study*

The current study first examined the extent to which friends are similar in specific and overall music similarity. In addition, the current study examined to what extent similarity in music preferences predicted the selection of new friend as well as whether friends continued being friends or discontinued being friends over a one-year period. This was made possible because the two waves of the study allowed categorization of friends who did not nominate each other in Wave 1, but did at Wave 2 (to-be friends), friends who nominated each other at both waves (stable friends), and friends who did nominate

each other at Wave 1, but not anymore at Wave 2 (unstable friends). This way, we studied the role of music preferences in the formation and instability of early adolescents' best friendships, respectively. Following suggestions of prior research, we expected that similarity in music preferences especially played an important role in the formation of friendships, and less so in the instability of friendships.

The focus of the current study was only on the first nominated best friend, because previous research has shown that this dyadic relationship is much stronger than other types of friendship (i.e., other close friends, such as the second or third nominated friends) (Degirmencioglu, Urberg, Tolson, & Richard, 1998; Newcomb & Bagwell, 1995). Additionally, first nominated friends seem to be the primary locus of influence on adolescents' school achievement and drug use (Mounts & Steinberg, 1995). Finally, the stability of first nominated best friendships is much higher compared to other friendships (Berndt & Keefe, 1995). Only mutual best friendships, or friendships in which both adolescents nominate each other as best friend, were included, because mutual best friendship nominations seem to indicate stronger ties between friends than non-mutual best friendship nominations (Griffon-Smith & Brownwell, 2003; Kurdek & Krile, 1982).

To summarize, the current study tests the following hypotheses:

*Hypothesis 1:* Friends show similarity in preferences for specific music dimensions and in the overall patterning of music preferences

*Hypothesis 2:* Specific and overall music similarity predict friendship formation

*Hypothesis 3:* Specific and overall music preferences do not predict friendship stability

## 2.2 Method

### *Participants*

Participants in this study were 566 adolescents of the early adolescent cohort participating in the CONflict And Management Of Relationships study (CONAMORE) (Meeus et al., 2005). CONAMORE is an ongoing longitudinal study that examines the relationships of Dutch adolescents with parents and peers as well as their emotional states. In the current study, data were used from the first two waves with a one-year interval. Adolescent nominated a single best friend and were selected if their best friend participated in the study and if they could be coupled to their best friend nomination in the same dataset in one of the two measurement waves. Out of 940 adolescents, 566 selected adolescents formed 283 same-sex friendship dyads, consisting of 49.2% boys and 50.8% girls. Nine mixed-sex dyads were identified but this number was too small for inclusion in analyses. The mean age of all adolescents was 12.97 ( $SD = 1.58$ ). All dyads were unique: no member of any dyad was also a member of another dyad at the same wave. The total group and the selected group of adolescents showed no significant ( $p > .05$ ) differences in gender, age, educational level, and all four music dimensions at both waves.

The ethnic composition of the present sample was 88.1% Dutch and 11.9% ethnic minorities. 40.5% of the adolescents were in high schools preparing for lower level tertiary education or lower level jobs, and 59.5% were in high schools preparing for college or university.

## *Procedure*

Participants came from various high schools in Utrecht and surroundings. Parents and students received a letter in which the aims of the study were described and information was given about the option of not participating. Students were required to provide written informed consent. Less than 1% decided not to participate. Participants completed a series of questionnaires in their classroom after school hours. Research assistants, who attended the administration, gave verbal instructions about filling out the questionnaires; written instructions were also included. Confidentiality of their given answers was guaranteed explicitly. For students who were absent on the day of testing, a second assessment time was organized. Students who were absent on both days of testing were not assessed. Each wave, respondents received €10,- after completing the questionnaires.

## *Types of Friendships*

Friendships were assessed by asking each respondent to nominate one single best friend who was not a brother or sister and not someone they had an intimate relationship with. Next, if these nominated best friends participated in the study and nominated the target adolescent as their best friend, they were coupled with the target adolescent. This resulted in 179 mutual best friendship dyads at Wave 1, and 162 mutual best friendship dyads at Wave 2, respectively. Of the 179 mutual best friends at Wave 1, 58 dyads stayed mutual best friends at Wave 2 (stable friends): that is, both adolescents nominated each other as mutual best friend one year later. The other 121 dyads did not nominate mutual best friends at Wave 2, but did at Wave 1 (unstable friends). Furthermore, 104 to-be best friends were identified, consisting of dyads that nominated each other as mutual best friends

only at Wave 2, and not at Wave 1.

Adolescents' music preferences were assessed by means of the Music Preference Questionnaire (MPQ; Sikkema, 1999). The MPQ consists of a list of 13 established categories of music. The items of the scale represent the major music dimensions in contemporary music. Subjects were asked to indicate on five-point Likert scales (1 = *very bad*, 5 = *very good*) the extent to which they liked each of the music genres listed. Missing data on the items of the questionnaires were imputed using the EM algorithm within SPSS 12.0. Four music dimensions were identified (Delsing et al., 2007): the *Elite Dimension* was defined by the genres classical, gospel, and jazz; The *Rock Dimension* was defined by rock, punk, gothic, and heavy metal music; The *Popular/Dance Dimension* was defined by pop music/charts, trance, and clubhouse; The *Urban Dimension* was defined by rap/hip-hop, R&B, and reggae. At both waves, exploratory factor-analyses on the present friendship sample clearly showed this four-factor solution, with few cross-loading genres. Furthermore, Confirmatory Factor Analyses (CFA) showed that for models examining four-factor solutions in which each specific item loaded on corresponding factors, high factor loadings (>.52) as well as adequate fit indices were found ( $\chi^2(59, n = 179/162) > 56.19, p < .01$ ; CFI's > .98, RMSEA's < .04). Cronbach's alpha's of the four dimensions were .69, .89, .64, and .79 respectively at Wave 1 and .66, .91, .61, and .77 respectively at Wave 2.

### *Strategy of Analysis*

In order to determine whether adolescents were more similar to their best friends in their preferences for specific music dimensions than to random non-friend dyads, multi-level intra-class correlations of each of the four music dimensions preferences were computed for friend-

ship dyads. With this technique, a comparison group is not needed because this measure takes into account any similarity that may exist among random dyads. In order to compare similarity in stable best friendships and unstable best friendships, differences in intra-class correlations were tested for significance by a procedure suggested by Haggard (1958): intra-class correlations are transformed using Fisher's  $z$  transformation, and then  $Z$  is computed as the difference between the two intra-class correlations, divided by the standard error of difference. Finally, sex differences between intra-class correlations were explored.

To examine similarity in the overall patterning of music preferences,  $q$ -correlations, or profile correlations, were computed for mutual friendship dyads (Luo & Klohnen, 2005).  $Q$ -correlations capture each dyad's similarity in terms of their organization (or patterning) of responses. Other types of similarity indexes, such as intra-class correlations and difference scores, are computed on the overarching "scale level" rather than on the individual "item level". That is, they completely ignore agreement (or disagreement) on the many specific responses on which the profile of individuals' music preferences is based, thus discarding a substantial amount of information that is captured by profile similarity correlations. Furthermore, in contrast to intra-class correlations, each dyad gets one  $q$ -correlation pertaining to their similarity in overall music genres and therefore this similarity score can be used to predict whether a friend is selected and whether a mutual friendship continues over a one-year period. Thus, overall music similarity was based on the pattern of adolescents' scores on all 13 music genres compared to the pattern of their friends' scores on all 13 music genres.

$Q$ -correlations do not account for the similarity that is found between random dyads, so overall music similarity will be examined by using a large number of randomly assigned dyads from

a heterogeneous sample of adolescents to establish a base against which similarity in real best friendship dyads can be compared. Randomization was used to create random pairs at Wave 1 and Wave 2 separately. The adolescent target group that could be matched to a best friend ( $N = 358$  and  $N = 324$  at Wave 1 and Wave 2, respectively) was randomly assigned a 100 times to the adolescents who could not be matched to a friend within the total sample of the same age cohort ( $N = 582$  at Wave 1 and  $N = 616$  and Wave 2). Multivariate tests on gender, age, educational level, and all four music dimensions showed no significant differences between the best friend sample and the random sample. Because all friendship dyads were same-sex, of a small age range (11 to 13), and had the same educational level, the random dyads were matched on gender, age, and educational level. Therefore, differences in overall music similarity between the real friends and the random dyads cannot be explained by the fact that best friends are more similar in background (i.e., gender, age, or educational level) than random dyads. In these analyses, the main effect of educational level was controlled for.

### 2.3 Results

Table 2.1

*Descriptives of Specific Music Dimensions for Wave 1 and Wave 2*

	Wave 1 ( $n=179$ )		Wave 2 ( $n=162$ )	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Rock	2.27 <sup>a</sup>	1.03	2.13 <sup>b</sup>	1.05
Elite	2.38 <sup>a</sup>	.93	2.39 <sup>a</sup>	.97
Popular/Dance	3.17 <sup>c</sup>	.89	3.24 <sup>d</sup>	1.02
Urban	2.58 <sup>e</sup>	.87	2.44 <sup>a</sup>	1.07

*Note.* <sup>a</sup> = differences between superscripts indicate significant ( $p < .05$ ) differences between means.

### *Descriptives*

A repeated measure analysis of variance in which all four dimensions at both waves were included revealed that overall, the means between all four music dimensions on both waves differed significantly from each other ( $F(7, 276) = 52.63, p < .001$ ). As shown in Table 2.1, the dimension Popular/Dance was rated significantly higher than all other dimensions at both waves, suggesting that this dimension is most popular among adolescents of the current sample. Next, Urban is liked the most, followed by both Elite and Rock, which are liked to the same extent at Wave 1. These last three dimensions can be seen as the less mainstream dimensions, because an average of three indicates that a dimension is neither liked nor disliked. Finally, the popular/dance dimension becomes more popular over time, Urban and Rock become less popular over time, and Elite seems to be liked to the same extent at Wave 1 and Wave 2.

### *Similarity in Music Preferences*

*Specific music similarity.* To examine specific music similarity among mutual best friends, intra-class correlations were computed for all four music dimensions. These results are shown in the first two columns of Table 2.2. At both waves, mutual best friends showed significant and high intra-class correlations on all four specific music dimensions, indicating that they are more similar in preferences for specific music dimensions than random dyads.

Table 2.2

*Specific Music Similarity for Mutual Best Friendships, To-be Friends, Stable Friends, and Unstable Friends*

	Total Friends		To-Be	Stable	Unstable	1vs2
			Friends	Friends	Friends	
	Wave 1	Wave 2	Wave 1	Wave 1	Wave 1	
	(n=179)	(n=162)	(n=104)	(n=58)	(n=121)	
<i>Specific music dimensions</i>						
Rock	.55**	.60**	.31**	.53**	.54**	n.s.
Elite	.36**	.48**	.34**	.48**	.23	n.s.
Popular/ Dance	.41**	.48**	.16	.36**	.44**	n.s.
Urban	.42**	.41**	.22**	.45**	.19	n.s.

\*  $p < .05$ ; \*\*  $p < .01$

Thus, these results confirm the first part of Hypothesis 1: friends consistently show high similarity in specific music dimensions.

*Overall music similarity.* To examine overall music similarity, q-correlations were computed for friendship dyads and random dyads. Differences in mean similarity were assessed with an ANOVA, in which gender (0 = male, 1 = female), age, educational level (0 = low, high = 1), and dyad membership (0 = random dyad, 1 = friend dyad) were used to predict overall music similarity. At both waves, overall music similarity as indicated by mean q-correlations was significantly ( $p < .05$ ) higher for friends ( $M = .31$  and  $M = .38$  at Wave 1 and Wave 2, respectively) than for random dyads ( $M = .04$  and  $M = .03$  at Wave

1 and Wave 2, respectively), even after controlling for demographical background and similarity in demographical background. These results therefore confirm the second part of Hypothesis 1: friends are moderately similar in their overall patterning of preferences for music dimensions.

*Similarity in Music Preferences in the Formation of Friendships.*

*Specific music similarity.* To examine its role in friendship formation, specific music similarity on Wave 1 was computed for dyads that would become friends one year later (to-be best friends). Results are shown in Table 2.2, third column. Intra-class correlations on the music dimensions Rock, Elite, and Urban were significant and positive, indicating that dyads that were going to be friends one year later already showed more similarity than random dyads. No evidence was found for similarity in the music dimension Popular/Dance. Thus, these results partly confirm the first part of Hypothesis

Table 2.3

*Summary of Logistic Regression Analyses: Overall Music Similarity Predicting Friendship Formation and Friendship Stability*

	To-be friends vs. random		Stable vs. unstable	
	OR	<i>B</i>	OR	<i>B</i>
Similarity music	1.9**	.64	0.9	-.02
Similarity music*gender	1.1	.09	0.8	-.20
Similarity music* educational level	1.6*	.49	0.9	-.07
Gender	1.4	.32	0.9	-.15
Educational level	1.1	.12	1.5*	.42

\*  $p < .05$ ; \*\*  $p < .01$

2: specific music similarity in the more non-mainstream music dimensions is related to the formation of friendships.

*Overall music similarity.* To examine the role of similarity in the overall patterning of music preferences in friendship formation, a logistic regression analysis was performed using gender, educational level, overall music similarity, and interaction of gender and educational level with overall music similarity on Wave 1 to predict friendship formation at Wave 2 (0 = random dyad, 1 = to-be friend dyad). Results are shown in Table 2.3, first two columns. Higher overall music similarity and the interaction between educational level and overall music similarity predict a higher chance of becoming a friend at Wave 2: adolescents who are more similar in overall music preferences have a 1.9 times higher chance of becoming friends than adolescents who are less similar in overall music preferences. Furthermore, adolescents with a higher educational level who are more similar in overall music preferences have a 1.6 higher chance of becoming friends compared to adolescents with a lower educational level who are more similar in overall music. It must be mentioned that adolescents with a higher educational level also had significantly ( $p < .05$ ) higher variances in overall music similarity than adolescents with a lower educational level ( $SD = .68$  vs.  $SD = .31$ , respectively), suggesting that adolescents with a higher educational level have a more differentiated music taste than adolescents with a lower educational level. Thus, in agreement with the second part of Hypothesis 2, similarity in the overall patterning of music preferences predicts a higher chance of becoming friends one year later, even after controlling for demographical background and similarity in demographical background. Furthermore, for adolescents with a higher educational level, chances of becoming friends due to overall music similarity were higher than for adolescents with a lower

educational level.<sup>2</sup>

*Similarity in Music Preferences in the Stability of Friendships.*

*Specific music similarity.* To examine the role of specific music similarity in friendship stability, specific music similarity was computed separately for stable friends and for unstable friends at Wave 1. Results are shown in Table 2.2, last three columns. Although stable friends showed higher intra-class correlations than unstable friends on the music dimensions Elite and Urban, none of the differences between stable friends and unstable friends were significant. These results show that specific music similarity does not play a role in the stability of friendships.

*Overall music similarity.* To examine the role of similarity in the overall patterning of music preferences in the stability of friendship, a logistic regression analysis was performed using gender, educational level, overall music similarity, and interaction of similarity in gender and educational level with overall music similarity at Wave 1 to predict friendship stability at Wave 2 (0 = unstable friends, 1 = stable friends). Results are shown in Table 2.3, last two columns. Adolescents with a higher educational level have

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<sup>2</sup> As suggested by a reviewer, additional analyses were performed to examine whether overall similarity in music preferences are used as markers for overall similarity in personality, and therefore enhance friendship formation. To do this, mediation analyses were performed, in which we included q-correlations between adolescents and their best friends' independent reports on the Big Five personality traits when predicting friendship formation. Results showed that although overall similarity in personality predicted friendship formation additionally over time ( $OR= 1.3, p < .05$ ), effects of overall similarity in music preferences seemed to remain the same ( $OR=1.9, p < .01$ ). Therefore, no support was found for the suggestion that similarity in music preferences serves as marker for similarity in personality and therefore enhances friendship formation.

a 1.5 times higher chance of staying friends than adolescents with a lower educational level. When comparing standardized regression coefficients in this equation, the effect of educational level is larger than all other effects. Thus, these results show that similarity in the overall pattern of music preferences plays no role in friendship stability.

## **2.4 Discussion**

The goals of the current study were to study friendship similarity in specific music styles and overall patterning of music preferences among adolescents in the formation of friendships and the stability of friendships, while controlling for similarity in social background. As expected, results provide clear and consistent evidence for high specific music similarity and moderate overall music similarity in early adolescent' mutual friendships. More importantly, both similarity in specific music dimensions and similarity in overall music preferences were found to be higher among mutual friends than among randomly paired adolescents, suggesting that early adolescents are more similar in specific music dimensions and overall music preferences to their friends than they are to other adolescents. These results are consistent with two theoretical frameworks. First, the Social Identity Theory (Tajfel, 1978) suggests that individuals may gain a social identity from the music-based groups to which they belong and will therefore adopt similar music preferences to those of the individuals in their group in an attempt to foster self-esteem and feelings of belonging (Tarrant et al., 2001). Second, the similarity-attraction hypothesis (e.g., Byrne, 1971) and the assortative mating perspective (Luo & Klohnen, 2005) suggest that individuals are most attracted to other people who have similar attitudes, values, and behaviors, and personality characteristics: the current study suggests that this also

applies to similarity in musical preferences.

Regarding the role of similarity in best friendship formation and stability, we adopted the perspectives of both Duck and Craig (1978) and Rentfrow and Gosling (2006, 2007), according to which similarity in music preferences predicts friendship formation because music preferences are made visible through clothing, hairstyle, and outward behavior, and individuals consider them as unique sources of visible information concerning personality, lifestyle, and values, respectively. In line with this hypothesis, results provide evidence for a role of both overall music similarity and specific music similarity in the dimensions that are more non-mainstream in the formation of mutual friendships. For three of the four specific music dimensions, namely Rock, Elite, and Urban, early adolescent dyads that would select each other as friends one year later were found to be more similar than adolescents from the same sample that did not select each other as friend. The music dimensions Popular/Dance may not be a distinctive marker for early adolescent' mutual friendship selection because it is such a broadly accepted and consumed dimensions, especially in early adolescence (Ter Bogt et al., 2003). Results of the current study confirm that it is the most popular dimensions among early adolescents. Clothes, hairstyles, and outward behavior associated with more non-mainstream music dimensions can be used to clearly differentiate between adolescents (Ter Bogt, 2004) and may therefore play a role in mutual friendship formation. High similarity in the overall patterning of music preferences predicted a 1.9 times higher chance of becoming mutual friends one year later compared to random dyads, even when controlling for gender, educational level, and similarity in these background variables. The present findings are in line with previous findings that showed that perceived similarity in music preferences are related to friendship aspirations (Knobloch et al., 1999). Thus, similarity in music preferences seems

to play an important role in the formation of early adolescent mutual friendships.

We also tested whether similarity in music preferences plays a role in friendship stability. Consistent with the filtering perspective, no evidence was found for a relationship between specific and overall music similarity and friendship stability. Music similarity therefore is related to mutual friendship formation, but not to mutual friendship stability. What do these results mean? It seems that during the formation process of early adolescents' friendships, music preferences seem to work as an important criterion to select one's friend because they tell a person something about one's potential friends' personality, life-styles, and values (Rentfrow & Gosling, 2007; Ter Bogt, 2000). Nevertheless, once friendships have been formed, they do not break up because of changes in music preferences. More likely, music preferences stay the same after the break-up of the friendship. Perhaps characteristics of the friendship itself, such as quality of friendship (e.g., Bagwell & Coie, 2004) or conflicts between friends (Laursen, 1993) determine whether friendships are terminated. However, stable friends did show higher specific music similarity in Elite and Urban music dimensions than unstable friends and differences may have not reached significance due to lack of power. Thus, future studies should examine the role of similarity in music preferences in friendship stability using larger samples.

An unexpected, yet remarkable finding was that for adolescents with a high educational level, high overall music similarity predicted a 1.6 times higher chance of becoming mutual friends than for adolescents with a low educational level. These results indicate that for adolescents with a higher educational level, similarity in music preferences is more important in the selection of mutual friends than for adolescents with a low educational level. An explanation for this difference is that adolescents with a higher educational

level had a more differentiated music taste than adolescents with a lower educational level (see also Ter Bogt, 2000), and that because of this greater variance in overall music preferences, overall music similarity may be more unique for to-be mutual friendship dyads in the former group than for to-be mutual friendship dyads in the latter group. Therefore, overall music similarity may be a more important selection criterion in mutual friendship formation for higher educated adolescents than for lower educated adolescents.

The current study is limited by the relatively low internal consistencies of the Elite and Popular/Dance music dimensions. This could mean that the way the music preferences were grouped into dimensions is not equal to the way these are grouped in the minds of the participants, or that there are individual differences in adolescents' understanding of dimensions. Another limitation is that the current study concentrates only on best friendships. Therefore, we cannot tell anything about other types of friendships, such as second or third best friendships. Specifically, this study cannot tell if to-be best friends were newly acquainted or already knew each other, or whether unstable friends just switched from a first nominated friend to a second or third nominated friend or stopped seeing each other entirely. In addition, because no data were available on other types of friendships, results of the current study cannot show whether music similarity plays a specific role in best friendships compared to other types of friendships. Nevertheless, because first nominated mutual friendships show highest stability compared to other types of friendship (Berndt & Keefe, 1995), one could argue that focusing on similarity effects over a one-year period in mutual best friendships is better than focusing on similarity effects in other more instable types of friendships. Future studies should use more measurements in time with shorter time intervals and focus on more types of (non)friendship than the mutual best friendships used

in the current study. Finally, because the application of the Social Identity Theory by Tarrant, North, and Hargreaves (2001) suggests that music preferences in friendship groups may affect adolescent music preferences, future studies should examine similarity in music preferences in adolescent friendship groups over time.

In sum, the current study provides strong evidence for specific music similarity and overall music similarity in Dutch early adolescent friendships. Similarity in social background does not seem to explain overall friendship similarity in music. Furthermore, the current study shows that non-mainstream music similarity and similarity in the overall patterning of music preferences both are related to friendship formation, and not to friendship stability.





**Chapter 3.**

**Personality Traits in Adolescent  
Friendships<sup>3</sup>**

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<sup>3</sup> Selfhout, M., Branje, S. , Raaijmakers, Q., & Meeus, W. (2007). Similarity in adolescent best friendships: the role of gender. *Netherlands Journal of Psychology*, 63, 50-57.

### **Abstract**

The purpose of this study was to examine dyadic similarity among mutual adolescent best friends and the moderating role of gender in this similarity. Questionnaire data were gathered from 267 Dutch adolescent same-sex best friends (Mean age = 14.58). Results showed that both boys and girls were more similar to their mutual best friend than randomized pairs in the Big Five personality traits Extraversion and Agreeableness. Furthermore, only girls were more similar to their mutual best friend than randomized pairs in problem behavior and perceived relationship characteristics. In general, similarity seems to play a larger role in mutual best friendships between girls than between boys.

### 3.1 Introduction

Do birds of a feather flock together, or do opposites attract? On the whole, more consistent evidence has been found for dyadic similarity in friends' characteristics than for dissimilarity in characteristics. Individuals have relationships with those who resemble them because similarities between individuals may validate perceptions of the world that these individuals have, allow communication with less effort because of predictability, and create pleasurable and enjoyable interactions (Aboud & Mendelsohn, 1998). However, the extent of similarity between best friends differs across individual and relational domains, and similarity in some domains, such as perception of relationship characteristics and similarity in personality, remain relatively understudied. Furthermore, more research is needed to clarify gender differences in similarity among friends in these domains. The current study will examine similarity in adolescent mutual best friends, or friends who both select each other as best friend, in problem behavior, Big Five personality domains, and relationship characteristics, and the moderating role of gender in similarity these domains.

#### *Similarity in Best Friendships*

Several studies have examined similarity between best friends in adolescence. Early adolescent boys' perceptions of several characteristics of the relationship, such as support, security, closeness, and conflict, were found to be moderately associated with best friends' perceptions of these characteristics (Bagwell & Coie, 2004). Adolescent depressive symptoms and attributional styles showed low to moderate associations with mutual best friends' reported level

of depressive symptoms (Stevens & Prinstein, 2005). Adolescent minor delinquency and substance use were found to be moderately to highly correlated with minor delinquency and substance use of their best friends (e.g., Kandel, 1978a; Urberg, Degirmencioglu, & Tolson, 1998). Similarity in substance use and delinquency seems to be higher than similarity in other domains. Mutual best friends were more similar in substance abuse, alcohol use, and minor delinquency than in depression, selected attitudes, perceived relationship with parents (Kandel, 1978b), sensation seeking, values, and various activities (Urberg et al., 1998).

Although similarity in personality traits, such as the Big Five personality dimensions, may be important in best friendships (Kenny et al., 1994), empirical evidence for this is ambiguous. During late childhood, mutual best friends have been found to be more similar than randomized dyads on all four dimensions of the Children's Personality Questionnaire, that is, extraversion, anxiety, tough poise, and independence (Fonzi & Tani, 2002). In contrast, adolescent mutual best friends and acquaintances have been found to be equally similar on all Big Five dimensions, that is, Extraversion, Agreeableness, Conscientiousness, Emotional Stability, and Openness to Experience (Murphy, 2005). Especially research on similarity in core personality traits, such as the Big Five, is scarce (Asendorpf & Van Aken, 2003). Thus, further research is needed to clarify whether best friends are similar on Big Five personality characteristics.

Most studies examined similarity between best friends without comparing this similarity to similarity between adolescents in a random control group. This comparison is important because similarity between friends may be the result of the stereotype effect: individuals may resemble each other because of shared cultural values, social desirability, and response biases (Cohen, 1977; Klohnen & Mendelsohn, 1998). As none of the above studies used control

groups, similarity found in these studies may not be unique for friends. Instead, it may be the result of the stereotype effect. Specifically, similarity found in prior studies may be due to characteristics of the school or class, as adolescent friends in the same dataset often come from the same school or even the same class.

A few studies did use control groups to control for random similarity when examining friendship similarity. In adolescence, similarity in substance use between non-mutual friendship dyads, or dyads in which only one individual selects the other as best friend, was higher than in randomly generated non-friend dyads (Hamm, 2000). Early and middle adolescent mutual friends were found to be more similar on smoking behaviors and misconduct activities than random pairs of adolescents (Tolson & Urberg, 1993). Finally, mutual and non-mutual best friends' binge drinking and sexual activity predicted changes in the corresponding behaviors of early to middle adolescents over a one-year period over and above effects of randomly chosen peers (Jaccard, Blanton, & Dodge, 2005). Thus, similarity in substance use, delinquency, and sexual activity between best friends seems not to be due to the stereotype effect and therefore is unique to the best friendship itself. For other domains, that is, personality characteristics, depression, and perception of relationship characteristics, it is not clear yet to what extent similarity found between friends is unique to the friendship itself.

The current study examined similarity in aggression, depression, perception of relationship characteristics, and Big Five personality traits for mutual best friends, by comparing it to similarity found in random dyads. The focus was only on the first nominated best friend because previous research has shown that this dyadic relationship is much stronger than other types of friendship (i.e. other close friends, such as the second or third nominated friend) (Degirmencioglu et al., 1998; Newcomb & Bagwell, 1995). Additionally, first nominated

friends seem to be the primary locus of influence on adolescent school achievement and drug use (Mounts & Steinberg, 1995). Only mutual best friendships, or friendships in which both adolescents nominate each other as best friend, were included in the current study, because mutual best friendship nominations seem to indicate stronger ties between friends than non-mutual best friendship nominations (Griffon-Smith & Brownwell, 2003). Thus, findings of the current study can only be generalized to adolescent mutual best friendships.

### *Gender Differences in Similarity in Best Friendships*

Previous authors (e.g., Griffon-Smith & Brownwell, 2003; Newcomb et al., 1999) have suggested that because girls have more intimate best friendships than boys (Buhrmester & Furman, 1987), they may influence on another more and become more similar to each other than boys. Furthermore, research has shown that girls may be more apt to conform to close others than boys (Becker, 1986; Cooper, 1979), which may result in more similarity in girl-girl friendships than between boy-boy friendships. Nevertheless, differences in similarity between boys' and girls' best friendships may also depend on the specific domain that is examined.

Studies surveying adolescents found that girls, but not boys, selected best friends one year later partly on the basis of similarity in smoking, drinking, and sexual behaviors (Rodgers, Billy, & Udry, 1984). Furthermore, adolescent girls were more similar to their best friend on all Big Five characteristics (Tani, Rossi, & Smorti, 2005) and the personality factors Dominance, Enthusiasm, and Verbal Achievement (Clark & Ayers, 1992) than adolescent boys. However, these studies did not control for random similarity among adolescents girls or adolescent boys. No differences in similarity in misconduct activities between girls' friendships and boys' friendships

in adolescence were found while controlling for random similarity (Tolson & Urberg, 1993). Because prior research examined similarity in perception of friendships only for boys (Bagwell & Coie, 2004; Poulin, Dishion, & Haas, 1999), the extent to which girls are similar in their perception of the relationship remains unclear. The current study will examine gender differences in friendship similarity in problem behavior, personality, and perception of relationship characteristics, while controlling for similarity among random dyads.

To summarize, the current study tries to answer the following research questions:

1. Are mutual adolescent' best friends more similar to each other than randomly paired adolescent dyads? We expected that mutual best friends were more similar on problem behavior than random dyads. We explored whether mutual friends are more similar in perceptions of relationship characteristics and Big Five personality characteristics than random dyads.
2. Are there gender differences in similarity between best friends? We expected that girls were more similar than boys in Big Five personality characteristics, but not in problem behaviors. We explored gender differences in the perception of friendship quality.

### **3.2 Method**

#### *Participants*

Participants in this study were 534 adolescents selected from 940 respondents of the early adolescent cohort participating in the

CONflict And Management Of RELationships study (CONAMORE) (Meeus et al., 2005). CONAMORE is an ongoing longitudinal study that examines the relationships of Dutch adolescents with parents and peers as well as their emotional states. At the first measurement, all indigenous early adolescents ( $N = 728$ ) received a letter including an invitation to participate with both parents during annual home-visits. 491 families initially agreed to participate. Due to our restriction of including only two-parent families, 90 one-parent families who agreed to participate were not able to take part in this additional research project. Of the remaining 401 families, 323 families were randomly selected to participate from Wave 2 onwards. Of these 323 families, best friends who did not already participate in the CONAMORE study from the first wave onwards were contacted and sent a questionnaire at home ( $N = 145$ ). 94.3% of these best friends returned the questionnaire. Data from the third wave were used in the current study, because only on this wave all measures were obtained from best friends. Adolescents were selected if their best friend already participated in the study or participated in the family subsample and if the best friendship nomination was reciprocated (50%). This resulted in 534 selected adolescents who formed 267 same-sex friendship dyads, consisting of 47.3% boys and 52.7% girls. Eleven mixed-sex dyads were identified but this number was too small for inclusion in analyses. The mean age of all adolescents was 14.58 ( $SD = 0.65$ ) in wave 3. Multivariate tests showed no significant ( $p > .10$ ) differences between the total group ( $N = 721$ ) and the selected group of adolescents ( $N = 534$ ) on all the measures used in the current study. Missing data on the items of the questionnaires were imputed using the EM algorithm within SPSS 12.0 (Wothke, 2000).

The ethnic composition of the present sample was 88.4% Dutch and 11.6% ethnic minorities. 40.5% of the adolescents were in high schools preparing for lower level tertiary education or lower level jobs,

and 59.5% were in high schools preparing for college or university. Educational levels of fathers and mothers of the adolescents were as follows: 23.1% and 31.2% finished only primary or high school, 36.2% and 39.4% finished low tertiary education, and 40.6% and 29.4% finished college or university education, respectively.

### *Procedure*

Participants came from twelve high schools in Utrecht and surroundings. Parents and students received a letter in which the aims of the study were described and information was given about the option of not participating. Students were required to provide written informed consent. Less than 1% ( $n=7$ ) decided not to participate. Participants completed a series of questionnaires in their classroom after school hours. Research assistants, who attended the administration, gave verbal instructions about filling out the questionnaires; written instructions were also included. Confidentiality of their given answers was guaranteed explicitly. For students who were absent on the day of testing a second assessment time was organized. Students who were absent on both days of testing were not assessed. Respondents received € 10,- after completing the questionnaires. For the family subsample, best friends were contacted by phone to ask whether they were willing to fill out a questionnaire. None of the friends declined this invitation although not all of them actually returned the questionnaire ( $n=12$ ). Questionnaires were sent by post and costs for sending the questionnaire back were refunded. These best friends also received € 10,- after completing the questionnaire.

## *Measures*

*Best Friendships.* Friendships were assessed by letting each respondent nominate their best friend who was not a brother or sister and not someone they had an intimate relationship with. Only reciprocated friendships, or friendships in which both adolescents selected each other as a best friend, were selected. This resulted in a total of 267 mutual best friendship dyads, consisting of 126 friendships between boys and 141 friendships between girls.

*Aggression.* Adolescent aggression was assessed with the Direct and Indirect Aggression Scales (Björkqvist et al., 1992). Subjects were asked to indicate on four-point scales (1 = *never*, 4 = *very often*) how often they display the behavior described when they are mad at someone from their class. The Direct Aggression Scale consists of 5 items (e.g., “I kick the other one”). The Indirect Aggression Scale consists of 12 items (e.g., “I try to make the other one jealous”). A summed, total score was computed from items of both the Indirect and Direct Aggression scale to form a score for aggression. The internal consistency of this aggression measure was .91.

*Depression.* Adolescent depression was assessed with the Children’s Depression Inventory (CDI), which is used as a screen for (subclinical) depressive symptomatology in children and adolescent (Kovacs, 1992). The items were scored on a 3-point scale, ranging from *false*, through *a bit true*, to *true*. The CDI consists of 27 items (e.g., “I’m sad all the time”). The internal consistency of this measure was .92.

*Personality.* The personality dimensions Extraversion, Agreeableness, Conscientiousness, Emotional Stability and Openness to Experience were measured using the shortened Dutch version of the Big Five

questionnaire (Goldberg, 1992). The adolescents judged whether the 30 items applied to themselves on a 7-point scale (1 = *absolutely agree*, 7 = *absolutely disagree*). Extraversion assesses the extent to which the person actively engages the world or avoids intense (social) experience (e.g., “talkative”). Agreeableness assesses the interpersonal nature of the person and can range from warm and committed to others (e.g., “friendly”) to antagonistic. Conscientiousness assesses the degree of organization, persistence, and motivation during the fulfilment of goal-directed task behaviors (e.g., “systematic”). Emotional Stability assesses the extent to which the person is emotionally stable or plagued by unpleasant experiences and distressing emotions (e.g., “nervous”). Openness to Experience assesses the depth, complexity, and quality of a person’s mental and experiential life along with the flexibility of his or her information processing (e.g., “versatile”). Internal consistencies of these scales were .82, .80, .84, .78, and .74, respectively.

*Relationship characteristics.* The Network of Relationship Inventory (NRI: Furman & Buhrmester, 1985) was used to assess support, dominance, and conflict in the best friendship. Participants were asked to answer questions about relationship characteristics on a five-point scale (1 = *never*, 5 = *always*). This questionnaire contained 24 questions, measuring Support (e.g., “How often do you turn to your best friend for support with personal problems?”), Dominance (“How often does your best friend get you to do things his/her way?”), and Conflict (e.g., “How much do you and your best friend get upset with or mad at each other?”). Internal consistencies of these scales were .95, .85, and .82. The Balanced Relatedness scale (Shulman et al., 1997) was used to measure the perception of balanced relatedness in friendships. The adolescents judged whether the 6 items applied to themselves on a 4-point scale (1 = *absolutely agree*, 4 = *absolutely*

*disagree*). This questionnaire contained 7 items (e.g., “My best friend respects my decisions”). The internal consistency of this measure was .89.

### **3.3 Results**

To examine similarity in aggression and depression, the Big Five personality dimensions, and relationship characteristics, intra-class correlations of each of these domains were computed for mutual best friends. With this technique, a comparison group is not needed because, for that attribute, this measure takes into account any similarity that may exist among adolescents as a whole, or similarity on that attribute among random dyads. The intra-class correlations can be interpreted as the proportion of variation in the outcome measure that is accounted for by the dyad. For example, the intra-class correlation of aggression for mutual friends equalled .32 at wave 1 (see Table 3.1, first column), indicating that thirty-two percent of the variation in aggression is accounted for by membership of a mutual best friendship at this wave (Kenny, Kashy, & Cook, 2006). Finally, differences in intra-class correlations between boys and girls were tested for significance by a procedure suggested by Haggard (1958): intra-class correlations are transformed using Fisher’s  $z$  transformation, and then  $Z$  is computed as the difference between the two intra-class correlations, divided by the standard error of difference.

Intra-class correlations indicated that mutual best friends are more similar than random dyads on aggression, depression, and all four relationship characteristics. Only two intra-class correlations of personality characteristics were significant: mutual best friends were significantly more similar on Extraversion and Agreeableness than random dyads. These results provide consistent evidence for

higher similarity in aggression, depression, and all four relationship characteristics between mutual best friends than between random dyads. Differences in similarity by gender were assessed by comparing intra-class correlations of boys' friendships and girls' friendships (See last three columns Table 3.1). Only girls showed significant positive intra-class correlations on externalizing and depression and all four relationship characteristics, and boys did not have significant intra-class correlations on these domains. Furthermore, intra-class correlations on these domains were significantly higher for girls than for boys, with the exception of perception of dominance in the friendship. Thus, these results suggest that similarity in problem behavior and perception of relationship characteristics is only unique for friendships between girls, and not for friendships between boys.

Table 3.1

Intra-class Correlations of Problem Behavior, Personality, and Relationship Characteristics for Mutual Best Friends by Gender

	Total (N=267)	Boys (N=126) (1)	Girls (N=141) (2)	1vs2
<i>Problem behavior</i>				
Aggression	.32**	.16	.41**	$p < .05$
Depression	.18*	-.08	.42**	$p < .01$
<i>Personality</i>				
Extraversion	.17*	.15	.16	n.s.
Agreeableness	.24**	.28**	.20*	n.s.
Conscientiousness	.06	.05	-.02	n.s.
Neuroticism	.00	.11	-.06	n.s.
Openness	.09	.09	.09	n.s.
<i>Relationship characteristics</i>				
Support	.35**	.05	.41**	$p < .05$
Dominance	.21*	.13	.25**	n.s.
Balanced	.27**	.05	.36*	$p < .05$
Relatedness				
Conflicts	.34**	.08	.42**	$p < .01$

\* =  $p < .05$ ; \*\* =  $p < .01$

### 3.4 Discussion

The purpose of the current study was to study similarity between Dutch adolescent mutual best friends in problem behavior, personality, and relationship characteristics. Results suggest that only among adolescent girls did mutual best friends show medium to high similarity in aggression, depression, and in characteristics of their best friendship, namely support, balanced relatedness, dominance, and conflicts. Through the use of intra- class correlations, similarity in these areas within real best friendship dyads was shown not to be due to the stereotype effect, and seems to be unique to the best friendship itself.

Limited evidence was found for similarity in personality in mutual best friendships: mutual best friends show higher similarity in the Big Five personality traits Extraversion and Agreeableness, but not in the other domains. This similarity was found in friendships between both boys and girls. Although prior studies did find differences in similarity in personality between boys and girls (Tani et al., 2005), these did not control for random similarity, which may explain the differences in results. Extraversion and Agreeableness may be specifically linked to friendships because both traits are strongly associated with sociability and social interest and therefore play an important role in more voluntary relationships, such as friendships (Jensen-Campbell et al., 2002). Extraversion and Agreeableness might have higher situational relevance for friendships than the other traits (Funder & Colvin, 1991). Furthermore, Extraversion and Agreeableness seem to be the two most important traits in acquaintance process because they are more visible than other traits (DePaulo, Kenny, Hoover, & Webb, 1987; Kenny et al., 1994). Therefore, adolescents may select each other as best friend based on these more visible personality traits.

One surprising result of the current study is that similarity was found between mutual friends in the perception of dominance. This result contrasts with the idea of complementarity: more dominant individuals are supposedly attracted to more submissive individuals and vice versa (Griffon-Smith & Brownwell, 2003). The current study confirms findings of previous research on childhood friendship: more dominant children are generally friends with other dominant children (Rubin, Burgess, & Wojslawowicz, 2000), and shyness and victimization is positively associated between friends (Haselager, Hartup, Van Lieshout, & Riksen-Walraven, 1999; Newcomb et al., 1999). Thus, dominance seems to be a shared characteristic rather than an opposite characteristic in mutual best friendships.

Strong evidence was found for a moderating role of gender in similarity in mutual best friendships. Similarity in aggression, depression, and the perception of three of the four relationship characteristics, that is, support, balanced relatedness, and conflict, was only found in friendships between girls after controlling for random similarity, and not in friendships between boys. This suggests that similarity in these domains primarily plays a role in mutual best friendships between girls, and not so much in mutual best friendships between boys. Thus, the more intimate character of girls' best friendships might lead girls to become similar in problem behavior and perception of the relationship, whereas boys might be less directly influenced in these areas by their best friend, and might be more influenced by the peer group as a whole (Berndt & Keefe, 1995; Griffon-Smith & Brownwell, 2003). Alternatively, girls select best friends that are similar because they may experience intimacy with a similar best friend, whereas boys may not necessarily want to experience high levels of intimacy with their best friends.

Several limitations of the current study should be noted. First, given the cross-sectional nature of the data, the longitudinal role of

similarity in formation, maintenance, and termination processes of best friendships cannot be distinguished on the basis of the present results. That is, adolescents could have selected other similar adolescents as best friends, could have become more similar through influence processes, and could have deselected dissimilar adolescents (Kandel, 1978a). Secondly, the current study focuses on mutual best friendships and therefore cannot tell whether similarity exists in other types of friendships. For example, friendship should be considered as a continuum from occasional or casual friend through good to best friend (e.g., Griffon-Smith & Brownwell, 2003). Future studies should use more measurements in time to assess the role similarity plays in the formation, maintenance, and termination of friendships, thereby focusing on more types of (non-)friendship than the typology mutual and random dyads used in the current study.

In sum, the current study suggests that adolescents tend to be similar to their mutual best friends in problem behavior, perception of relationship characteristics, and two specific personality traits, namely Extraversion and Agreeableness. Similarity in aggression, depression, and in several relationship characteristics seems to be found only in best friendships between girls, and not in best friendships between boys. Thus, similarity seems to play a larger role in mutual best friendships between girls than between boys in most areas, with the exception of several personality traits.



## **Chapter 4.**

# **Specific Personality Traits and Friendship Formation<sup>4</sup>**

*“There are, it has been said, two types of people in the world. There are those who, when presented with a glass that is exactly half full, say: this glass is half full. And then there are those who say: this glass is half empty. The world belongs, however, to those who can look at the glass and say: What’s up with this glass? Excuse me? Excuse me? This is my glass? I don’t think so. My glass was full! And it was a bigger glass!”*

**~Terry Pratchett, *The Truth***

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<sup>4</sup>Selfhout, M., Burk, W., Branje, S., Denissen, J. J. A., Van Aken, M. A. G., & Meeus, W. (in press). Emerging late adolescent friendship networks and Big Five personality traits: A dynamic social network perspective. *Journal of Personality*.

### **Abstract**

The current study focuses on the emergence of friendship networks among just-acquainted individuals, investigating the effects of Big Five personality traits on friendship selection processes. Sociometric nominations and self-ratings on personality traits were gathered from 205 late adolescents (mean age= 19) at five time points during the first year of University. SIENA, a novel multilevel statistical procedure for social network analysis, was used to examine effects of Big Five traits on friendship selection. Results indicated that friendship networks between just-acquainted individuals became increasingly more cohesive within the first three months, and then stabilized. Whereas individuals high on Extraversion tended to select more friends, individuals high on Agreeableness tended to be selected more as friends. In addition, individuals tended to select friends with similar levels of Agreeableness, Extraversion, and Openness.

## 4.1 Introduction

Research suggests that personality traits affect the development of existing social relationships (Asendorpf & Denissen, 2006; Branje, Lieshout, & Van Aken, 2004; Neyer, Banse, & Asendorpf, 1999). In addition, similarity in specific personality traits has been shown to play an important role in friendship dyads (Hamm, 2000; Luo & Klohnen, 2005; McPherson, Smith-Lovin, & Cook, 2001; Selfhout, Branje, Raaijmakers, & Meeus, 2007). Surprisingly, little is known about the main effects of personality traits compared to effects of similarity in these personality traits on friendship selection processes. Further, friendship dyads seem to be embedded within a larger social network of interconnected dyadic friendships and groups (Carrington et al., 2005; Wasserman & Faust, 1994). Therefore, examining the role of personality in selection processes within friendship networks as a whole may be a more realistic approach than focusing exclusively on friendship dyads. In the current study, we utilize a social network approach to examine the development of emerging social networks and to investigate selection effects involving personality traits.

### *Friendship Selection and Big Five Personality Traits*

Among the best developed models concerning personality traits is the Big Five personality model (Digman, 1990; McCrae & Costa, 1994). This model consists of five personality factors, namely Openness (to experience), Conscientiousness, Extraversion, Agreeableness, and Neuroticism. The five factors have shown high rank-order and mean level stability over time (Roberts & Mroczek, 2008) and exist in diverse cultures (McCrae & Costa, 1997). The Big Five personality traits may affect friendship selection in at least three different ways. First, there may be personality differences in the number of friends

individuals select (Asendorpf & Wilpers, 1998). Second, personality may affect the extent to which individuals are being selected as a friend (Jensen-Campbell et al., 2002). Finally, being similar in personality may affect friendship selection processes (Selfhout et al., 2007).

*Selecting friends.* Extraversion is mainly related to one's social activity level and is thought to reflect the basic motivation to obtain rewards through social situations, making extraverted individuals more likely to experience positive affect in social situations (Denissen & Penke, 2008a; Elphick, Halverson, & Marszal-Wisniewska, 1998; Fleeson, Malanos, & Achille, 2002; Freedman & Doob, 1968). Because of this increased positive affect during social interactions, extraverted individuals may be more motivated to select friends.

Empirical studies have examined effects of each of the Big Five traits on number of nominated friends and contact with non-acquainted individuals. One cross-sectional study showed that Extraversion, Conscientiousness, and Agreeableness were associated with more reciprocated friends for children (Jensen-Campbell, Knack, Waldrip, & Campbell, 2007). Nevertheless, these associations may be explained both by associations between personality and selecting friends and associations between personality and being selected as a friend (Sprecher & Regan, 2002). Longitudinal studies show that only Extraversion predicted contacting more unacquainted fellow students over seven weeks (Paulhus & Trapnell, 1998) and more same-sex friends over 15 months (Asendorpf & Wilpers, 1998) among undergraduates. Thus, these results suggest that only Extraversion longitudinally enhances friendship selection.

*Being selected as a friend.* Agreeable individuals tend to show more prosocial and altruistic behaviors, such as higher empathy (Nettle, 2006), higher willingness to cooperate (Denissen & Penke, 2008a;

Holmes, 2002), and more conflict strategies based on integration of both partners' views and needs (Jensen-Campbell et al., 2007). These prosocial behaviors may make Agreeable individuals more attractive as potential friends. Thus, Agreeableness may enhance being selected as a friend.

Cross-sectional studies provide inconsistent evidence for effects of personality traits on peer acceptance, which can be seen as a proxy for being selected more as a friend. For children, Extraversion, Conscientiousness, and Agreeableness were associated with more reciprocated friends (Jensen-Campbell et al., 2007). Among 12 to 18 year-old adolescents, higher Extraversion and Agreeableness were associated with more peer acceptance (Scholte, Van Aken, & Van Lieshout, 1997). Nevertheless, only Extraversion was associated with more peer acceptance among early adolescents, after adjusting for attractiveness, self-esteem, and class-size (Lubbers, Van Der Werf, Kuyper, & Offringa, 2006; Paulhus & Trapnell, 1998). Thus, although evidence is inconsistent, Extraversion, Agreeableness, and Conscientiousness may be associated with higher peer acceptance. Notwithstanding, it is not clear whether these associations are due to selecting friends or being selected as friend (Sprecher & Regan, 2002). More insight can be gained in unique effects of personality traits on selecting friends versus effects on being selected as a friend by studying these effects simultaneously.

*Selecting similar friends.* The similarity-attraction hypothesis (e.g., Byrne, 1971) focuses on the role of similarity in personality traits in friendship selection, independent of main effects of personality traits. This perspective suggests that actual similarity in personality traits, or similarity between individuals' self-ratings and their friends' self-ratings of their own traits, increases attraction. Several mechanisms have been proposed to explain this effect. The reinforcement-affect

explanation suggests that actual similarity reinforces individuals' opinions, views, and feelings, and thereby triggers an implicit affective response that increases attraction (Clore & Byrne, 1974). Uncertainty reduction theory indicates that actual similarity affords predictability, allowing individuals to communicate with less effort and greater confidence (Berger & Calabrese, 1975). This increase in attraction will, in turn, enhance friendship selection. Thus, these theories predict that actual similarity in personality across *all* Big Five traits enhances friendship selection.

Nevertheless, one recent study found weak cross-sectional and no over-time associations between actual profile similarity across all Big Five traits and friendship intensity among just-acquainted freshmen (Selfhout, Denissen, Branje, & Meeus, in press). Still, it might be that similarity in two *specific* traits, namely Extraversion and Agreeableness, may enhance friendship selection. First, Extraversion may be directly expressed in the interaction styles used when getting acquainted with peers. Extraverted individuals seem to be more talkative and outgoing, whereas introverts seem to act more shy and inhibited during initial interaction (Paulhus & Trapnell, 1998). If two extraverted individuals meet, they may be able to predict each other's responses more easily and enjoy this interaction more than with a more inhibited, shy individual. Introverts, on the other hand, may enjoy the more inhibited interaction with each other more than with more outgoing, talkative extraverts, and may be more able to predict each other's responses as well. Higher enjoyment and predictability have been specifically suggested to enhance attraction between individuals, leading to friendship formation (Berger & Calabrese, 1975). Thus, similarity in Extraversion may increase similarity in interaction styles during acquaintanceship, which may enhance friendship selection through higher enjoyment and predictability between interaction partners.

In addition, recent studies suggest that Agreeableness is mainly expressed through altruistic behaviors (Denissen & Penke, 2008a). Specifically, evolutionary game theory (Gilchrist, 2007; Smith & 1984) offers some hints that similarity in Agreeableness enhances friendship selection. Research on this theory suggests that individuals' altruism can only be considered as a successful collaboration strategy for the altruistic individual if the interaction partner acts altruistically as well. Specifically, if two individuals collaborate altruistically in so-called zero-sum games, the outcome is more beneficial for *both* individuals because the shared efforts produce better results. However, if one of the two individuals acts egoistically, the person acting altruistically loses more than the one acting egoistically. If both individuals act egoistically, they gain less than when both act altruistically, but at least more than when one of them acts egoistically. Therefore, similarity in altruistic behaviors can be expected to lead to more beneficial outcomes than dissimilarity in altruistic behaviors. In a similar vein, individuals who select others with similar levels of Agreeableness may benefit more from this relationship than when they select those who differ from them in Agreeableness. Hence, similarity in Agreeableness may enhance friendship selection.

Consistent with the notion that only similarity in Agreeableness and Extraversion play an important role in friendships, Dutch same-sex adolescent friends tended to show actual similarity only in Extraversion and Agreeableness, regardless of sex differences in similarity (Selfhout et al., 2007). In contrast, studies did not find evidence for actual similarity in any of the Big Five traits among adolescent same-sex friends (Murphy, 2005) and in Conscientiousness among undergraduate friends (Lusk, MacDonald, & Newman, 1998). Thus, these studies provide inconsistent evidence for actual similarity in Extraversion and Agreeableness in existing adolescent friendships.

*The Emergence of Friendship Networks in Late Adolescence*

The previously discussed studies examined friendships from a dyadic perspective, focusing on associations between personality and the relationship between two individuals. Several studies have shown that existing friendships are embedded within a larger social network of friends, consisting of dyadic relationships interconnected with each other (Steglich, Snijders, & West, 2006). Few studies, however, have examined the emergence of friendship networks in late adolescence. Late adolescents in Western industrialized countries, such as the Netherlands, typically go through a period of much change in occupational, educational, and social domains, such as moving out of the parental home, going to college, or starting to work. These transitions often make individuals move away from their old friendship networks and may create a high need to establish new friendship networks (Arnett, 2004; Asendorpf & Wilpers, 1998).

Studies have described the development of adolescents' existing friendship networks in Sweden (Burk, Steglich, & Snijders, 2007) and the Netherlands (Snijders & Baerveldt, 2003). Nevertheless, few studies examined the *emergence* of friendship networks in late adolescence. A study of 32 University freshmen showed that individuals who were getting acquainted tended to increasingly form *reciprocated* friendships (i.e., John selects Mark, and Mark selects John) as well as *transitive* ties (i.e., John selects Sue, Sue selects Mark, and John selects Mark) over the course of the academic year (Van de Bunt, Van Duijn, & Snijders, 1999). This suggests that late adolescents who are getting acquainted increasingly form cohesive friendship networks, over and above increasingly forming reciprocated relationships. Because of the small sample size, however, the generalizability of these findings may be limited. Therefore, more insight is needed to how friendship networks develop during

acquaintanceship in late adolescence.

### *The Current Study*

The current study can contribute to knowledge about the development of emerging friendship networks and the role of Big Five traits herein in several unique ways. First, we examined the emergence of friendship networks in a naturalistic setting by focusing on incoming university freshmen in the Netherlands. For educational purposes, university freshmen at Utrecht University in the Netherlands are randomly placed in groups in which they work together during the remainder of the year to complete a substantial part of the psychology curriculum, creating a naturalistic setting to study the formation of new friendships. Second, both main effects of personality traits (Neyer et al., 1999) and effects of similarity in personality (Sunnafrank & Ramirez, 2004) on friendship selection have been suggested to work fast and directly in the acquaintanceship phase. To track these rapid changes, we examined university freshmen after they just got acquainted. Further, because individuals who select others as friends more frequently are more likely to be selected as a friend, effects of a personality trait on being selected as friend may be confounded with effects of this personality trait on selecting friends.

To account for the complex dynamics of friendship selection, we used a social network approach to simultaneously examine personality effects on selecting friends, being selected as a friend, and selecting similar friends. In addition, using a social network approach allows adjusting *network effects* on friendship selection. For example, the tendency of individuals to become friends with friends' friends means that transitivity *affects* friendship selection over time: individuals seem to get to know others through the friends that they already have, using the social network structure to develop

new friendships. To develop more realistic models of personality effects on friendship selection, one should therefore adjust for network effects such as transitivity. To achieve this, we used actor-based models of network dynamics (Snijders, 2001; Snijders et al., 2007) to examine the emergence of cohesive friendship networks as well as to simultaneously examine unique effects of personality on selecting friends, effects of personality on being selected as friend, and effects of similarity in personality on selecting friends in late adolescence.

Regarding the development of late adolescent friendship networks over time, we expect that the network will become more cohesive over time. Specifically, we expect that the dyadic connections (e.g., number of reciprocated friendships) as well as triadic connections (e.g., transitivity) initially increase and then stabilize over time (Van de Bunt et al., 1999). We expect that Extraversion and Agreeableness are associated with friendship selection during acquaintanceship. Because effects of personality traits on selecting friend and being selected as a friend may be confounded, we explored these effects simultaneously.

## 4.2 Method

### *Participants*

Participants included 205 Psychology freshmen ( $M = 18.9$  years,  $SD = 1.6$ ) attending university in Utrecht, which is a medium-sized city in the Netherlands. Participants filled out questionnaires at five monthly waves. The majority of participants were female ( $n = 168$ ; 82%) and of Dutch origin ( $n = 189$ ; 92%). About 52% ( $n = 107$ ) of the sample lived in Utrecht at the start of the study; after four months, 76% ( $n = 156$ )

lived in Utrecht. Additional analyses exploring differences between participants who lived in Utrecht and those who did not, both at the first and the last wave of the study, did not result in any significant ( $p > .10$ ) differences in Big Five traits or friendship intensity.

### *Procedure*

During the second week of their first semester at the university, participants completed online questionnaires by accessing a website using a personal password. Participants filled out questionnaires that appeared in randomized order to avoid response sets. Confidentiality of all answers was explicitly guaranteed. The instruments used in the current study were part of a larger battery of assessments that took approximately 40 minutes to complete. For the follow-ups, participants were contacted through e-mail and mobile phones to remind them to complete the online questionnaire. An identical procedure was followed each of the next four consecutive months. Participants received €20 (around \$25), two hours of course credit, and a personality feedback profile after successful completion of the study.

A total of 489 Psychology freshmen students had been randomly assigned to one of the 20 introduction groups ranging between 16 and 24 individuals. E-mails, flyers, posters, and an announcement during the first university lecture generated attention for the current study. A total of 378 students (77% of 489) from 18 groups initially agreed to participate. Of these 378 students, we selected students from the 10 groups in which more than 80% of the group members filled out the online registration form. Of the 238 individuals in these groups, 221 agreed to participate (93%). Participants and nonparticipants did not significantly differ in group size and age ( $F(2,376) = .93, p > .10$ ). Further, these two groups did not significantly differ in gender

( $\chi^2 = 2.68$ ,  $df = 1$ ,  $p > .05$ ). Participants in groups met up in mandatory university lessons throughout the year, ranging between 4 to 8 hours a week. All measurements took place during weeks in which students attended university lessons, and these mandatory meetings did not significantly change in frequency throughout the study period. A measure of how much each participant communicated with their group members across the four months (ranging from 1 = *Never* to 7 = *Very often*;  $M = 2.99$ ,  $SD = 1.83$ ) indicated that participants communicated regularly with one another within groups.

After four months, 205 individuals of the 221 participants at Wave 1 still took part in the current study (93% retention rate). Compared to these 205 participants, the 16 non-participating group members rated themselves as somewhat less neurotic (3.21 vs. 3.62,  $F = 5.67$ ,  $p < .05$ ) and substantially less conscientious (3.92 vs. 4.75,  $F = 22.74$ ,  $p < .01$ ). No differences were found for the other Big Five factors or number of friendship nominations.

### *Measures*

*Personality traits.* Each month, participants self-rated the revised Ten Item Personality Inventory (TIPI-r; Denissen, Geenen, Van Aken, Gosling, & Potter, 2008b; Gosling et al., 2003). This instrument consists of 5 bipolar items (Extraversion: “extraverted, enthusiastic” vs. “reserved, quiet”; Agreeableness: “critical, quarrelsome” vs. “sympathetic, warm”; Conscientiousness: “dependable, self-disciplined” vs. “disorganized, careless”; Neuroticism: “anxious, easily upset” vs. “calm, emotionally stable”; Openness to Experience: “open to new experiences, complex” vs. “conventional, uncreative”). Participants rated themselves on these items, ranging from 1 (extremely like the left adjective pair) to 7 (extremely like the right adjective pair). A previous study examined reliability as well as validity

of all five single items (Denissen et al., 2008a). Monthly test-retest reliability was medium to high for all single-item Big Five traits ( $r = >.55, p < .001$ ). Further, the single items showed high ( $r = > .60, p < .001$ ) inter-item correlations with corresponding items of the same trait in the Big Five Inventory (Denissen et al., 2008b).

*Friendship nominations.* Each month participants described their relationship with each member of their group on a six-point scale (1 = *far acquaintance*, 2 = *acquaintance*, 3 = *close acquaintance*, 4 = *friend*, 5 = *close friend*, and 6 = *best friend*). An equivalent single item scale has been shown to be predictive of proximity, amount of communication, attraction, and type of relationship over a period of nine weeks (Sunnafrank & Ramirez, 1994). We elected to dichotomize this scale to indicate presence or absence of friendship ties (i.e., 0 = value less than 4 and 1 = value greater than or equal to 4).

### *Strategy of Analysis*

To analyze the effects of the Big Five on friendship network dynamics, we used actor-oriented models of network evolution (Snijders, 2001, 2005) implemented with the Simulation Investigation for Empirical Network Analyses (SIENA) software program (Snijders, Steglich, Schweinberger, & Huisman, 2006). This framework has been successfully applied to friendship networks in order to assess selection effects based on adolescent study program and smoking (Snijders, in press) and delinquency in adolescence (Burk et al., 2007; Snijders & Baerveldt, 2003). We will first discuss assumptions of SIENA in a nontechnical way, followed by characteristics and parameters of the SIENA program relevant for the current study. The following descriptions are directly adopted from a nontechnical description of Snijders et al. (in press). Technical explanations regarding SIENA are

extensively explained elsewhere (Huisman & Snijders, 2003; Snijders, in press; Snijders et al., 2007; Snijders, Steglich, Schweinberger, & Huisman, 2006).

For each of the ten groups, the development of friendship networks across five waves was formally represented by five directed adjacency matrices consisting of dichotomous cells. Whereas outgoing ties from non-participating group members were coded as missing, ties from participants to non-participating group members were included in the data. In SIENA, friendships between individuals are binary variables, denoted by  $x_{ij}$ . A friendship tie consists of a sender  $i$ , who is referred to as *ego*, and a receiver  $j$ , who is referred to as *alter*. A friendship tie between  $i \rightarrow j$  is either existent or nonexistent at a given moment in time (values 1 and 0, respectively). All these ties together make up the friendship network, represented by its  $n \times n$  adjacency matrix  $x = (x_{ij})$  (self-ties are excluded). Changes in this friendship network as a whole are the dependent variables of our analysis. Put differently, effects of personality traits on selection processes are examined by studying these effects on changes of friendship ties in the peer network.

This way of modelling is based on several assumptions that are important to the current study (for a complete overview, see Snijders et al., in press). First, changes in this network are assumed to follow a *continuous Markov-chain* across time (Katz & Proctor, 1959; Wasserman & Pattison, 1996). This means that although observations of friendship selection in themselves are discrete (i.e., individuals are either friends, or not), the network change process itself is assumed to occur step-by-step (i.e., individuals do not become friends suddenly). To reflect this, the discrete changes are broken down in so-called *microsteps*, which represent smaller changes in the network as a whole. If we take an example of John forming a friendship with Sam,

these two persons may not be connected at Time 1, and may mutually select each other as friend at Time 2. Thus, discretely, this mutual friendship apparently exists at Time 2 ‘out of nothing’.

Nevertheless, it seems reasonable to assume that this friendship was formed step by step, as a consequence of reciprocation of this friendship tie or maybe even by other indirect connections that John and Sam had with each other through a third person, Sue. Prior studies regarding social networks among late adolescents have demonstrated that friendships seem to develop through reciprocation of friendship ties and the formation of triadic friendships (Knecht, 2008; Snijders et al., 2007; Van de Bunt et al., 1999). We addressed this assumption by examining these tendencies, to be discussed more fully under network effects. Second, future changes in the network are assumed to be the result of the current state of the network. This assumption implies that all relevant information concerning the current state of network is available in the data. Because we captured a friendship network from the initial phase in which adolescents start to know one another and the round-robin design ensures we have all the information concerning friendship ties between all individuals in the introduction groups, the current study is consistent with this assumption and this assumption does not need to be additionally tested. A last assumption relevant for this study is that SIENA assumes that network ties are enduring *states* rather than brief *events*. That is, the program assumes friendship ties, after being formed, tend to endure over time. Because of the relatively short-term nature of this study, we were not able to fully test this assumption. Nevertheless, prior studies have indicated that adolescent friendship choices seem to endure (Brendgen et al., 2000; Bukowski & Newcomb, 1984). Further, we did test for the stability of friendships in the current analysis to get an indication of the feasibility of this assumption.

To examine effects of the Big Five personality traits on friendship

selection, two stages of estimation need to be distinguished. First, estimations were run for each of the 10 groups separately. Second, the estimates for each of the 10 groups were combined using a multilevel analysis (details follow below). Because of the multilevel structure of the current data (i.e., sociometric nominations were provided within each of the 10 introduction groups), group-level descriptives were weighted for group size before being aggregated. We will first describe how the same estimation procedure was performed for the 10 groups separately.

Within each group, variables were entered in two steps. First, *network effects* were entered. We include four network effects: outdegree, reciprocity, transitivity, and geodesic distance-2. *Outdegree* describes the tendency of individuals to selectively nominate friends (i.e., individuals do not randomly nominate friends). *Reciprocity* describes the tendency for individuals to reciprocate a relationship (i.e., directed ties that are shared between dyadic partners). Transitivity and Geodesic distance-2 are two effects that each pertain to network closure, or the tendency of individuals to form triadic relationships over time. *Geodesic distance-2* (GD=2) describes the tendency of individuals to form indirect ties (i.e., without forming a direct tie) to other individuals in the network. A technical way to describe such indirect connections is to say that the distance between individuals equals two network ties (hence the name of this parameter). When the GD=2 parameter is positive, individuals are unlikely to form direct ties with their friends' friends. By contrast, negative values of GD=2 suggest a tendency of individuals to nominate their friends' friends (statistically controlling for the number of indirect friendships, which is indexed by the transitivity parameter). For example, a negative GD=2 estimate would indicate that John is more likely to select Mark as a friend, given that John's friend Sue selected Mark as friend (and regardless of any other indirect friendship to Mark). *Transitivity*

describes the tendency for individuals to directly select the friends of their friends the more they are indirectly befriended with the former. For example, a positive transitivity effect would indicate that the more friends John has that are befriended with Mark, the more likely John will select Mark directly as friend over time. Note that although these two network effects both pertain to the formation of triadic relationships, they differ in that transitivity is dependent on the number of indirect friendships, whereas GD=2 is independent of the number of indirect friendships. If reciprocity, transitivity, and GD=2 all significantly enhance friendship selection, this provides support for the earlier mentioned assumption of modelling with SIENA: namely, that friendship ties are formed in a step by step manner, through the structure of the friendship network.

We tested whether adding the effect of transitivity and the effect of GD=2 each significantly added to the fit. Score test statistics can be interpreted as approximate chi-square values, and therefore improvement of the fit values greater than 3.84 (with  $\Delta df = 1$ ,  $p < .05$ ) can be interpreted as model improvements (Sweinberger, in prep.). This model comparison tests whether adding the two effects pertaining to cohesive peer networks (i.e., transitivity and GD=2), or individuals' tendency to become friends with their friends' friends) significantly adds to model fit. Thus, including these effects allows us to examine whether it is warranted to use a social network approach such as SIENA, over and above a dyadic approach.

After including the four network effects, we include individual covariates when predicting changes in friendship ties: sex and the five Big Five factors. For each of these six attributes, three parameters are estimated: the *attribute ego* parameter (effect of the attribute on selecting friends), the *attribute alter* parameter (effect of attribute on being selected as a friend), and the *attribute similarity* parameter (tendency for individual to select friends with similar

levels of attribute). Taking Extraversion as an example, a positive Extraversion ego effect indicates that those high on Extraversion tend to have a higher number of outgoing friendship nominations than those low on Extraversion. A positive Extraversion alter effect indicates those high on Extraversion tend to have a higher number of incoming friendship nominations. A positive Extraversion similarity effect indicates individuals tend to nominate friends with similar levels of Extraversion. Parameters describing participant sex may be interpreted in a similar manner. Thus, a total of 18 parameters were simultaneously entered in the model: ego, alter, and similarity effects of sex and the five personality traits. Because of this exploratory nature of this study, we adopt a two-sided significance test with a significant level of at least  $p < .01$ . Significance is calculated by dividing estimates by their standard errors, adjusted for unreliable standard error across groups.

SIENA provided parameter values ( $\beta_k$ ) for the network effects and effects of individual covariates. We will start with providing a technical explanation of an interpretation of  $\beta_k$ , followed by a conceptual interpretation. As discussed before, the dependent variable is changes in the network from friendship ties being absent (value of 0;  $x_a$ ) to being present (value of 1;  $x_b$ ), or vice versa. Interpretation of  $\beta_k$  on these changes are as follows: When individual  $i$  changes one of his/her friendship ties, then  $f_i(x_b, \beta_k) - f_i(x_a, \beta_k)$  is the log odds ratio for individual  $i$  to choose between friendships being present or absent, where  $\beta$  refers to the specific individual covariate predicting friendship changes. This makes the probability of either of these friendship ties being present or absent:  $\exp(f_i(x_b, \beta_k) - f_i(x_a, \beta_k))$ . Nevertheless, in this case, the rate at which individuals change their friendship ties is assumed to be same for all individuals. As individual differences in the rates changes occur in friendship ties are of interest for our

research questions (e.g., whether more Extraverted persons change their ties more than less extraverted persons), SIENA estimated the rate change for different levels of the individual covariate in question (See Snijders et al., in press, pages 17-20). Conceptually, higher significant values of  $\beta_k$  in the current study indicate that individuals tend to form a friendship in the network over and above chance when scoring higher on the individual covariate, holding all other effects constant. The effects are assumed to be constant across the whole period of time.

After we estimated network effects and individual covariate effects for each of the ten groups, we used the multilevel analysis to analyze the mean network and individual covariate effects across the ten groups (for technical details, see Snijders & Baerveldt, 2003). In this meta-analysis, the parameter estimates obtained for each introduction group separately were combined in a way that accounted for the fact that the differences between the parameter estimates are composed of real variability together with unreliable (error) variability. The latter was reflected by the standard errors of the parameter estimates. One assumption of this method, as in other multilevel methods (Cochran, 1954; Hedges & Olkin, 1985), is that the estimated mean effect across all groups is independent of the standard errors of this estimated mean effect. This was checked by examining plots provided by the SIENA-program that showed distributions of mean effects and their standard errors. These plots showed no indication of any association between the mean effects and their standard errors. Finally, it was tested whether the variance of each mean effect was significantly different from zero, to examine whether introduction groups differ in how personality predicted friendship selection (homogeneity between groups).

## 4.3 Results

### *Descriptive Analyses*

Table 4.1 presents weighted means (according to group size) of the structural characteristics across the ten friendship networks and individual personality measures over the five waves. These describe how the emerging friendship network develops over time. The indices describing the structural characteristics of the networks collectively indicate a tendency toward network expansion over three months, followed by subsequent stabilization. Specifically, the *average degree*, or average number of outgoing network ties, tends to increase over the first three months. After that, these numbers tend to remain relatively stable. The *reciprocity* and *transitivity* indices reflect the proportion of reciprocated friendship ties and proportion of transitive triplets, respectively. These indices indicated growth that gradually tends to stabilize over the course of the study. Taken together, these indices suggest an increase in connections within the network, and show increases in reciprocated and triadic friendship ties from the initial wave (in which very few individuals knew each other) over the first three months, followed by relative stability for most of these network characteristics.

Table 4.1

*Descriptive Statistics of Network Structure and Big Five Traits Across 10 groups*

	Wave 1		Wave 2		Wave 3		Wave 4		Wave 5	
	Mean	SD								
Average degree	1.71		2.64		3.56		3.67		3.64	
Reciprocity index	.13		.29		.30		.33		.32	
Transitivity index	.33		.34		.36		.44		.45	
Openness	4.63	1.25	4.59	1.23	4.61	1.26	4.62	1.27	4.60	1.25
Conscientiousness	5.31	1.23	5.23	1.23	5.28	1.24	5.30	1.26	5.37	1.28
Extraversion	4.86	1.45	4.81	1.47	4.81	1.46	4.77	1.44	4.78	1.46
Agreeableness	5.18	1.19	5.21	1.20	5.25	1.21	5.24	1.22	5.23	1.22
Neuroticism	3.21	1.24	3.13	1.22	3.12	1.23	3.12	1.21	3.11	1.22

*Notes.* All reported statistics were means across the 10 groups, which were weighted for group size. The range between the groups is reported between parentheses. *Average degree* describes the proportion of ties in relation to the total number of possible ties. The *reciprocity index* describes the proportion of reciprocated ties in relation to the total number of ties. The *transitivity index* describes the proportion of transitive triplets in relation to the total possible number of transitive triplets. Higher scores on the five Big Five traits indicate that participants rated themselves higher on that specific trait.

The lower part of Table 4.1 presents means and standard deviations of all Big Five factors across the five waves weighted by participants' group size. Five repeated-measure ANOVA's showed no significant ( $F(4, 201) = .77 - 1.20, p > .10$ ) mean level changes in the Big Five traits across four months, suggesting that the average mean level of the Big Five traits remained stable across the course of the study.

### *Specification of Final Network Model*

We initially tested a dyadic independence model to determine if adding transitivity and GD=2 each significantly increased the model fit. Transitivity test statistics ranged from 15.68 to 23.43 ( $\Delta df = 1$ ) across the ten groups, with  $p < .001$ . For GD=2, test statistics ranged from 84.68 to 93.43 ( $\Delta df = 1$ ) across the ten groups, with  $p < .001$ . This indicates that adding the transitivity as well as the GD=2 effect in the model significantly improves the fit of the model in all groups, warranting the use of a social network approach.

*Network effects.* Table 4.2 presents aggregated estimates of four network effects: outdegree, reciprocity, transitivity, and GD=2. As expected, all emerged as significant predictors of friendship ties. The outdegree parameter was negative, indicating that individuals do not tend to nominate just anyone as a friend (friendship is a selective process). The reciprocity was positive, indicating that individuals tend to reciprocate friendship nominations over time. Finally, both indices pertaining to the formation of triadic friendships, namely transitivity and GD=2, were significant. Specifically, the negative GD=2 measure indicated that if individuals were indirectly befriended with a third person via one direct friend, they were more likely to select that third person directly over time. In addition, the positive transitivity effect indicated that the more friends individuals had that were befriended with a third person, the more they were likely to select

the third person as a direct friend. In sum, these two network effects suggest that individuals tended to form triadic friendships over time. This also means that data of the current study are consistent with the first assumption of SIENA analyses: individuals tended to form friendships in a step-by-step manner, by using existing ties in the peer network. To get some indication of the feasibility of the third assumption of SIENA analyses, that is, whether friendship ties tend to be stable rather than tend to change after being formed, the stability of friendship ties after being formed at the second measurement was examined (at the first measurement, they were just acquainted). Of all friendship ties being formed at Wave 2, 92% remained at Wave 3, 88% at Wave 4, and 82% at Wave 5. Thus, it seems that our data is consistent with the assumption that friendship ties tend to be enduring states rather than brief events.

Table 4.2

*Multi-Level Analysis of Ego, Alter, and Similarity Effects of Big Five Traits on Friendship Selection (10 groups)*

Parameter	Mean		Variance	
	parameter		parameter	
	Estimate	SE	Estimate	Chi <sup>2</sup>
<i>Network effects</i>				
Outdegree	-1.86***	.08	.17	16.56
Reciprocity	1.73***	.11	.16	12.13
GD=2	-.52***	.06	.04	14.46
Transitivity	.14***	.02	.00	6.04
<i>Ego effects</i>				
Gender†	.29**	.06	.00	6.22
Openness	.02	.15	.10	14.97
Conscientiousness	-.02	.04	.08	13.18
Extraversion	.10***	.01	.03	10.34
Agreeableness	.07	.04	.00	7.41
Neuroticism	-.07	.09	.07	11.50
<i>Alter effects</i>				
Gender	-.18	.14	.00	4.33
Openness	.01	.05	.10	15.14
Conscientiousness	.05	.03	.00	7.98
Extraversion	.01	.03	.00	5.30
Agreeableness	.14***	.01	.13	16.60
Neuroticism	-.04	.03	.01	8.83
<i>Similarity effects</i>				
Gender	.40***	.12	.00	8.52

*Table 4.2 continued*

*Table 4.2 continued*

Parameter	Mean		Variance	
	Parameter		Parameter	
	Estimate	SE	Estimate	Chi <sup>2</sup>
Openness	1.45***	.19	.31***	33.80
Extraversion	.01	.03	.00	5.30
Agreeableness	.14***	.01	.13	16.60
Neuroticism	-.04	.03	.01	8.83
<i>Similarity effects</i>				
Gender	.40***	.12	.00	8.52
Openness	1.45***	.19	.31***	33.80
Conscientiousness	-.17	.19	.26	11.53
Extraversion	1.46***	.10	.35***	33.29
Agreeableness	1.55***	.03	.82**	25.79
Neuroticism	-.15	.18	.32	12.78
Conscientiousness	-.17	.19	.26	11.53

† 0 = male, 1 = female

*Notes.* Significance of the mean parameters is determined by dividing the parameter estimate by the standard error, adjusting for unreliable error variance across groups. Significance of the variance parameter is determined with a chi-square test with 9 degrees of freedom.

\*\*  $p < .01$ , \*\*\*  $p < .001$ .

*Effects of sex.* Table 4.2 presents sex ego, sex alter, and sex similarity effects in the models. The gender ego effect was significant: females tended to nominate more friends. Further, the gender similarity effect was significant, suggesting that males tended to select males and females tended to select females as friends.

*Effects of Personality Traits.* Table 4.2 presents the aggregated results of the parameters modelling various selection effects involving the Big Five personality characteristics.

To what extent do personality characteristics predict the number of selected friends? This question is addressed with the ego parameters for each of the personality measures. The only estimated parameter that emerged as a significant predictor of friendship ties was the Extraversion ego parameter. Individuals who rated themselves as high on Extraversion tended to nominate more friends. Thus, Extraversion predicts selecting more friends over time.

To what extent do personality characteristics predict being selected as a friend? This question is addressed with the alter parameters for each of the personality measures. The only estimated parameter that emerged as a significant predictor of friendship ties was the Agreeableness alter parameter. Individuals who rated themselves as more agreeable tended to receive more nominations. That is, individuals reporting higher levels of Agreeableness appeared to be more attractive (i.e., more popular) friendship partners. Thus, Agreeableness predicts being selected as a friend over time.

To what extent do individuals select friends who have similar levels of personality characteristics? This question is addressed with the similarity parameters for each of the personality measures. Three of these effects emerged as positive and significant predictors of friendship ties: Agreeableness, Extraversion, and Openness. In other words, individuals tend to select friends with similar levels of

Openness, Agreeableness, and Extraversion.

The last column of Table 4.2 shows whether the variance of the estimated parameter differs significantly from zero, that is, whether there are significant differences between the 10 groups in ego, alter, and similarity effects. The similarity in Openness, Agreeableness, and Extraversion estimates significantly differed across the ten groups. Nevertheless, follow-up tests revealed the estimated similarity parameters were significant predictors of friendship ties in most of the groups (7 out of 10 for Openness, 10 out of 10 groups for Agreeableness, and 8 out of 10 groups for Extraversion), showing that in most groups, individuals tended to select others with similar levels of Openness, Agreeableness, and Extraversion. All other parameter estimates were highly consistent in size across groups.

#### **4.4 Discussion**

The current study is among the first to show the development of emerging friendship networks in late adolescence in a naturalistic setting. Results were consistent with suggestions concerning the increasing need of late adolescents to form new friendships because they enter a new phase of life (Neyer et al., 1999). On average, dyadic connections increased over time, and seemed to stabilize after three months: Just-acquainted university students increasingly select others as friends and increasingly tend to reciprocate these friendship selections over the first three months. Moreover, the current study suggests that individuals increasingly form cohesive friendship networks, over and above the tendency to form dyadic relationships: individuals tended to become friends with their friends' friends more and more. These results are consistent with a study showing that a small group of unacquainted university freshmen increasingly form

reciprocated and transitive ties across the academic year (Van de Bunt et al., 1999). Thus, the current study is among the first to show the development of emerging friendship networks in late adolescence in a naturalistic setting. Moreover, all indicators of network expansion seem to stabilize after three months. Nevertheless, because no information was used concerning the network after four months, future research should examine the subsequent development of emerging friendship networks.

Further, the current study examined to what extent just-acquainted individuals select friends, are being selected as a friend, and select similar friends based on Big Five personality traits. Results indicated that three personality traits were uniquely associated with friendship selection: Extraversion, Agreeableness, and Openness. Extraversion appeared to be the most important factor in selecting friends. This is consistent with a study using a dyadic analysis, which suggested that Extraversion is the only personality trait that increases selecting friends over time (Asendorpf & Wilpers, 1998). Prior studies have suggested that extraverted individuals experience more positive affect in social situations, making extraverted individuals more motivated to be socially active when getting acquainted (Ashton, Lee, & Paunonen, 2002; Elphick et al., 1998). Thus, Extraverted individuals seem to select friends more, possibly because of increased positive affect in new social situations.

Second, actual similarity in Extraversion, or similarity according to individuals' self-ratings and their friends' self-ratings on Extraversion, predicted friendship selection over time: Extraverts tend to nominate each other as friends, and introverts tend to nominate each other as friends. Prior studies have found that mutual adolescent friends tend to show actual similarity in Extraversion (Selfhout et al., 2007) and several studies have shown that actual similarity in Extraversion predicts more relationship satisfaction

in intimate relationships (e.g., Barelds & Barelds-Dijkstra, 2007). Extraverts seem to interact in similar ways when getting acquainted: they are more talkative, less shy, and more spontaneous when first talking to strangers (Paulhus & Trapnell, 1998). In contrast, introverts may be more cautious when first talking to others and interact in more shy, withdrawn ways. Similarity in ways of interacting may make interaction more predictable and enjoyable, which may increase attraction between individuals, leading to more friendship selection (Berger & Calabrese, 1975; Byrne & Nelson, 1965). In sum, Extraversion seems to enhance selecting friends, and actual similarity in Extraversion seems to enhance selecting each other as friend.

Nevertheless, results of the current study suggested that Extraversion did not predict being selected as a friend over time. This contrasts findings showing that Extraversion predicts peer popularity longitudinally (Lubbers et al., 2006; Paulhus & Trapnell, 1998). An explanation for the difference between findings of prior studies compared to those in the current study is that we examined the *unique* effect of Extraversion on selection friends versus the *unique* effect of Extraversion on being selected as a friend. It could be that possible effects of Extraversion on being selected as a friend are confounded by effects of Extraversion on selecting friends: individuals who tend to select more have higher chance of being selected more as a friend as well (Steglich et al., 2006). Therefore, it seems important to take personality effects on both processes simultaneously into account.

In contrast to Extraversion, Agreeableness predicted being selected more as a friend. This result is in line with prior studies showing that agreeable individuals are more popular with peers (Jensen-Campbell et al., 2007; Scholte et al., 1997). Agreeable individuals have a high desire to maintain positive relations with others and are characterized by tendencies towards cooperation, empathy, likeability, and friendly compliance (Rothbart, 1989).

Therefore, peers may prefer agreeable individuals as friends.

Further, actual similarity in Agreeableness predicted friendship selection. This is consistent with the finding that mutual adolescent friends tend to be similar in Agreeableness (Selfhout et al., 2007). This result can be explained by an evolutionary approach to game theory (Gilchrist, 2007; Smith & 1984), which suggests that the more successful collaboration strategies for individuals are those based on a match between altruistic behaviors. Two individuals who act altruistically while interacting with each other gain most, followed by those who both act egoistically. The least profitable strategy is when there is a mismatch in altruistic behavior, because one invests only for the gains of the other. Hence, friends who are similar on Agreeableness may benefit more than those who are dissimilar, which could explain why similarity in Agreeableness enhances friendship selection. In sum, Agreeableness seems to enhance the probability of being selected as a friend, and similarity in Agreeableness seems to enhance selecting each other as a friend.

The finding that Agreeableness does not predict selecting friends does not support the conceptualization of Agreeableness as a higher enjoyment of others' company (Hogan, 1996) and confirms views emphasizing that Agreeableness pertains to altruistic behaviors more (Buss, 1991; Denissen & Penke, 2008a). That is, Agreeableness, in contrast to Extraversion, does not seem to be associated with higher social activity. Instead, agreeable individuals may attract individuals more than extraverts because of their altruistic behaviors.

Unexpectedly, actual similarity in Openness also predicted friendship selection over time. Openness has traditionally been viewed as an intrapsychic trait, pertaining to individual differences in the structure and functioning of the mind, and therefore of little importance to social relationships (McCrae, 1996). Nevertheless, although Openness in itself may be of small importance in selecting

friends and being selected by friends, actual similarity in Openness might be associated with similarity in vocational choices (Holland, Johnston, Hughey, & Asama, 1991; McCrae & Costa, 1994), interests (McCrae, 1996), and values (Tse & Cheng, 2006). Actual similarity in values and interests specifically are thought to enhance interaction between individuals during acquaintanceship (Byrne & Nelson, 1965; Clore & Byrne, 1974). Consistent with the idea that similarity in Openness is considered desirable in friendship, one study showed that adolescents' self-rated Openness and their ratings on ideal friends' Openness were highly associated, even though Openness in itself was neither desirable nor undesirable as a personality trait (Tse & Cheng, 2006). In sum, although Openness may not predict selecting friends or being selected as a friend, a certain match in Openness may enhance friendship selection.

Further, females tended to nominate more partners, a result consistent a prior study examining existing adolescent friendship networks (Burk et al., 2007). Regarding similarity, males tended to select males, and females tended to select females as friends. Because findings in this study as well as several prior studies (Burk et al., 2007; Kupersmidt, DeRosier, & Patterson, 1995; Tolson & Urberg, 1993; Urberg et al., 1998) indicate that this gender similarity effect on friendship selection is quite sizeable, it is important to take into account the tendency for individuals to select friends of the same gender. Accordingly, all the discussed results were adjusted for gender differences on friendship selection processes.

Moreover, all discussed findings were adjusted for the tendency of individuals to form triadic friendships over time. More specifically, if individuals selected a friend, and this friend selected a third person as his or her friend, then individuals tended to select this third person as a friend over time as well (i.e., geodesic distance-2 effect). Additionally, this tendency to form triadic friendships

increased if they had more friends connected to this third person (i.e., transitivity effect). In short, individuals tended to use the structure of the friendship network as a whole to select friends. As these network effects may be correlated with main effects and similarity effects of personality on friendship selection, they need to be taken into account when examining personality effects on friendship selection.

Overall, results suggested that effects of similarity in Big Five personality traits on friendship selection were greater than direct effects of personality traits on friendship selection. This suggests that a certain match in actual personality traits is especially important during friendship selection, even more so than individuals' absolute level of personality traits. This result contrasts findings based on the same dataset suggesting that actual *overall* similarity in the Big Five traits does not predict friendship intensity among unacquainted freshmen over time (Selfhout et al., in press). Nevertheless, the current study suggests that domain-specific similarity in Big Five personality, namely similarity in Extraversion, Agreeableness, and Openness, does enhance friendship selection. This suggests the potential importance to examine specific, rather than overall, similarity in Big Five personality traits between individuals.

As expected, the current study did not find evidence for effects of Neuroticism and Conscientiousness on friendship selection during acquaintanceship. It might be that Neuroticism and Conscientiousness are associated more with maintaining relationships than with forming them. With regards to the former, self-esteem decreases more for neurotic individuals when having conflicts with their romantic partner than for non-neurotic individuals, suggesting that neurotic individuals are more sensitive to social cues in existing relationships than non-neurotic individuals (Denissen & Penke, 2008b). Conscientiousness seems to be an indicator of self-control processes, such as effortful control (Kochanska, Tjebkes, Forman,

& Kochenderfer-Ladd, 1998). Individuals who have poorer self-control seem to disclose personal information inappropriately, are more likely to engage in prejudiced behavior, are less responsive to their partners in romantic relationships, have poorer interpersonal interactions, and have impairment in everyday activities (Finkel & Campbell, 2001; Monteith, 1993). These behaviors seem to pertain to maintaining existing relationships more than to forming them. Thus, although these two factors do not seem to be associated with friendship selection during acquaintanceship, other research suggests that they may be important for existing relationships.

One limitation of the current study is the reliance on a relatively highly educated sample, consisting primarily of female students. This may limit the choices individual had when choosing friends: to a certain degree, individuals were 'forced' to select friends of the same gender and the same educational background. On the other hand, even when individuals have ample opportunities to interact with other-gender friends, they still tend to form same-gender friendships (Maccoby, 1988). Further, because social homogamy (i.e., individuals tend to form friendship with others that are similar to them in social background) is a pervasive fact of life, the high similarity in social background in the current study may form a realistic setting in which individuals usually form friendships. Further, we adjusted for gender effects as well as effects of gender composition of the dyad on friendship selection and still found effects of personality on friendship selection. Nevertheless, future studies should include individuals from various demographical backgrounds to investigate whether personality effects on friendship selection prevail after adjusting for the possible effect of social homogamy on friendship selection.

Additionally, the current study selected certain introduction groups on the basis of the number of participants that were willing to participate, which may have led to the selection of groups

characterized by specific personality traits. Because personality data were not available for nonparticipants, we cannot adjust for potential differences between groups that participated and groups that did not participate. Nevertheless, all university freshmen were randomly assigned into the introduction groups, suggesting that it is less likely that individuals in certain groups would have higher scores on certain traits than others. Moreover, although we found that Conscientiousness indeed predicted attrition in the current study, this trait did not affect friendship selection.

Another limitation concerns the assumptions regarding the social network approach. A last assumption relevant for this study is that SIENA assumes that network ties are enduring *states* rather than brief *events*. That is, the program assumes friendship ties, after being formed, tend to endure over time. Given the relative short-term (i.e., four months) design of the current study, we were not able to adequately address this assumption. Although friendships in the current sample did seem to endure over time, future studies should examine the development of friendships over a longer period of time to test this assumption of SIENA.

Further, because the number of groups ( $n = 10$ ) can be considered small for making reliable inference about between-group differences in effects, the between-group variance found in the results may be rather imprecise estimates. However, it should be noted that between-group differences were not the main focus of this study investigating processes *within* groups, with between-group differences being merely adjusted for. Finally, SIENA models are currently limited to dichotomous network ties, so network data that consist of valued ties (e.g., a continuous measure of strength of relationship) had to be dichotomized for use in these models. Although the choice of an arbitrary cut-off value for dichotomization may affect results in general, additional analyses showed that choosing another

cut-off value (contrasting best friends and good friends to other types of relationships) produced a similar pattern of results.

### *Conclusion*

The social network approach offers several advantages over traditional statistical approaches. First, by using a social network approach, the development of emerging friendship networks was studied. This approach allowed us to show that, over and above the formation of reciprocated friendships, late adolescents tend to increasingly form triadic friendships. Moreover, the current study showed that accounting for the formation of cohesive network structures (i.e., the tendency of individuals to become friends with friends' friends) improved fit of the models of personality effects on friendship selection, suggesting that accounting for the network as a whole provides a more realistic model of friendship selection processes than using dyadic processes only. Taken together, results suggest that several Big Five factors play an important but differentiated role in initial friendship selection processes. Extraversion seems to increase selecting friends, whereas Agreeableness seems to increase being selected as a friend. Moreover, actual similarity in these personality traits as well as similarity in Openness seems to play an even more important role in enhancing friendship selection over time.



## Chapter 5.

# Overall Personality Traits and Friendship Formation<sup>5</sup>

*“The trouble with having an open mind, of course, is that people will insist on coming along and trying to put things in it.”*  
~**Terry Pratchett**

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<sup>5</sup> Selfhout, M., Denissen, J., Branje, S., & Meeus, W. (2009). In the eye of the beholder: Perceived, actual, and peer-rated similarity in personality, communication, and friendship intensity during the acquaintanceship process. *Journal of Personality and Social Psychology*, 96, 1152-1165.

### **Abstract**

The current paper examined associations of perceived similarity, actual similarity, and peer-rated similarity in personality with friendship intensity during the acquaintanceship process in a naturalistic setting. Self- and peer-rated personality data were gathered from undergraduates (mean age= 18.9) at five time points during the first year of university using a round-robin design. Whereas perceived and peer-rated similarity in personality were concurrently associated with more friendship intensity for just-acquainted individuals, actual similarity in personality was not. Further, bidirectional cross-lagged associations between perceived similarity and friendship intensity were found. Peer-rated similarity was also associated with increases in friendship intensity, and this association was mediated by communication frequency. These results indicate that specific types of similarity in personality are differentially associated with friendship intensity during early phases of acquaintanceship in a real-life setting. Further, insight was provided in the direction of causality between similarity and attraction: perceived and peer-rated similarity seem to breed friendship intensity, whereas friendship intensity seems to breed perceived similarity only. Finally, peers' expectations seem to affect individuals' communicative behaviors, which in turn affect friendship formation.

## 5.1 Introduction

A substantial body of anecdotal and empirical evidence suggests that similarity enhances attraction (Montoya, Horton, & Kirchner, in press). Although several experimental studies using bogus strangers showed that higher similarity in values is associated with higher attraction (e.g., Byrne, 1971; Byrne & Nelson, 1965; Hoyle, 1993), there is a lack of studies examining whether individuals tend to form friendships with others who have similar personality traits in real-life situations. In addition, although similarity may increase friendship intensity by making communication between individuals more predictable and therefore enjoyable (Berger & Calabrese, 1975), relatively few studies have examined the mediating role of communication in the effects of similarity on friendship intensity. In an attempt to address these lacunas, the current study first examined unique cross-sectional associations of perceived similarity, actual similarity, and peer-rated similarity in personality with friendship intensity for just-acquainted individuals. Further, bidirectional longitudinal associations between these different types of personality similarity and friendship intensity were studied to provide insight in the direction of causality between similarity and attraction. Finally, we examined to what extent communication mediates the longitudinal effects of personality similarity on friendship intensity.

### *Actual Similarity and Friendship Intensity*

Early research and theorizing on the role of similarity in attraction has focused mainly on *actual* similarity in values (e.g., Byrne, 1971; Hoyle, 1993). These studies were predominantly laboratory experiments and focused on the association between actual similarity in values and attraction to a bogus stranger. Results of this research

have been interpreted as support for the so-called *similarity-attraction hypothesis*: higher actual similarity in values between participants and bogus strangers is associated with higher attraction to these bogus strangers. In addition, literature on assortative mating (Barelds & Barelds-Dijkstra, 2007; Luo & Klohnen, 2005; Lusk et al., 1998) suggests that individuals tend to form intimate relationships with others who are similar to them in values, preferences, and personality traits.

A set of related theoretical perspectives is usually used to explain individuals' preference for interaction with like-minded others. The reinforcement-affect explanation suggests that similarity in values reinforces individuals' opinions, views, and feelings, and therefore triggers an implicit affective response that increases attraction (Clore & Byrne, 1974; Izard, 1960). Uncertainty reduction theory indicates that similarity in values affords predictability, allowing individuals to communicate with less effort and greater confidence (Berger & Calabrese, 1975). Finally, similarity may be important for maintaining intimate relationships because it is supposed to increase intimacy between partners through shared agreement and common knowledge of married and family life (Barelds & Barelds-Dijkstra, 2007; Esterberg, Moen, & Dempster-McCain, 1994).

It is currently unclear whether findings regarding the effects of actual similarity in laboratory studies can be generalized to effects of actual similarity on attraction in real-life settings. For example, even subtle environmental factors such as room temperature (Griffitt, 1970) and background music (May & Hamilton, 1980) have been shown to reduce effects of actual similarity in personality on attraction. In real-life settings, such environmental factors may be even more powerful and may therefore cancel out actual similarity effects on attraction. In addition, the saliency of actual similarity in values and personality is high in laboratory studies, because individuals in

these studies receive the bogus stranger's attitude or personality information *preceding* their attraction assessments. In the absence of any additional information, this almost forces individuals to focus on similarity in these attributes regarding their attraction ratings. In contrast, in real-life situations, the saliency of attitudes and personality is likely lower, because a range of other factors may be important during interaction. Thus, the artificial nature of prior experimental designs may limit the generalizability of actual similarity effects on attraction to real-life situations.

Recent empirical evidence suggests that actual similarity in personality is not associated with friendship intensity in real-life settings. For example, a recent meta-analysis of 313 laboratory and field investigations on the link between attraction and similarity in values and personality traits showed that actual similarity in these domains is associated with attraction in no-interaction and short-interaction laboratory studies but not in field studies examining existing relationships (Montoya, Horton, & Kirchner, in press). This is consistent with recent findings showing that actual similarity in personality traits was not associated with relationship satisfaction in both same-gender (Morry, 2005) and cross-gender (Morry, 2006) friendships.

### *Perceived Similarity and Friendship Intensity*

Several researchers have suggested that *perceived similarity* (i.e., similarity between two individuals as perceived by one individual) in both values and personality traits, and not actual similarity per se, is associated with higher attraction (Horton, 2003; Hoyle, 1993; Morry et al., 2005). Two causal directions of the association between perceived similarity and attraction have been hypothesized.

According to the *attraction-similarity hypothesis*, higher

attraction breeds perceptions of similarity (Hoyle, 1993; Morry, 2005; Morry et al., 2005). Relationship partners may overestimate similarity to assure themselves of the correctness of their own attributes, a process that protects their self-esteem (Ross, Greene, & House, 1977). Balance Theory (Heider, 1958) states that cognitions are organized in a harmonious (i.e., balanced) fashion. Because of the persistent (lay) belief that friends *should* be similar in traits, any dissimilarity in traits may cause a cognitive imbalance that is countered by illusions of similarity (Morry, 2005). Consistent with this, in an experimental study, priming satisfaction in existing same-gender friendships increased perceived similarity in personality traits (Morry et al., 2005).

Another line of research hypothesizes that perceived similarity increases attraction (*similarity-attraction hypothesis*). According to Sunnafrank and Ramirez (2004), individuals make an estimate of similarity on first encounters. When these estimates indicate a high degree of perceived similarity with another person, they can be expected to seek out future interactions with that person. The previously mentioned reinforcement-affect explanation can be invoked to explain this effect: perceived similarity in personality might create a feeling of recognition, self-confirmation, and self-reassurance; this could then lead to more enjoyable interactions, which increases attraction (Berg & Clark, 1986).

Perceived similarity in various attitudes among previously unacquainted undergraduates predicted higher proximity, attraction, communication, and friendship intensity over a period of nine weeks (Sunnafrank & Ramirez, 2004). In a similar vein, recent research on assortative mating suggests that perceived similarity in values and traits, instead of actual similarity in these domains, increases relationship satisfaction because it enhances conflict resolution and mutual understanding (Murray, Holmes, Bellavia, Griffin, &

Dolderman, 2005). For example, perceiving more similarity in personality traits predicted increased relationship satisfaction over a period of six weeks among just-acquainted dating couples (Lutz-Zois, Bradley, Mihalik, & Moorman-Eavers, 2006). In sum, there is empirical evidence for cross-sectional and bidirectional longitudinal associations between friendship intensity and perceived similarity in personality.

### *How Others Perceive Similarity in Dyads: Peer-Rated Similarity and Friendship Intensity*

The focus of prior studies on the similarity-attraction link has typically been on either the self (i.e., perceived similarity) or the dyad (i.e., actual similarity). Nevertheless, several researchers have emphasized that the role of personality in social relationships may also depend on how individuals are viewed by multiple others, such as peers (Hofstee, 1994; Kenny & Acitelli, 2001; Touhey, 1974). Social Comparison Theory (Festinger, 1954) has stressed peer effects on individuals' thinking, in particular under conditions of uncertainty. The basic premise of this theory is that the evaluation of many skills and aptitudes can be achieved only by comparing one's own evaluation to those of peers. When there is doubt about the appropriateness of certain preferences, individuals will compare their own preferences to peers' ideas and try to confirm these preferences (Baron et al., 1996). Extending this view, peers' perceptions on individuals might affect the social choices an individual makes. For example, an experimental study showed that presenting the opinion of a majority concerning attractiveness of specific males among female college students directly alters their rating of attraction towards these men (Baron et al., 1996). Given strong and persistent lay beliefs of individuals that similarity is a prerequisite for friendship, this belief may act as a peer

norm to which individuals conform. To the best of our knowledge, however, associations between peer-rated similarity in personality and friendship intensity have not been previously studied.

### *Associations of Similarity with Friendship Intensity among Just-Acquainted Individuals*

Studying just-acquainted individuals can provide insight into effects of similarity on friendship intensity during the acquaintanceship process. First, similarity effects on friendship intensity might work very fast and occur in the very beginning of the acquaintanceship phase (Sunnafrank & Ramirez, 2004). Although the previously mentioned studies using bogus strangers did tap into the role of similarity on attraction during the acquaintanceship phase, the generalizability of these studies has been questioned because of their artificial character (Sunnafrank, 1986). One notable exception is a longitudinal study on similarity in personality and friendship among twenty-five unacquainted freshmen (Izard, 1960). Results indicated that individuals who liked each other the most six months after first acquaintance showed higher actual similarity in personality than those who did not like each other. Nevertheless, actual similarity effects upon first acquaintance as well as perceived and peer-rated similarity effects on attraction were not accounted for in this study.

Another reason to study associations between similarity and friendship in individuals who are just getting acquainted is that according to Social Comparison Theory, peer-rated similarity effects occur especially under conditions of uncertainty. That is, during the acquaintanceship phase, individuals may be especially affected by the views of peers on which persons are similar in personality. Therefore, a design is needed that examines the role of different types of similarity in friendship intensity among just-acquainted individuals

in a naturalistic setting.

*Unique Associations of Perceived Similarity, Actual Similarity, and Peer-rated Similarity with Friendship Intensity*

To capture the unique influence of each type of similarity, it is necessary to control for all other indices using multiple regression. Because the three different indices of similarity are expected to be positively related, this procedure slightly alters the meaning of each index. For example, controlling for actual and peer-rated similarity transforms the index of perceived similarity into a measure of *illusory similarity* (Murray et al., 2005) because it taps into similarity perceptions that are not grounded in reality.

In contrast, two persons may actually be more similar according to their independent ratings of each other, but may not perceive this similarity in each other while at the same time peers also do not perceive this similarity (*unique actual similarity*). One study examined the unique associations of actual similarity and perceived similarity in values with attraction, showing that only the former was associated with attraction (Hoyle, 1993).

Some theorists have argued that aggregated peer estimations of personality traits are at least as reliable and valid as self-reports (e.g., Funder & Colvin, 1991; Kenny et al., 1994). In line with this reasoning, aggregated peer-ratings of just-acquainted individuals' Big Five personality traits show higher test-retest stability across four months compared to self-ratings (Denissen et al., 2008a). In another study, aggregated peer-ratings showed stronger associations with social behaviors, such as nervous withdrawal and tendencies to control others' behaviors, compared to self-reports (Kolar & Funder, 1996). Thus, although both aggregated peer-reports and self-reports of personality likely contain measurement error, both are reliable and

valid indicators of actual personality traits and may therefore provide a unique perspective concerning the role of personality traits in the formation of friendships. Therefore, it is important to simultaneously estimate effects of actual similarity based on self-reports and peer-rated similarity on friendship intensity, to be able to disentangle the relative importance of both similarity indices in friendship intensity. In sum, it seems that perceived similarity in personality, but not actual similarity in personality, is associated with friendship intensity. To what extent actual similarity, perceived similarity, and peer-rated similarity are *uniquely* associated with friendship intensity remains unclear, however. In the first part of the current study, we will therefore focus on the unique associations of actual similarity, perceived similarity, and peer-rated similarity with friendship intensity.

### *Does Similarity Breed Attraction, or Does Attraction Breed Similarity?*

The question of direction of causality between the associations of similarity and friendship intensity applies to associations between all three types of similarity and friendship intensity. Although results of prior studies concerning existing friendships (e.g., Morry, 2005) show no concurrent associations between actual similarity in personality and friendship intensity after controlling for perceived similarity, it may take time for individuals to discover each other's core personality traits (Duck & Craig, 1978). Accordingly, it is still an open question whether associations between actual similarity and friendship intensity emerge during later phases of acquaintanceship. As increasing satisfaction in existing friendships predicts more perceived similarity in traits (Morry, 2005) and perceived similarity in values predicts higher friendship intensity over time during acquaintanceship (Sunnafrank & Ramirez, 2004), one could

expect bidirectional associations between perceived similarity and friendship intensity. Nevertheless, because these associations have not been studied simultaneously during the acquaintanceship phase, the direction of causality in the links between perceived similarity and friendship intensity needs to be further studied.

Also, the bidirectional longitudinal associations between peers' perceptions of similarity and friendship intensity have not been examined yet. According to Social Comparison Theory, the peer group may 'push' individuals who are perceived as similar towards becoming friends (Festinger, 1954), suggesting that peer-rated similarity predicts friendship intensity. In contrast, if Balance Theory is extended from perceived similarity to views of peers on similarity of others, friendship intensity might also affect peer-rated similarity: as certain individuals become friends and spend more time together, peers may balance out dissimilarities they see between them.

### *The Role of Communication in Similarity Effects on Attraction*

Even if it is found that specific types of similarity predict friendship intensity, the processes behind similarity effects on friendship intensity remain relatively understudied. *Why* may higher perceived similarity or peer-rated similarity predict higher friendship intensity over time? Duck (1994) provided a theoretical framework that emphasized the role of communication in the link between similarity and attraction. Specifically, this theory claims that when people discover similarities between them, this will enhance communication between these persons. One way in which shared personality traits may foster communication is that similar persons can effectively use information on their own states and personality to make valid inferences about the other person (Berger & Calabrese, 1975; Neyer et al., 1999).

The idea that communication is enhanced through similarity is also found in the reinforcement-affect explanation (Clore & Byrne, 1974) and Uncertainty Reduction Theory (Berger & Calabrese, 1975). This suggests that greater actual similarity facilitates communication. Communication, in turn, has been shown to foster social relationships such as friendships (Goldstein & Woods, 2002; Koesten, 2004). If actual similarity predicts friendship intensity during later phases of acquaintanceship, communication might be found to mediate this link. Nevertheless, because we hypothesized that actual similarity does not predict friendship intensity, actual similarity is not expected to predict friendship intensity through communication.

Nevertheless, the explanation regarding a mediation role of communication may also apply to peer-rated and perceived similarity effects on attraction. Peers might affect the communication between two individuals and thereby indirectly increase or decrease the friendship intensity between the two individuals. For example, peers may provide certain individuals with more opportunities to communicate by spending more or less time with these individuals themselves (Williams, Shore, & Grahe, 1998). In addition, peer norms about which individuals should be friends might be transferred to individuals' own perceptions about who they should become friends with (Baron & Kerr, 2003; LaRocco, 1985), thereby guiding individuals' communicative behaviors. Perceiving similarities may increase pleasant communicative experiences because of lay assumptions that similar individuals should become friends. In other words, if individuals think they are similar, they may find communication more pleasant and easy, and therefore decide to become friends. Prior results do indicate that for unacquainted undergraduates, the amount of communication during acquaintanceship is associated with higher perceived similarity in values (Sunnafrank, 1986). Accordingly, perceived similarity and peer-rated similarity in personality may

increase communication, and communication, in turn, may predict higher friendship intensity.

### *The Current Study*

The current study focuses on the unique cross-sectional and longitudinal associations of perceived similarity, actual similarity, and peer-rated similarity with friendship intensity for just-acquainted freshmen. By examining the unique associations between these types of similarity and friendship intensity, we studied their relative importance in predicting friendship intensity during the acquaintance phase. As individuals are more likely to select same-gender friends than cross-gender friends (Tolson & Urberg, 1993), we controlled for effects of gender composition of the dyad on friendship intensity. Further, we examined to what extent communication mediated effects of perceived similarity and peer-rated similarity on friendship intensity.

The following hypotheses were tested:

- 1. Perceived similarity is uniquely associated with more friendship intensity for just-acquainted individuals.*
- 2. Actual similarity is not uniquely associated with friendship intensity for just-acquainted individuals.*
- 3. Peer-rated similarity is uniquely associated with more friendship intensity for just-acquainted individuals.*
- 4. Perceived similarity predicts higher friendship intensity over time, and friendship intensity predicts higher perceived similarity over time.*
- 5. Actual similarity and friendship intensity are not bidirectionally associated over time.*

*6. Peer-rated similarity predicts increases in friendship intensity over time, and friendship intensity predicts more peer-rated similarity over time.*

*7. Communication mediates effects of peer-rated similarity on friendship intensity over time.*

*8. Communication mediates effects of perceived similarity on friendship intensity over time.*

## **5.2 Method**

### *Sample*

Participants were psychology freshmen attending Utrecht University in the Netherlands who started their study in the autumn of 2006. Studying freshmen offers several advantages. First, they have a high need to discover new friends because they often move to a new city and enter a new phase of life away from existing friendships (Asendorpf & Wilpers, 1998). Second, for educational purposes, freshmen at the Utrecht University in the Netherlands are randomly placed in groups in which they work together during the remainder of the year to complete a substantial part of the psychology curriculum. This means that studying this particular sample offers a unique possibility to examine to what extent similarity is associated with friendship intensity for just-acquainted individuals in a naturalistic setting.

A total of 489 students were assigned to one of the 20 introduction groups of around 25 people each. E-mails, flyers, posters, and an announcement during the first university lecture generated attention for the current study. A total of 378 participants (77% of all first-year students) stemming from 18 groups signed up for the study via a website. Of these, the 10 groups in which more than 80% of the participants registered for the current study were selected for

participation. In these 10 groups of 238 individuals, 221 individuals registered for the current study (93% enrolment rate). The mean age of these individuals was 18.9 ( $SD = 1.6$ ), and 181 (82%) were females. The majority of participants (92%) were of Dutch origin. The participants that were selected ( $n = 221$ ) and those that were not ( $n = 157$ ) did not differ significantly ( $p > .10$ ) in gender and age. Only 5 pairs of group members reported that they already knew each other before the start of the study: these were excluded from all analyses.

After 4 months, 205 individuals of the 221 participants at Wave 1 still participated (93% retention rate). Compared to these 205 participants, the 16 non-participating group members were rated by their peers as somewhat less neurotic (3.35 vs. 3.66,  $F(5, 216) = 5.67$ ,  $p < .05$ ) and substantially less conscientious (3.94 vs. 4.72,  $F(5, 216) = 22.74$ ,  $p < .01$ ).

No differences were found for the other Big Five factors, communication, or friendship intensity. Finally, participants rated at each wave whether they were romantically involved with any of their group members. We excluded 8 dyads in which at least one of the members indicated this was the case. Table 5.1 shows the number of females, same-gender female dyads, same-gender male dyads, and cross-gender dyads across the 10 groups. Overall, few males were present in the groups and most dyads were same-gender female dyads, followed by cross-gender dyads and same-gender male dyads.

Table 5.1

## Size and Gender Composition of the Ten Groups of Undergraduates

Group	Individuals		Dyads			
	Females	Total	Female	Male	Cross-gender	Total
1	17	21	136	6	68	210
2	18	24	153	15	108	276
3	20	23	190	3	83	253
4	18	24	153	15	108	276
5	18	24	153	15	108	276
6	15	21	105	15	90	210
7	23	23	253	0	0	253
8	17	19	136	1	34	171
9	16	21	120	10	80	210
10	19	21	171	1	38	210
Total	181	221	1547	81	718	2345

*Note.* One dyadic judgment was randomly selected of dyads that were entered twice.

## *Procedure*

Starting the second week of their University freshmen year, participants filled out the questionnaires online by accessing a website using a personal password. Participants completed the Big Five Inventory (BFI; Denissen et al., 2008b; John & Srivastava, 1999) at the first Wave. Additionally, participants completed Big Five and friendship intensity round robin ratings for each group member monthly over five Waves. Confidentiality of all answers was explicitly guaranteed. The questionnaires used in the current study were part of a larger battery that took a median of 40 minutes to complete. Participants received €20 (around \$25), 2 hours of course credit, and (optionally) a personality feedback profile at the end of the study.

## *Instruments*

*Single item Big Five inventory.* Because letting participants rate all other participants on multi-item Big Five scales would place too excessive demands on their motivational as well as cognitive abilities of participants, we used the ultra-short revised Ten Item Personality Inventory (TIPI-r; Denissen et al., 2008a; Gosling et al., 2003). The revised questionnaire reduced the original 10 unipolar items to 5 bipolar items (Extraversion: “extraverted, enthusiastic” vs. “reserved, quiet”; Agreeableness: “critical, quarrelsome” vs. “sympathetic, warm”; Conscientiousness: “dependable, self-disciplined” vs. “disorganized, careless”; Neuroticism: “anxious, easily upset” vs. “calm, emotionally stable”; Openness to Experience: “open to new experiences, complex” vs. “conventional, uncreative”). Participants rated both themselves and their peers on these items, using a 1 (extremely like the left adjective pair) to 7 (extremely like the right adjective pair) scale. Following Woods and Hampson (2005), we

varied the location of the socially desirable pole, with Extraversion, Openness, and Conscientiousness items having the desirable pole on the left side, and Neuroticism and Agreeableness having this pole on the right side. All single-items measures demonstrated significant convergent validity correlations with multi-item scales (Denissen et al., 2008a).

*Big Five Inventory.* At Wave 1, participants completed the 44-item Dutch translation of the Big Five Inventory (e.g., Denissen et al., 2008a; John & Srivastava, 1999) concerning their own personality dimensions. This instrument consists of 8 statements for the factors Extraversion (sample item: “is talkative”) and Neuroticism (sample item: “can be moody”), 9 statements for the factors Conscientiousness (sample item: “does a thorough job”) and Agreeableness (sample item: “is generally trusting”), and 10 statements for the factor Openness (sample item: “values artistic, aesthetic experiences”). Participants indicated their agreement regarding each statement on a 1 (totally disagree) to 5 (totally agree) Likert scale. Cronbach’s alphas were .83, .76, .86, .88, and .82, from Wave 1 to Wave 5, respectively (see the study of Denissen et al. (2008a) for descriptives as well as correlations with other scales of the BFI in the current sample).

*Friendship intensity.* Friendship intensity was measured at each wave by asking each participant to indicate to what degree they were friends with each of their group members on a continuous scale, ranging from 1 = *Far acquaintance* to 7 = *Best friend*. An equivalent single item scale has been shown to be predictive of proximity, amount of communication, attraction, and type of relationship over a period of nine weeks (Sunnafrank & Ramirez, 1994). In the current study, friendship intensity showed high within-wave correlations with other indicators of friendship at all five waves, such as support ( $r = .84-.87$ ,

$p < .001$ ) and liking ( $r = .85-.87$ ,  $p < .001$ ). Medium sized monthly test-retest reliability was found ( $r = .41-.53$ ,  $p < .001$ ).

*Communication* was measured by asking participants to indicate how much they had spoken to each of their group members during the last week on a scale ranging from 1 = *Never* to 7 = *Very often*. In the current study, communication was correlated very with an indicator of physical proximity during class of group members ( $r = .82-.87$ ,  $p < .001$ ) and liking ( $r = .86-.87$ ,  $p < .001$ ) within waves. Medium sized monthly test-retest reliability was found ( $r = .48-.68$ ,  $p < .001$ ).

### *Strategy of Analysis*

Instead of focusing on similarity in specific personality domains, we examined overall personality similarity by calculating q-correlations (Cronbach & Gleser, 1953), which capture each dyad's similarity in terms of their organization (or patterning) of Big Five responses (i.e., in terms of personality profiles). Other types of similarity indexes, such as univariate difference scores, ignore multivariate agreement (or disagreement) on the many specific responses on which the profile of individuals' personalities is based and thus discard a substantial amount of information that is captured by profile similarity correlations (Luo & Klohnen, 2005). Another important difference between profile-based and difference score-based similarity is that profile correlations can range from being highly positive, indicating similarity, to being close to zero, indicating neither similarity nor dissimilarity, to being negative, indicating opposites or complementarity.

All scores were standardized first to account for possible mean-level differences between scales. Perceived similarity was examined by computing the Q-correlation between ratings of Person A's self-reported Big Five scores and Person A's ratings of Person

B's Big Five scores. Actual similarity was examined by computing the Q-correlation between Person A's self-rated Big Five scores and Person B's self-rated Big Five scores. Finally, we constructed scores for peer-rated similarity by first computing mean scores based on all peer-ratings of participants' Big Five traits, and next computing Q-correlations between the mean scores of peers' ratings of Person A's Big Five scores and the mean scores peers' ratings of Person B's Big Five scores. Alternatively, one could compute peer-rated similarity by first calculating q-correlations between peers' ratings of participants and then using the means of these q-correlations. This alternative peer-rated similarity index correlated highly ( $r = .93-.97$ ,  $p < .05$ , across the five waves) with the peer-rated similarity indices we used in all following analyses.

Because we are dealing with dyadic data, each of the dyadic judgments is entered twice (i.e., A judges B, but B also judges A) which creates non-independence of data, and therefore violates independence assumptions associated with standard regression analyses. Models typically used when dealing with round-robin data, such as the Actor Partner Interdependence Model (Cook & Kenny, 2005), are not able to deal with cross-lagged modelling including as many variables as used in the current study while controlling for dyadic non-independence, because the modelling would become too complex. We therefore randomly selected half of each of the dyadic judgments, resulting in 2345 unique dyadic judgments.

Because each participant is a member of up to 25 different dyads (i.e., A rates B, A rates C, etc), associations of actual, perceived, and peer-rated similarity with friendship similarity were computed within participants through cross-lagged multilevel modelling in Mplus (Muthén & Muthén, 1998-2006), tapping into processes of similarity and friendship intensity for each participant of the sample. In this model, each similarity type was used to predict subsequent

friendship intensity one month later and friendship intensity was used to predict each of the subsequent three similarity types. By doing so, all cross-lagged effects were controlled for concurrent associations as well as stability paths. Thus, cross-lagged effects of the similarity types reflect the degree to which similarity predicts an increase or decrease in friendship intensity one month later, and cross-lagged effects of friendship intensity reflect the degree to which friendship intensity predicts an increase or decrease in similarity one month later.

To account for possible shared variance because individuals are nested within each of the 10 groups, we controlled for Level 3 (between-group) differences in the analyses. Because this did not affect any of the results in a significant way, we decided to model only Level 1 and Level 2 in the final analyses. Root Mean Square Errors of Approximation (RMSEA's) smaller than .05 and Comparative Fit Indices (CFI's) larger than .95 indicate adequate fit of the models to the data (Muthén & Muthén, 1998-2006).

We followed the several steps of Holmbeck (1997) to test whether communication mediates effects of perceived similarity and peer-rated similarity on friendship intensity. Partial mediation is found when similarity significantly predicts communication over time (Condition 1), communication subsequently significantly predicts friendship intensity over time (Condition 2), and direct effects of similarity on friendship intensity significantly reduce in size compared to the non-mediation model (Condition 3). We tested this last condition by examining confidence intervals of similarity effects on friendship intensity in Mplus. To test the fourth condition of full mediation, two versions of this mediation model were compared. In the *unconstrained model of mediation*, direct effects of similarity on subsequent friendship intensity are modelled. In contrast, in the *constrained model of mediation*, direct effects of similarity are

constrained to zero across five waves while all other associations remain the same. Condition 4 is met if the fit does not improve significantly when the unconstrained model of mediation is compared to the constrained model of mediation using chi-square tests. Note that in all these models, we controlled for the reverse direction of effects by letting communication predict similarity and further let friendship intensity predict communication at each wave. We will examine these conditions separately for actual similarity, perceived similarity, and peer-rated similarity effects on friendship intensity.

### 5.3 Results

#### *Descriptives*

Table 5.2 shows the means and standard deviations of all variables (self-ratings on friendship intensity, communication, all Big Five traits, perceived similarity, actual similarity, as well as peer-rated similarity) across five waves. Repeated-measure analyses were run to check whether there were mean-level changes in these variables. Whereas friendship intensity significantly increased over time ( $F(4, 201) = 933, p < .01$ ), communication significantly declined over time ( $F(4, 201) = 1164, p < .01$ ). This suggests that on average, individuals became more befriended with each other over time, but communicated less with each other over time. All other variables showed mean level stability across the four-month period.

Table 5.2

*Descriptives of Single-item Big Five Traits, Communication, Friendship Intensity over Four Months*

	Wave 1		Wave 2		Wave 3		Wave 4		Wave 5	
	M	S	M	SD	M	SD	M	SD	M	SD
Friendship Intensity	2.73	1.21	2.74	1.10	2.74	1.24	2.77	1.22	2.78	1.23
Communication	3.31	1.62	3.22	1.64	3.01	1.65	2.88	1.66	2.67	1.78
Openness	4.60	1.29	4.63	1.31	4.61	1.28	4.60	1.29	4.62	1.31
Conscientiousness	4.75	1.39	4.74	1.35	3.76	1.38	3.36	1.37	4.74	1.36
Extraversion	4.79	1.34	4.81	1.33	4.82	1.25	4.83	1.30	4.80	1.29
Agreeableness	5.13	1.04	5.14	1.03	5.13	1.03	5.12	1.02	5.13	1.03
Neuroticism	3.63	1.31	3.65	1.38	3.67	1.36	3.65	1.33	3.64	1.34
Perceived similarity	.55	.43	.53	.49	.54	.48	.54	.53	.55	.52
Actual similarity	.33	.44	.32	.42	.33	.23	.31	.22	.33	.54
Peer-rated similarity	.42	.51	.41	.54	.43	.60	.44	.60	.44	.57

*Note.* All similarity scores range from -1 (dissimilar profiles) to 1 (similar profiles). *Perceived similarity*= Similarity in ratings of Person A's self-reported Big Five scores and Person A's ratings of Person B's Big Five scores; *Actual similarity*= Similarity between Person A's self-rated Big Five scores and Person B's self-rated Big Five scores. *Peer-rated similarity*= Peers' ratings of Person A's Big Five scores and peers' ratings of Person B's Big Five scores.

### *Concurrent Associations between Different Types of Similarity and Friendship Intensity*

Through the use of the multilevel module in SPSS 12.0, bivariate multilevel correlations between the different types of similarity and friendship intensity were obtained for the first wave (see Table 5.3). Friendship intensity showed positive correlations with all types of similarity. The similarity indices themselves showed positive but low correlations with each other, suggesting that they partially overlap but reflect different types of similarity in personality. This suggests that peer-rated similarity in the current study is not merely another index of actual similarity as measured by self-reports.

Table 5.3

#### *T1 Correlations between Friendship Intensity, Perceived Similarity, Actual Similarity, Peer-Rated Similarity, and Communication*

	Perceived similarity	Actual similarity	Peer-rated similarity	Commun- ication
Perceived similarity	-			
Actual similarity	.23**	-		
Peer-rated similarity	.22**	.19**	-	
Communication	.26**	.05**	.17**	-
Friendship intensity	.25**	.06**	.14**	.74**

\*  $p < .05$ ; \*\*  $p < .01$

Table 5.4

*Multivariate Beta-Weights Indicating the Associations between Similarity and Friendship Intensity at Wave 1*

	Friendship intensity
Sex (0 = male, 1 = female)	.02
Cross-gender (0 = same-gender, 1 = cross-gender)	-.08***
Age	.00
Perceived similarity	.29***
Actual similarity	.01
Peer-rated similarity	.14***

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

*Unique Associations of Perceived Similarity, Actual similarity, and Peer-rated similarity with Friendship Intensity*

To examine the unique associations of perceived similarity, actual similarity, and peer-rated similarity with friendship intensity, each of the types were entered simultaneously in a multilevel regression analysis, while controlling for effects of focal participant's age, gender, and the gender composition of the dyad (i.e., same-gender versus cross-gender). The fit of this model was adequate:  $\chi^2 = 104.22$ ,  $df = 16$ ,  $p < .01$ ; CFI = .99; RMSEA = .03. Results are shown in Table 5.4. The first three hypotheses were confirmed: higher perceived similarity and higher peer-rated similarity were associated with higher friendship intensity. Furthermore, actual similarity was not uniquely associated with friendship intensity. Finally, same-gender dyads reported higher friendship intensity than cross-gender dyads. No gender and age effects on friendship intensity were found.

*Addressing Alternative Explanations*

To examine whether actual similarity based on single items has equivalent associations with friendship intensity compared to actual similarity based on the (more reliable) BFI, we replaced the former similarity index by the latter similarity index in the multilevel regression analysis. The association of unique actual similarity based on the BFI with friendship intensity ( $\beta = .02, p > .05$ ) was equivalent to the association of unique actual similarity based on the single items with friendship intensity. Thus, the null associations between friendship and unique actual similarity was not due to measurement of the Big Five with single items.

To examine whether including only perceptions of one single rater of friendship intensity affected the associations between perceived similarity and friendship intensity, we ran regression analyses in which we replaced the dependent variable of friendship intensity as reported by the focal individual by friendship intensity as reported by both dyadic partners (i.e., computed as the mean of these two scores). Results showed equivalent effects of perceived similarity ( $\beta = .25, p > .001$ ), actual similarity ( $\beta = .02, p > .05$ ), and peer-rated similarity ( $\beta = .12, p < .05$ ) on friendship intensity. In addition, using scores of the partners' perception on friendship intensity show a similar pattern of results. Thus, associations of perceived similarity and peer-rated similarity with friendship intensity seem to be relatively unaffected by intra-individual reporting biases.

Finally, to examine whether perceived similarity or peer-rated similarity effects suppress associations between actual similarity and friendship intensity, we first omitted peer-rated similarity from the original analysis while keeping all other variables in, followed by omitting only perceived similarity. Results showed that whereas omitting only perceived similarity from these analyses revealed

a significant association between actual similarity and friendship intensity ( $\beta = .05, p < .05$ ), omitting peer-rated similarity from the analysis did not produce an association between actual similarity and friendship intensity. This suggests that the (small) bivariate association between actual similarity and friendship intensity is completely accounted for by subjective perceptions of similarity. In contrast, the variance shared by peer-rated and actual similarity (i.e., the variance tapping into actual similarity that is agreed upon by self and peers) does not seem to be associated with friendship intensity.

*Cross-lagged Longitudinal Associations between Perceived Similarity, Actual Similarity, Peer-rated similarity, Friendship Intensity, and Communication*

The longitudinal associations between perceived similarity, actual similarity, peer-rated similarity, and friendship intensity across five monthly intervals were examined in a cross-lagged multilevel model in Mplus. To examine bidirectional associations between the three types of similarity and friendship intensity, the effect of each of the three types of similarity on friendship intensity at each subsequent wave was estimated. At the same time, the effect of friendship intensity on the three types of similarity at each subsequent wave was estimated. We controlled for within-wave correlations and stability paths. To examine the unique effects of and on actual, perceived, and peer-rated similarity, within-wave associations and bidirectional longitudinal associations between these three types of similarity were simultaneously estimated. The fit indices indicated that the model provided a close fit to the data:  $\chi^2 = 911.27, df = 473, p < .01$ ; CFI = .98; RMSEA = .02.

Table 5.5 shows all associations in the cross-lagged multilevel model. The concurrent correlations show the same pattern as found

in the bivariate correlations: whereas higher perceived similarity and peer-rated similarity were associated with higher friendship intensity, actual similarity was not. Table 5.5 shows that the within-wave correlations between all variables became smaller across waves. This can be partially explained by the design of the cross-lagged model: because each within-wave correlation was controlled for the previous concurrent correlations as well as prior stability paths, the variance to be explained at each subsequent wave becomes smaller.<sup>6</sup> Stability paths increased from Wave 1 to Wave 3, but remained at the same level from Wave 3 onwards. Confidence intervals of the stability paths indicated that whereas high stability for friendship intensity and peer-rated similarity were found across all waves, perceived similarity and actual similarity showed significantly ( $p < .05$ ) lower stability from the first to the last waves, respectively.

Hypothesis 4 was confirmed: the cross-lagged associations revealed that higher perceived similarity predicted higher friendship intensity one month later, while at the same time higher friendship intensity predicted higher perceived similarity one month later, respectively. This pattern of results was found consistently across all five waves. Hypothesis 5 was also confirmed: actual similarity and friendship intensity were not significantly associated at any of the waves. Hypothesis 6 was partly confirmed: higher peer-rated similarity predicted higher friendship intensity over time. Nevertheless, the

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<sup>6</sup> Because one disadvantage of modelling all five waves is that the variance to be explained in the later waves becomes smaller (see Table 3), we additionally modelled bidirectional associations between Wave 1 and Wave 5 of perceived, actual, and peer-rated similarity with friendship intensity. The same pattern of results emerged. Whereas perceived similarity and peer-rated similarity at Wave 1 predicted higher friendship intensity at Wave 5, actual similarity did not predict friendship intensity. Further, friendship intensity at Wave 1 predicted higher perceived similarity at Wave 5.

Table 5.5

*Associations between Friendship Intensity, Perceived Similarity, Actual Similarity, and Peer-Rated Similarity across Five Waves*

	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5
<i>Within-wave correlations</i>					
Actual similarity $\leftrightarrow$	.02	.03	.00	.00	.00
Friendship intensity					
Perceived similarity	.10***	.08***	.06***	.04	.02
$\leftrightarrow$ Friendship intensity					
Peer-rated similarity	.04***	.05***	.05***	.00	.00
$\leftrightarrow$ Friendship intensity					
Perceived similarity	.13***	.10***	.07**	.09***	.06***
$\leftrightarrow$ Actual similarity					
Actual similarity	.02	.01	.02	.00	.00
$\leftrightarrow$ Peer-rated similarity					
Perceived similarity	.26***	.09***	.04	.02	.03
$\leftrightarrow$ Peer-rated similarity					
<i>Stability paths</i>					
Actual similarity	-	.34***	.47***	.54***	.56***
Perceived similarity	-	.29***	.45***	.44***	.48***
Peer-rated similarity	-	.78***	.85***	.86***	.85***
Friendship intensity	-	.72***	.80***	.80***	.82***
<i>Cross-lagged paths</i>					
Actual similarity $\rightarrow$	-	.08***	.05***	.04**	.06**
Perceived similarity					
Actual similarity $\rightarrow$ Peer-rated similarity	-	.09***	.03	.00	.01
Actual similarity $\rightarrow$	-	.01	.00	.00	.00
Friendship intensity					

*Table 5.5 continues*

*Table 5.5 continued*

	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5
Perceived similarity →	-	.09***	.07***	.04**	.05**
Actual similarity					
Perceived similarity →	-	.07***	.03	.06***	.02
Peer-rated similarity					
Perceived similarity →	-	.06***	.04**	.05**	.06***
Friendship intensity					
Peer-rated similarity →	-	.12***	.08***	.03	.15***
Actual similarity					
Peer-rated similarity →	-	.18***	.12***	.10***	.13***
Perceived similarity					
Peer-rated similarity →	-	.06***	.07***	.05***	.04**
Friendship intensity					
Friendship intensity →	-	-.02	.00	.02	.01
Actual similarity					
Friendship intensity →	-	.07***	.09***	.15***	.12***
Perceived similarity					
Friendship intensity →	-	.00	.01	.02	.01
Peer-rated similarity					

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

second part of Hypothesis 6 was not confirmed: friendship intensity did not predict subsequent peer-rated similarity. Different types of similarity also had effects on each other over time: first, higher perceived similarity predicted higher actual similarity over time, while at the same time higher actual similarity predicted higher perceived similarity over time at all waves. Second, perceived similarity predicted higher peer-rated similarity from Wave 1 to Wave 2 and from Wave 3 to Wave 4, indicating that as individuals perceived more similarity, peers also began to perceive more similarity. The reverse is also true: higher peer-rated similarity predicted higher perceived

similarity at all waves. Higher peer-rated similarity also predicted higher actual similarity from Wave 1 to Wave 2. As perceived similarity subsequently predicted higher friendship intensity at each wave, both actual similarity and peer-rated similarity had indirect effects on friendship intensity through perceived similarity. That is, as dyad partners increased in actual similarity and peer-rated similarity, they ended up perceiving more similarity themselves. This, in turn, predicted increases in friendship intensity over time.

*Mediation of Communication: Perceived Similarity and Peer-rated Similarity Effects on Friendship Intensity*

The fourth column of Table 5.3 shows the initial correlations of communication with different types of similarity and friendship intensity. Consistent with assumptions for the mediational models, communication was significantly positively correlated with perceived similarity, peer-rated similarity and friendship intensity at Time 1. To test whether communication mediated the longitudinal effects of perceived similarity and peer-rated similarity on friendship intensity, necessary for full mediation for each similarity type separately.

*Peer-rated similarity.* To test Hypothesis 7, we created a mediation model of communication for effects of peer-rated similarity on friendship intensity. Fit indices of this model again indicated a close fit to the data (CFI's > .98; RMSEA's < .02). In Figure 5.1, the conceptual model of communication as mediator of peer-rated similarity effects on friendship intensity is shown. The first condition of partial mediation was met: peer-rated similarity predicted more communication over time at each wave (paths B:  $\beta = .04-.05$ ,  $p < .01$ ). Higher communication in this model predicted higher friendship intensity at all waves (Paths C:  $\beta = .24-.29$ ,  $p < .01$ ), confirming

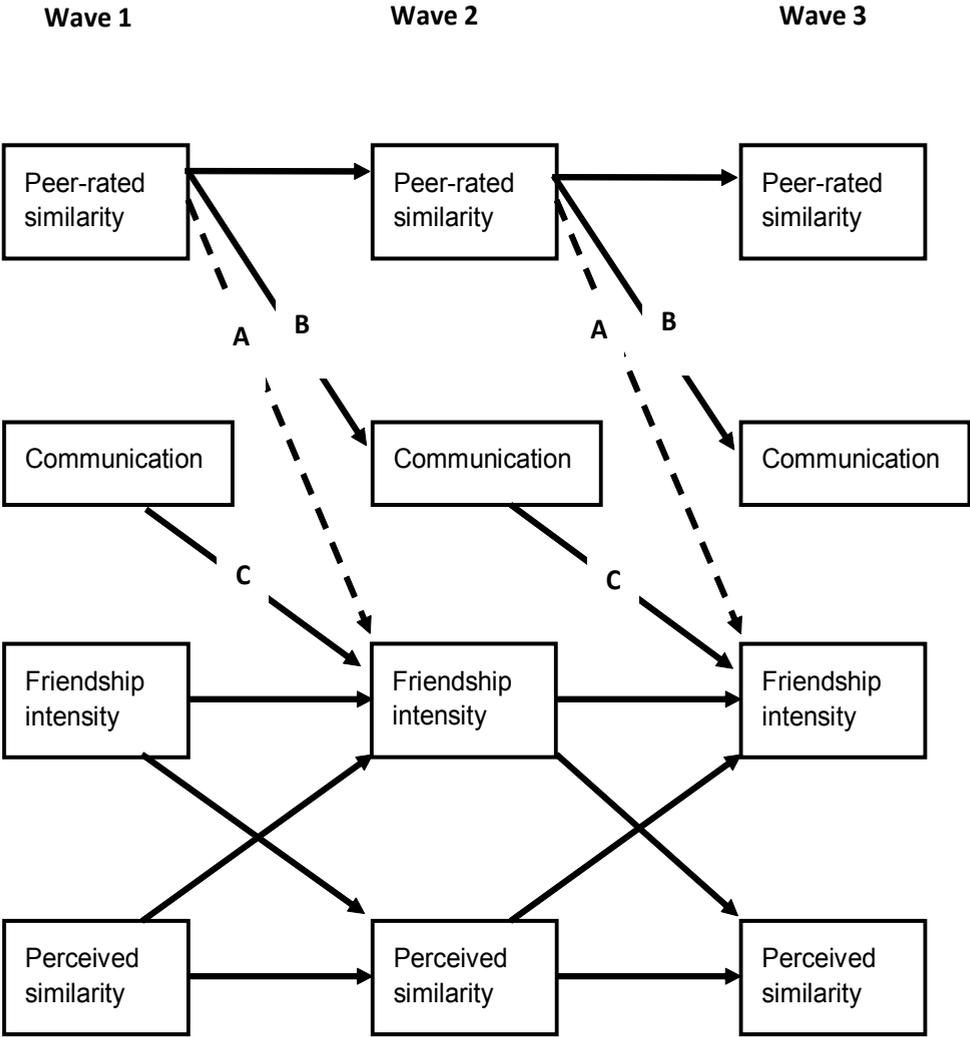
the second condition for partial mediation. The third condition of partial mediation was also met: effects of peer-rated similarity on subsequent friendship intensity became significantly ( $p < .05$ ) smaller after controlling for effects of communication on friendship intensity (Paths A:  $\beta = .00-.01$ ,  $p > .05$ ), with one exception: the association between peer-rated similarity at Wave 4 and friendship intensity at Wave 5 ( $\beta = .05$ ,  $p < .01$ ) did not become significantly smaller.

The additional fourth condition for full mediation was also met for the first four waves: the fit of the constrained model (the model in which all effects between waves 1 to 4 of peer-rated similarity on friendship intensity were constrained to zero ( $\chi^2 = 924.46$ ,  $df = 473$ ) did not significantly differ from the fit of unconstrained model (the model in which effects of peer-rated similarity on friendship intensity from Wave 1 to Wave 4 were left unconstrained ( $\chi^2 = 912.53$ ,  $df = 477$ ):  $\Delta\chi^2 = 12.6$ ,  $\Delta df = 4$ ,  $p > .05$ ). Thus, in line with Hypothesis 7, these results support the full mediation model of communication in the effects of peer-rated similarity on friendship intensity from Wave 1 to Wave 4: as individuals were perceived as more similar by their peers, they tended to communicate more often, which, in turn, predicted higher friendship intensity over time. Nevertheless, by the fourth month of the acquaintanceship process, higher peer-rated similarity also directly predicted higher friendship intensity.

*Perceived similarity.* To test Hypothesis 8, we created a mediation model of communication for effects of perceived similarity on friendship intensity. Fit indices of this model were all satisfactory (CFI's  $> .96$ ; RMSEA's  $< .03$ ). The first condition of partial mediation was not fully met: effects of perceived similarity on subsequent communication were inconsistent, because perceived similarity predicted more communication only from Wave 1 to Wave 2 ( $\beta = .08$ ,  $p < .01$ ). Although the second condition of partial mediation was met

(effects of communication on later friendship intensity ranged from  $\beta = .23-.28$ ,  $p < .001$ , between Waves 1 and 5; Paths C in Figure 5.1), examining confidence intervals showed that perceived similarity effects on friendship intensity did not significantly ( $p < .05$ ) reduce in size. Thus, Hypothesis 5 was not confirmed: communication did not mediate effects of perceived similarity on friendship intensity.

*Actual similarity.* Because no effects of actual similarity on friendship intensity were found, Condition 3 of mediation was not met.



*Figure 5.1.* Conceptual model of longitudinal effects between perceived similarity, peer-rated similarity, communication, and friendship intensity. Although paths between only three waves are shown in this conceptual model, all five waves were estimated simultaneously. Effects shown in this figure were consistently found over all five waves. Dotted lines indicate that after controlling for effects of communication on friendship intensity, effects of peer-rated similarity on friendship

intensity disappeared. Within-wave and longitudinal associations between different similarity indices were estimated but are not shown in this figure.

## 5.4 Discussion

The purpose of this study was to examine both the concurrent and the bidirectional longitudinal associations between perceived similarity, actual similarity, and peer-rated similarity, and friendship intensity during acquaintanceship process. In the following, we will discuss results for the three different types of similarity, as well as the extent to which communication acts as a mechanism behind similarity effects on friendship intensity.

### *Perceived Similarity and Friendship Intensity*

The first part of the results showed that greater perceived similarity in personality was uniquely associated with more friendship intensity for freshly acquainted individuals. The current study thus offers support for the claim that perceived similarity effects on friendship intensity work very fast and early in the acquaintanceship phase (Sunnafrank & Ramirez, 2004). Although prior studies have shown cross-sectional associations between perceived similarity in values and attraction to bogus strangers (e.g., Byrne, 1971), the current study expands these findings by showing that perceived similarity in personality is associated with higher friendship intensity for real individuals in a naturalistic setting. In addition, prior findings were expanded by showing that associations of perceived similarity and friendship intensity exist even when controlling for actual similarity as indicated by self- or peer-ratings of each dyad member's personality. In other words, it seems that if people have the illusionary perception

of being similar to others (Murray et al., 2005), they are more likely to be friends with them, regardless of whether individuals actually are more similar in personality.

Additionally, results showed bidirectional longitudinal associations between perceived similarity in personality and friendship intensity. On the one hand, individuals who are more befriended with each other increasingly seem to *perceive* that they are similar in their personality profiles. This result is consistent with findings showing that in existing friendships, higher satisfaction predicted subsequent higher perceptions of similarity in personality (Morry, 2005, 2006). Our study expands these findings by showing that this not only the case for existing friendships, but also for freshly acquainted individuals in a real-life setting. This is consistent with Balance Theory (Heider, 1958): because similarities between individuals are believed to be inherent to relationships, any dissimilarity may cause a cognitive imbalance that is countered by illusions of similarity (Morry, 2005).

On the other hand, higher perceived similarity in personality predicted higher friendship intensity over time. This finding is consistent with earlier studies showing that perceived similarity in values predicts higher attraction to bogus strangers (Hoyle, 1993) and higher friendship intensity between freshly acquainted undergraduates (Sunnafrank & Ramirez, 2004). The current study extends prior findings by indicating that, next to perceived similarity in values, perceived similarity in personality traits also effects friendship intensity. Findings are also in line with research on assortative mating, in which perceived similarity in personality, and not actual similarity in personality, has been found to be associated with higher relationship satisfaction over six weeks (Murray et al., 2005). As indicated before, people seem to make an estimate of similarity on the first encounter and tend to believe these first impressions affect the way people will interact in the future (Berg &

Clark, 1986; Sunnafrank & Ramirez, 2004).

Several explanations previously applied to actual similarity effects on attraction may apply to perceived similarity effects on attraction. For example, the reinforcement-affect explanation could be taken to suggest that perceptions of similarity between oneself and others work as a reinforcement of the opinions, views, and feelings one holds on the world, and therefore perceived similarity triggers an implicit affective response that increases attraction (Clore & Byrne, 1974). As no support was found for mediation of communication of the association between perceived similarity and friendship intensity, explanations focusing on communication do not seem to apply to perceived similarity effects on friendship intensity (Berscheid & Walster, 1978).

### *Actual Similarity and Friendship Intensity*

Results from this study show that actual similarity is not uniquely associated with friendship intensity for just-acquainted individuals, thus providing no support for Uncertainty Reduction Theory (Berger & Calabrese, 1975) and the reinforcement-affect explanation (Clore & Byrne, 1974; Izard, 1960) regarding actual personality similarity effects on attraction during the acquaintanceship process. Results showed that when controlling for perceived similarity, associations between actual similarity and friendship intensity disappeared. In a similar vein, longitudinal analyses revealed no bidirectional longitudinal associations between friendship intensity and actual similarity: thus, actual personality similarity was also not associated with friendship intensity during later phases of acquaintanceship.

*Peer-Rated similarity and Friendship Intensity*

Concerning unique associations between peer-rated similarity and friendship intensity, we found that as peers perceive similarity in personality between two individuals, these individuals tend to be more befriended, even if these individuals are only freshly acquainted. Moreover, because we controlled for effects of other similarity types on friendship intensity, the current study provides evidence for *unique* peer-rated similarity effects: similarity perceived by peers is associated with more friendship intensity, over and above associations of idiosyncratic perceptions of similarities and actual similarity (as indicated by independent self-reports) with friendship intensity.

Results provide more insight in the direction of causality between these associations. Support was found for Social Comparison Theory (Festinger, 1954) in that peer-rated similarity directly predicted friendship intensity, but only after three months of getting acquainted (peer-rated similarity also predicted higher friendship intensity before these three months, but this effect disappeared after controlling for communication). It may be that the group as a whole has to develop a certain coherence to be able to influence individuals' behaviors. For example, only from the *norming* stage onwards does the group create certain group norms that affect individuals' behaviors (Tuckman, 1965; Tuckman & Jensen, 1977). Similarity between befriended individuals may become such a peer norm and individuals may directly conform to this norm by seeking out friends that peers view as similar to them in personality. Future studies should address whether the stages of groups and consensus among peers concerning personality moderate the effects of peers' perceptions on friendship intensity.

Our study provides evidence for communication as a possible mechanism explaining *how* peer-rated similarity affects friendship

intensity. To this purpose, we examined the role of communication in mediating the link between peer-rated similarity and friendship intensity. Peer-rated similarity indirectly affected friendship intensity from the start of the study onwards by exerting an influence on communication behavior. That is, even as individuals are just becoming acquainted, higher perceptions of similarity by peers predicted more communication over time between these individuals, which in turn predicted increases in friendship intensity over time.

There are at least two ways in which peer perceptions of similarity may affect communication. Peer-rated similarity in personality may pertain to different aspects of actual personality traits than the current construct labelled “actual similarity” according to self-ratings (Hofstee, 1994). That is, both self-ratings and peer-ratings may be valid indicators of actual similarity between individuals, but peers may report certain aspects of personality traits that individuals themselves cannot or will not report. The previously mentioned theoretical explanations regarding actual similarity effects on attraction could therefore apply to peer-rated similarity effects on attraction as well. For example, in line with Uncertainty Reduction Theory, higher peer-rated similarity may increase the predictability of a conversation between two individuals and thereby increase attraction. In line with the notion that self-ratings and peer-ratings of similarity pertain to different constructs, concurrent associations between actual similarity and peer-rated similarity were small. Moreover, additional analyses found that peer-rated similarity did not suppress associations between actual similarity and friendship intensity. This suggests that peer-rated similarity is not a substitute for actual similarity according to self-ratings and has its own unique effects on friendship intensity through communication.

Alternatively, communication might be directly affected by peers’ behaviors. Social Comparison Theory claims that individuals

conform to views of peers and adjust their behaviors accordingly. That is, peers may provide certain individuals with more opportunities to communicate by spending more or less time with these individuals themselves (Williams et al., 1998). Further, peer norms about which individuals should be friends might be transferred to individuals' own perceptions about who they should become friends with (Baron & Kerr, 2003; LaRocco, 1985), thereby guiding their communicative behaviors. This way, peers' expectations that "birds of a feather flock together" may create a press for individuals to befriend those who are perceived as similar and shun those who are perceived as dissimilar. According to the current study, one effective way peers can do this is by increasing or decreasing communication between individuals. Future studies should examine what types of peer behaviors influence individuals' communicating behaviors that in turn affect the formation of friendships.

Note that although communication and friendship intensity were highly correlated across waves in the current study, research suggests that these two variables pertain to different constructs. Conceptually, it seems that although friends tend to communicate frequently, frequent communication between two individuals does not necessarily indicate friendship. For example, research suggests that more hostile relationships, such as relationships between bullies and their victims, are also characterized by frequent interaction (Veenstra et al., 2007). Further, the current study showed that whereas mean levels of friendship intensity increased over time, mean levels of communication decreased over time. This suggests that overall, freshmen in this study became more befriended, but at the same time became more selective with whom they communicated. Moreover, communication and friendship intensity differentially predicted and were differentially predicted by other constructs. For example, although perceived similarity and friendship intensity

were bidirectionally associated across waves, perceived similarity only predicted more communication from Wave 1 to Wave 2, and communication did not predict perceived similarity across time.

The current study also offered a unique possibility to examine indirect effects of actual and peer-rated similarity through perceived similarity on friendship intensity. Regarding the former, there were no direct longitudinal effects of actual similarity on friendship intensity. Therefore, it seems that perceived similarity does not mediate effects of actual similarity on friendship intensity. However, because actual similarity consistently predicted perceived similarity, it seems that actual similarity between individuals increases perceptions of similarities in personality (Hoyle, 1993). This, in turn, seems to enhance friendship intensity over time. Peer-rated similarity also predicted higher perceived similarity at all waves, indicating that peers' perceptions on similarity in personality traits may affect individuals' own perceptions. As perceived similarity subsequently predicted higher friendship intensity, peers seem to indirectly affect friendship intensity through individuals' perceptions.

The current study deals with similarity in personality, and the question arises whether results are generalizable to similarity in other domains. Prior research has shown that actual similarity in values within friendships is even lower than actual similarity in personality (Tolson & Urberg, 1993) and actual similarity in values is not associated with attraction to bogus strangers (Hoyle, 1993). In contrast, studies have shown bidirectional associations between perceived similarity in values and attraction (Morry, 2006; Sunnafrank & Ramirez, 2004). It seems likely that similar results would have been found regarding similarity in values and friendship intensity, though it remains unclear to what extent these findings are generalizable to peer-rated similarity in values, or similarity in other domains such as problem behaviors (Tolson & Urberg, 1993) and

leisure activities (Selfhout, Branje, Ter Bogt, & Meeus, 2009).

One limitation of the current study is the reliance on a relatively highly educated sample, consisting primarily of female students. This may have limited the choices people could make of potential friends, because similarity in demographical traits of individuals may affect friendship selection (see Gilson, Hunt, & Rowe, 2001). On the other hand, because social homogeneity (i.e., individuals tend to form friendship with others that are similar to them in social background) is a pervasive fact of life, the high similarity in social background in the current study may form a realistic setting in which individuals usually form friendships. Further, we controlled for gender effects, age effects, and gender composition of the dyad effects on friendship intensity and still found direct effects of perceived similarity and indirect effects of peer-rated similarity on friendship intensity. Notwithstanding, future studies should investigate the possible effect of social homogeneity by examining just-acquainted individuals from various demographical backgrounds.

Another limitation of the current study is that effect sizes found in this study were relatively small, implying that other factors may also be important when getting acquainted. For example, appearances (Sprecher & Regan, 2002; Zakin, 1983), initial expected outcome of the relationship (Sunnafrank & Ramirez, 2004), and practical limitations such as the possibilities to interact frequently (Haynie & Osgood, 2005) have been indicated to affect friendship selection. Nevertheless, results were found irrespective of intra-individual biases, such as reporting on both friendship intensity and similarity, and even more importantly, the pattern of results was found consistently across five waves, suggesting that these relatively small effects of similarity in personality may act in a cumulative way to predict friendship intensity over time.

To conclude, the current study provides insight in the

similarity-attraction link in several ways. First, specific types of similarity in personality were associated with more friendship intensity for just-acquainted individuals in a naturalistic setting, suggesting that similarity is associated with attraction already during early phases of acquaintanceship and can be generalized to real-time situations. Further, the current results reinforce the need to use a multiple informant design when studying the similarity-attraction link because only perceived similarity and peer-reported similarity in personality were associated with more friendship intensity, whereas actual similarity in personality was not. Moreover, through the use of a longitudinal design, insight was provided in the direction of causality between similarity and attraction: perceived similarity and peer-rated similarity seem to enhance friendship formation, and being befriended seems to enhance perceptions of similarity. Finally, processes underlying effects of peer-rated similarity on friendship intensity were studied: peer perceptions of similarity in personality seem to affect individuals' communicative behaviors, which in turn affect friendship formation.



## **Chapter 6.**

### **Depression and Friendship Quality<sup>7</sup>**

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<sup>7</sup> Selfhout, M., Branje, S., & Meeus, W. (2009). Developmental trajectories of perceived friendship intimacy, constructive problem solving, and depression from early to late adolescence. *Journal of Abnormal Child Psychology*, 37, 251-264.

### **Abstract**

This study examined friendship types in the developmental trajectories of perceived closeness and balanced relatedness. In addition, differences between friendship types in the development of constructive problem solving and depression were examined. Questionnaire data of five annual waves were used from two adolescent cohorts (cohort 1:  $M = 12.41$  years; cohort 2:  $M = 16.37$  years). Growth Mixture Modelling revealed two developmental trajectories of perceived friendship intimacy: interdependent and disengaged friendships. Adolescents in interdependent friendships were characterized by high perceived closeness and balanced relatedness across adolescence. Whereas girls in disengaged friendships showed no increase in perceived balanced relatedness, boys in disengaged friendships and adolescents in interdependent friendships did. Furthermore, adolescents in disengaged friendships had lower levels of and smaller increases in constructive problem solving. Girls in disengaged friendships reported more depression.

## 6.1 Introduction

Intimate friendships first appear during early adolescence, primarily because the ability to balance closeness and individuality in their friendships does not emerge until this period (Selman, 1990). Intimacy may be critical in differentiating friendship types in adolescence. Adolescents who experience less intimate friendships may develop less constructive ways to resolve conflicts in friendships (e.g., Shulman, Elicker, & Sroufe, 1994) and may be at risk for developing depression (e.g., Shulman & Laursen, 2002). Nevertheless, more research is needed to examine different developmental trajectories of friendship intimacy, as well as differences between friendship types in developmental trajectories of conflict resolution and depression. The current study examines whether different friendship types can be distinguished based on developmental trajectories of perceived friendship intimacy from early to late adolescence (for boys and girls separately). Furthermore, differences between these friendship intimacy types in the developmental trajectories of perceived constructive problem solving and depression across adolescence will be examined.

### *Perceptions of Friendship Intimacy in Adolescence*

Several developmental theories emphasize a balance between two characteristics of intimacy in relationships as crucial for optimal development: closeness and individuation. Closeness refers to the interpersonal processes whereby friends feel bonded to each other (Reis & Shaver, 1988). Individuation refers to the process by which social individuals become differentiated one from the other and has been described as a hallmark of the developing adolescent (Sullivan, 1953). At least three theoretical perspectives emphasize a role of

both closeness and individuality. Attachment theory (Bowlby, 1973) suggests that optimal adaptation within close relationships involves use of a partner not only as a source of closeness, but also as a secure base for individual exploration. In a similar vein, theories concerning closeness and individuation (Grotevant & Cooper, 1986) suggest that normative development across adolescence is characterized by maintaining close relationships with parents and peers while at the same time increasing individuation. Individuation emerges gradually during adolescence, as adolescents strive to distinguish themselves from both parents and peers (Grotevant & Cooper, 1998). Furthermore, theories dealing with parenting practices (Baumrind & Black, 1967) suggest that providing warmth as well as encouraging children's psychological autonomy is associated with positive developmental outcomes.

Although these theories primarily deal with parent-adolescent and partner relationships, closeness and individuation also seem to characterize cognitive representations or perceptions of intimacy in adolescent friendships (Selman, 1990). The co-development of perceived closeness and individualization is at the basis of developing healthy relationships with friends (Selman, 1990), and is a key developmental task for adolescent friendships to become fully mature (Santrock, 1996). Selman defined two developmental levels of intimacy from late childhood to late adolescence. First, during late childhood and early adolescence, closeness is expressed by sharing experiences with regard for the other's opinion but still primarily for the sake of each person's own satisfaction, without a strong sense of interconnecting. Individuality is negotiated by using cooperative strategies but in a persuasive manner, with a focus on individual needs. Therefore, perceived closeness and individuality are still relatively low in early adolescence compared to middle and late adolescence. Second, from middle adolescence onwards,

closeness is expressed by sharing emotions with regard to individuals' own feelings and thoughts as well as friend's feelings and thoughts. Individuality is negotiated through collaborative strategies oriented towards integration of needs of the self and the other. Thus, perceived closeness and individuality in friendships both increase from middle adolescence onwards.

Shulman and Knafo (1997) partially adopted Selman's developmental model to explain the development of perceptions of intimacy specifically during adolescence and also proposed that the transition in friendship intimacy from a focus on the self to a focus on both friends takes place around middle adolescence. However, they identified at least two friendship types that differ in this development: interdependent and disengaged friendships. They focused on one important aspect of perceived individuality in adolescent friendships: balanced relatedness, or the extent to which an adolescent feels that his or her friend accepts his or her opinions, wishes, and needs (Shulman & Knafo, 1997).

Already in early adolescence, adolescents in disengaged friendships are thought to feel less emotionally close to their friends than adolescents in interdependent friendships, because they view dependence on friends as a sign of weakness. During middle adolescence, interdependent friends develop an awareness of each other's needs, and therefore feel that their individuality is accepted more by their friends than adolescents in disengaged friendships. As a consequence, they resolve conflicts through taking into account opinions, needs, and wishes of both themselves and their friends. In addition, interdependent friends remain more emotionally close to each other than disengaged friends. In late adolescence, both perceived closeness and balanced relatedness remain higher for adolescents in interdependent friendships compared to adolescents in disengaged friendship. Thus, according to this model, adolescents

in interdependent friendships perceive higher closeness from early adolescence onwards and higher balanced relatedness from middle adolescence onwards compared to adolescents in disengaged friendships.

A series of experiments (Shulman, 1993; Shulman & Knafo, 1997; Shulman & Laursen, 2002) have focused on these two types of friendships by examining adolescent best friends who performed a joint card sorting task, first individually, and then working together. Best friends were then classified on both the extent to which their interaction improved problem solving on the card sorting task, and the extent to which friends worked together. Early and middle adolescents who improved much when interacting and also collaborated much were classified as interdependent friends, and those low on these characteristics were classified as disengaged friends. Around half were interdependent friends and the other half were disengaged friends. During middle adolescence, disengaged friends perceived lower closeness and balanced relatedness than interdependent friends (Shulman & Knafo, 1997). Another study used cluster analyses on perceived friendship characteristics and found adolescents in disengaged friendships based on reports of low closeness, intimacy, companionship, and satisfaction, whereas three other groups were found with higher scores on these dimensions (Way, Cowal, Gingold, Pahl, & Bissessar, 2001). Because one indicator of perceived closeness, namely perceived closeness, most clearly differentiates between disengaged and other types of friendship (Way et al., 2001), we will focus on perceived closeness.

It may seem contradictory that adolescents in disengaged friendships are not emotionally close to their best friend, and also report that they feel that their friend does not accept their individuality: why would they worry about their individuality if their friend is not close to them? Nevertheless, when adolescents feel low closeness,

they might still wish that their individuality is accepted by their friend and might even faster perceive their friend as a threat to their individuality (Shulman et al., 1994). Research shows that in family and peer relationships, higher closeness is associated with higher balanced relatedness (Hodges et al., 1999). Therefore, adolescents in disengaged friendships experience low closeness and still seem to be concerned with whether their friend accepts their individuality.

Related to this point, Shulman (1993) has suggested that there also might be an enmeshed type of friendship: these adolescents perceive high closeness to their friends and at the same time perceive that their friend does not accept their individuality, because individuals are too concerned about keeping their friends close. However, in all of the experimental studies discussed above, individuals either could not be classified in this category or less than 2% of all individuals were classified in this category.

Thus, taken together, it seems that at least two friendship types exist in adolescence: adolescents in interdependent friendships, with higher levels of closeness and balanced relatedness, and adolescents in disengaged friendships, with lower levels of closeness and balanced relatedness. Nevertheless, these findings still leave open the question whether interdependent and adolescents in disengaged friendship can be distinguished based on the developmental pathways of closeness and balanced relatedness from early to late adolescence.

Contradictory evidence exists about gender differences in the proportions of adolescents in interdependent and disengaged friendships. Whereas some studies showed similar proportions of early adolescent boys and girls in the two friendship types (Shulman, 1993, 1995; Shulman & Knafo, 1997), others found that in early adolescence, boys were more likely to be in the disengaged group than girls (Shulman & Laursen, 2002; Way et al., 2001). Furthermore, girls have been shown to perceive higher closeness (e.g., Furman

& Buhrmester, 1992; Tse & Cheng, 2006) and higher balanced relatedness (Shulman & Knafo, 1997) in their best friendships than boys, suggesting that more girls may be presented in interdependent friendships than in disengaged friendships. Thus, gender differences in the proportion of adolescents in interdependent and disengaged friendships remain unclear.

### *Friendship Types and Constructive Problem Solving*

Over the course of adolescence, adolescents increasingly learn to use constructive problem solving, or to negotiate between their own views and views of others, during conflicts with best friends (Laursen, 1993). A meta-analysis of problem solving styles showed that constructive problem solving is one of the most commonly used tactics to resolve conflicts in friendships, and that constructive problem solving increases from childhood to adulthood (Laursen, Finkelstein, & Betts, 2001). Developmental models of friendship intimacy propose that differences in development of perceived closeness and balanced relatedness are mainly expressed in different developmental trajectories of constructive problem solving during conflicts (Selman, 1990; Shulman & Laursen, 2002). From middle adolescence onwards, adolescents are thought to increase in constructive problem solving (Selman, 1990), and there are assumed to be differences in these developmental trajectories between interdependent and disengaged friends (Shulman and Laursen, 2002). Adolescents in interdependent friendships are thought to actively negotiate between their own ideas and opinions and those of their best friends and to increase in constructive problem solving from middle adolescence onwards, when friends need to start recognizing each others' individual opinions, ideas, and needs. In contrast, adolescents in disengaged friendships are thought to be less likely to use constructive ways of

problem solving and choose to blame each other for mistakes without taking responsibility, or to avoid talking about the conflict all together (Shulman & Laursen, 2002). In addition, adolescents in disengaged friendships are thought to show smaller increases in constructive problem solving from middle to late adolescence (Shulman & Knafo, 1997). Consistent with this view, seventeen year-old adolescents in interdependent friendships have been shown to use more constructive problem solving to resolve conflicts than adolescents in disengaged friendships (Shulman & Laursen, 2002). Thus, adolescents in interdependent and disengaged friendships differ in mean levels of constructive problem solving in middle adolescence. However, it remains unclear whether these differences between friendship types can be observed in the developmental trajectory of constructive problem solving from early to late adolescence.

### *Friendship Types and Adolescent Depression*

Whereas for girls depression increases from early adolescence into adulthood, for boys depression decreases across adolescence (e.g., Galambos, Barker, & Almeida, 2003). The previously discussed attachment theory (Bowlby, 1973), theories regarding the closeness-individuation link (Grotevant & Cooper, 1986), and theories dealing with parenting practices (Baumrind & Black, 1967) all emphasize that positive developmental outcomes occur when closeness and individuation are balanced. In a similar vein, it has also been suggested that adolescents in disengaged friendships perceive more depression than adolescents in interdependent friendships (Shulman & Knafo, 1997).

Several processes might explain why depression and low quality friendships, such as disengaged relationships, may be linked. First, adolescents with more depressive feelings typically have lower levels

of social skills (Engels, Deković, & Meeus, 2002), making it more difficult for them to maintain a friendship in which both closeness and balanced relatedness are high. Furthermore, adolescents with depression may elicit more negative responses from friends, who therefore evaluate them as less likeable and less attractive, and engage in fewer positive behaviors with them (Coyne & Downey, 1991; Hale, 2001; Rudolph et al., 2000). This may result in lower perceived closeness and balanced relatedness by the depressed adolescent. In addition, lower quality friendships might lead to more loneliness and depression, because adolescents in such friendships may experience low social support when facing emotional problems (Prinstein et al., 2005).

Differences between adolescents in interdependent and disengaged friendships in depression have been found. Adolescents in disengaged friendships concurrently reported higher levels of depressive symptoms than adolescents in interdependent friendships (Way et al., 2001). Furthermore, high closeness and high balanced relatedness can be viewed as two indicators for high friendship quality, and cross-sectional (Kiesner, Poulin, & Nicotra, 2003) and over-time (Prinstein et al., 2005; Stice, Ragan, & Randall, 2004) associations between low perceived friendship quality and depression in adolescence have been shown. Nevertheless, differences between friendship types in developmental trajectories of depression remain unclear. Further, girls' emotional states may be more affected by the quality of their friendship than boys' emotional states are (Prinstein et al., 2005; Rudolph, 2002; Rudolph & Hammen, 1999). For example, early adolescent girls were found to report more depressive symptoms after experiencing interpersonal stress than boys (Rudolph, 2002). Therefore, differences in depression between friendship types may be more pronounced for girls than for boys.

This study will examine the following research questions:

1. Can adolescent friendships be classified as interdependent and disengaged friendships based on developmental trajectories of perceived closeness and balanced relatedness? First, we will explicitly test whether two classes of friendships can be found in these developmental trajectories that resemble interdependent and disengaged friendships. Based on the theoretical model of Shulman and Knafo (1997), the first class is expected to show higher perceived closeness from early adolescence onwards and higher perceived balanced relatedness from middle adolescence onwards compared to the second class. We will explore gender differences in these developmental trajectories and in the distributions of these classes.
2. To what extent do adolescents in interdependent and disengaged friendships differ in their development of constructive problem solving during conflicts in their friendship? We will explore whether adolescents in interdependent friendships show higher mean levels and a stronger increase in constructive problem solving from middle adolescence onwards compared to adolescents in disengaged friendships.
3. To what extent do adolescents in interdependent and disengaged friendships differ in their development of depression? We will explore whether adolescents in disengaged friendships show higher mean levels and a stronger increase in depression from early to late adolescence compared to adolescents in interdependent friendships.

## 6.2 Method

### *Participants*

Participants in this study were 911 adolescents selected from 1313 respondents of the young and old adolescent cohort participating in the CONflict And Management Of Relationships study (CONAMORE) (Meeus et al., 2005). CONAMORE is an ongoing longitudinal study that examines the relationships of Dutch adolescents with parents and peers as well as their emotional states. In the current study, data were used from target adolescents who filled out questionnaires on all five waves with a one-year interval. Two criteria were used to select adolescents of the total sample to prevent interdependence in the data. First, if a friend was mentioned more than once in a particular wave by two or more target adolescents, one target adolescent was randomly selected. Second, of the mutual friendships in each wave, one target adolescent was randomly selected to further improve independence of each friendship. This resulted in 911 adolescents whose perceptions were unique in the sense that each friendship was reported on only once. The total group and the selected group of adolescents showed no significant ( $p > .10$ ) differences in gender, age, educational level, closeness, balanced relatedness, constructive problem solving, and depression in all waves. Of the 911 adolescents, 48.6% were boys and 51.4% were girls. The mean age of the first cohort at the first wave was 12.41 ( $SD = .58$ ) and of the second cohort at the first wave was 16.37 ( $SD = .84$ ). The first age cohort was followed from age 12 to age 16, the second age cohort was followed from age 16 to age 20. Therefore, we were able to examine developmental trajectories from early adolescence until late adolescence.

The attrition was low across the five waves: of the 911 adolescents, 7.8% ( $n = 71$ ) dropped out at one of the waves. The participants that

dropped out did not significantly ( $p > .10$ ) differ from participants that continued on gender, age, closeness, balanced relatedness, constructive problem solving, and depression in all five waves. Therefore, we estimated their scores using Full Information Maximum Likelihood within the program Mplus (Muthén & Muthén, 1998-2006). Because missing data at each wave were below 8%, we used the same method to impute scores for adolescents having missing data.

The ethnic composition of the present sample was 88.1% Dutch and 11.9% ethnic minorities. Forty and a half percent of the adolescents were in high schools preparing for lower level tertiary education or lower level jobs, and 59.5% were in high schools preparing for college or university. Educational levels of adolescents' fathers and mothers were as follows: 23.1% and 31.2% finished only primary or high school, 36.2% and 39.4% finished low secondary education, and 40.6% and 29.4% finished college or university education, respectively.

### *Procedure*

Participants came from various high schools in Utrecht and surroundings. Parents and students were invited to participate by providing a letter in which the aims of the study were described and information was given about the option of not participating. Students were required to provide written informed consent. Less than 1% decided not to participate. Participants completed a series of questionnaires in their classroom after school hours. Research assistants, who attended the administration, gave verbal instructions about filling out the questionnaires and written instructions were also included. Confidentiality of their given answers was guaranteed explicitly. For students who were absent on the day of testing a second assessment time was organized. Students who were absent on both days of testing were not assessed. Each wave, respondents received

US\$ 13 after completing the questionnaires.

### *Measures*

*Perceived Closeness.* Perceived closeness was assessed with the commitment scale of the Investment Model Scale (Rusbult et al., 1998). This scale contains 4 items: “I want the relationship with my best friend to stay good”, “I am strongly attached to the relationship with my best friend”, “I try my very best to maintain the relationship with my best friend”, and “I hope that the relationship with my best friend stays like it is”. Participants judged whether the 4 items applied to themselves on a 5-point scale (1 = *absolutely disagree*, 5 = *absolutely agree*). Cronbach’s alphas of closeness ranged between .89 and .92 from Wave 1 to Wave 5.

*Perceived Balanced Relatedness.* The Balanced Relatedness scale (Shulman et al., 1997) was used to measure perceived balanced relatedness in best friendships. This questionnaire contained 7 items: “My best friend respects my decisions”, “My best friend thinks it is right to sometimes disagree with him/her”, “My best friend respects my ideas”, “My best friend is not hurt when I have others friends or business”, “My best friend allows me to think over my ideas”, “My best friend considers my opinion”, and “My best friend encourages my suggestions”. Participants judged whether the 7 items applied to their best friendship on a 4-point scale (1 = *absolutely disagree*, 4 = *absolutely agree*). Cronbach’s alphas of balanced relatedness ranged between .88 and .92 from Wave 1 to Wave 5. Correlations between closeness and balanced relatedness range from .32 to .46 ( $p < .01$ ) within waves, suggesting that closeness and balanced relatedness are distinct but related constructs.

*Constructive problem solving.* Perceived constructive problem solving

was measured with two subscales of the Conflict Resolution Style Inventory (CRSI) of Kurdek (1995). The first subscale “Problem Solving” consisted of five items pertaining to constructive problem solvings, such as “Try to find resolutions that are acceptable for the both of us”. The second subscale “Engagement” consisted of five items pertaining to non-constructive problem solvings during conflict with my best friend, such as “Attacking him/her personally”. These items were recoded so that higher scores reflected more constructive problem solving. Participants were asked to report to what extent these items applied to themselves when having a conflict with their best friend on a 5-point scale ranging from (1 = *absolutely disagree*, 5 = *absolutely agree*). An exploratory factor analysis showed that all 10 items loaded higher than .40 on one factor at each wave. Furthermore, Confirmatory Factor Analyses (CFA) revealed high factor loadings ( $>.39$ ) as well as adequate fit indices ( $(\chi^2(16, N = 911) > 56.19, p < .01$ ; CFI's  $> .98$ , RMSEA's  $< .04$ ) in models in which all items loaded on one single factor. Therefore, for each wave, one score for constructive problem solving was computed. Cronbach's alpha's ranged from .82 to .85 from Wave 1 to Wave 5.

*Depression.* Depression was assessed with the Children's Depression Inventory (CDI; Kovacs, 1992). This questionnaire contains 27 items. Example items include: “I feel sad all the time”, “I often think other people do not like me”, and “I hate myself”. The items were scored on a 3-point scale, ranging from *false*, through *a bit true*, to *true*. A mean score was computed to create a depression score. The CDI is a well-established instrument for measuring depression in non-clinical samples of children and adolescents (Craighead, Smucker, Craighead, & Ilardi, 1998; Kovacs, 1992). Cronbach's alphas of this measure ranged from .89 to .93 from Wave 1 to Wave 5.

*Stability and Gender Composition of Friendship.* Only a small num-

ber of adolescents reported stable friendships ( $n=73$ ) and even fewer adolescents consistently reported cross-gender friendships ( $n=4$ ) over all five waves: therefore, friendship stability and gender composition of the friendship dyad were entered as continuous covariates in the analyses. Friendship stability was entered as a continuous variable, ranging from 0 = *stable over 0 waves* to 5 = *stable over five waves*. Sixty-three point three percent of the adolescents had same-gender friendships in all waves ( $n=577$ ), 18% had mixed-gender friendships in 1 wave ( $n=164$ ), 9.3% had mixed-gender friendships in 2 waves ( $n=85$ ), and 9.4% had mixed-gender friendships in 3 to 5 waves ( $n=69$ ).

### *Statistical analyses*

To answer the first research question, that is, can two different classes be identified based on developmental trajectories of closeness and balanced relatedness across adolescence, we followed the four steps proposed in the step-wise procedure for Growth Mixture Modelling (GMM) (Muthén & Muthén, 2000). We first examined univariate longitudinal growth models (LGM) in Mplus (Muthén & Muthén, 1998-2006) for closeness and balanced relatedness separately. Different types of latent growth models were estimated to determine which growth model best applied the data, that is, no growth, linear growth, quadratic growth, or freely estimated growth. This was done by comparing RMSEA's, CFI's, and BIC's between each of these models. RMSEA's smaller than .05 and CFI's larger than .95 indicate adequate fit of the model, and relatively lower RMSEA's, lower BIC's, and higher CFI's indicate better fit when comparing models (Kline, 1998). Intercepts and slopes within the same growth model were correlated because this significantly improved the fit in all models. Gender differences were tested using multiple group models.

An accelerated growth curve design was used to examine closeness and balanced relatedness from early to late adolescence. That is, to estimate linear growth across the age cohorts, the loadings on the slope factor for the first age cohort ranged from 0 to 4 from wave 1 to wave 5, and the same loadings for the second age cohort ranged from 4 to 8 from wave 1 to wave 5, respectively. Intercepts and slopes were constrained to be equal across age cohorts, resulting in one single developmental pathway for each dimension from age 12 to age 20.

All models were estimated separately for boys and girls, allowing us to test for different class solutions between boys and girls. Step 2 in this procedure was estimating Latent Class Growth Analysis (LCGA). Several criteria were used to decide on the optimal number of classes (Hill et al., 2000). First, lower BIC values indicate improvement of that class-solution compared to a class-solution with one fewer class. Second, the usefulness of the classes was determined by examining several indicators: the distinctiveness of the developmental trajectories (based on theoretically expected distinctive trajectories), the predictive value of the class-probabilities (a higher class probability reflecting a better class solution), and the number of adolescents in each class (at least 1% of all adolescents must be in one class). The third was testing stability of the solutions by repeatedly estimating models with random starting values. Stable models achieve similar solutions despite different starting values. These criteria are also applied in step 3 and step 4.

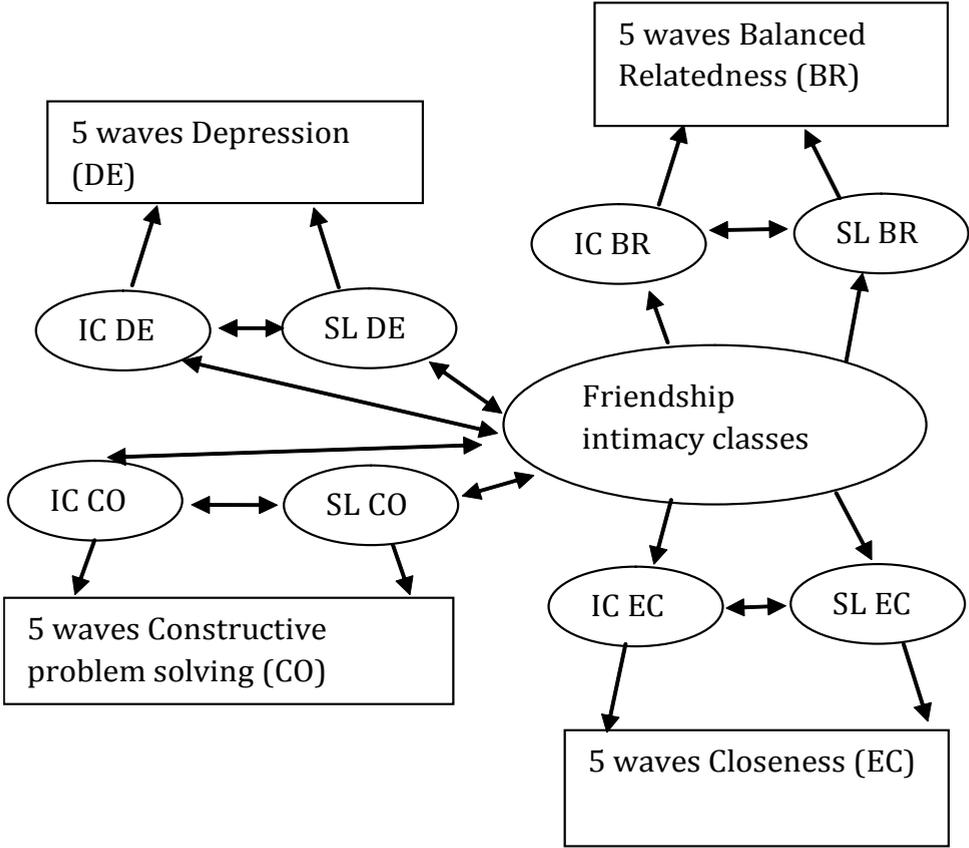


Figure 6.1. Conceptual model of the development of depression and conflict resolution style constructive problem solving predicting friendship intimacy class membership.

In step 3, General Mixture Models (GMM) were estimated that include either the variation of the intercepts or the variation of the slopes within the classes (with the restriction of equal intercept or slope variances across classes). In step 4, General Mixture Models were estimated with both variation in intercepts and slopes. We determined whether unconstraining intercept variances, slope variances, and intercept and slope variances led to a better fit by testing whether the loglikelihood

significantly ( $p < .05$ ) increased. To answer research questions 2 and 3, that is, to what extent do interdependent and adolescents in disengaged friendships differ in their development of perceived constructive problem solving and depression, we first examined the univariate longitudinal growth models for constructive problem solving and depression separately to see what growth model fits the data best. Next, General Growth Mixture Modelling was applied (Muthén & Muthén, 2000), in which the intercepts and slopes of these two growth models were related to the class-solutions probabilities of friendship types that are based on the development of closeness and balanced relatedness. Thus, the effects of the mean levels and growth over time of perceived constructive problem solving and depression on the latent class membership of perceived closeness and balanced relatedness were examined. See Figure 6.1 for a conceptual model of all three research questions.

### 6.3 Results

Table 6.1

#### *Fit Indices of Final Univariate Growth Curve Models*

Model	$X^2$	<i>df</i>	RMSEA	CFI
Males				
Closeness	41.11*	22	.04	.96
Balanced relatedness	31.26*	22	.03	.96
Depression	23.93*	22	.02	.99
Constructive problem solving	42.56*	22	.04	.95
Females				
Closeness	21.76*	22	.00	1.00
Balanced Relatedness	36.05*	22	.04	.97
Depression-Quadratic for Old	17.30*	15	.02	1.00
Constructive problem solving	47.82*	22	.05	.95

*Note.* RMSEA = Root mean square error of approximation; CFI = Comparative fit index. All models were estimated with linear growth, unless stated otherwise.

\*  $p < .05$

First, univariate growth curve models of closeness and balanced relatedness were examined (see Table 6.1). For both dimensions, a linear growth curve fitted the model best, showing lowest  $\chi^2$  and RMSEA and highest CFI values. Multiple group analyses in which intercept and slope means and variances for boys and girls were unconstrained showed that only the means of the intercepts of both

closeness and balanced relatedness differed significantly ( $p < .05$ ), with girls scoring significantly higher on perceived closeness and balanced relatedness. Therefore, we estimated the models separately for boys and girls. Whereas the slope of perceived closeness was not significant for boys and girls, the slopes of balanced relatedness was significant and positive for both boys and girls. Note that in all models, variances of intercepts and slopes were significant ( $p < .05$ ).

### *LCGA and GMM Analyses: Classes in Developmental Trajectories of Closeness and Balanced Relatedness*

We first examined step 2, that is, the LCGA-solutions. Because no gender differences in steps 2, 3, and 4 were found in the number of class-solutions, the discussion of all following steps refers to results for both boys and girls together. First, a model with four-class solution showed the lowest BIC-value. However, this class-solution was not very useful as indicated by a number of issues. The class-probabilities of the fourth specific class did not differentiate well with the other three classes: the latent class probability was only 71% for this specific class. Furthermore, the growth curve of the fourth class in the four-class solution was very similar in shape to the growth curve of the third class. In addition, increasing the number for starting values resulted in different distributions of adolescents across the classes, indicating that this class solution was not stable. Both the two-class and three-class solutions did not have these problems when running the LCGA's. Therefore, we performed step 3 and 4 for the two-class and three-class solution and used loglikelihood to test within each class solution whether the GMM models fitted the data better.

For both the two-class and three-class solution, the model in which variances of intercepts and slopes were unconstrained simultaneously fit the data best. Nevertheless, although the three-

class solution showed a lower BIC value, several other criteria were not met. The class-probabilities of the third class did not differentiate well with the other 2 classes within this class solution: the average latent class probability was only 70%. Furthermore, increasing the number for starting values showed that the three-class solution with free variances of intercepts and slopes was not stable. In addition, examining the three-class solution (within the theoretical framework of Shulman's possible enmeshed type (high closeness, low balanced relatedness) suggested that the third class converged with the first class: both classes scored relatively high on both closeness and balanced relatedness, and means on closeness and balanced relatedness did not significantly ( $p > .05$ ) differ from each other.

The two-class solution with free variances of intercepts and slopes, on the other hand, met all criteria: the number of adolescents in each class were large enough to be meaningful ( $> 35.3\%$ ), the average class-probabilities were all larger than 89%, the growth curves were different in mean level and shape and could generally be shaped within the theoretical framework of Shulman and Knafo (to be discussed in more detail in the next section), and different starting values yielded similar distributions of adolescents across the two classes. Finally, loglikelihoods of the models in which variances of intercepts and slopes of closeness and balanced relatedness were unconstrained (-5001 for boys and -4455 for girls, with 24 estimated parameters) were significantly ( $p < .01$ ) lower than models in which both variances of intercepts and slopes (-5023 for boys and -4582 for girls, with 20 estimated parameters) were constrained. Therefore, the two-class solution with free variances in intercepts and slopes of closeness and balanced relatedness fitted the data best.

Table 6.2 shows the means and variances of perceived closeness and balanced relatedness for adolescents in interdependent friendship and adolescents in disengaged friendships by gender. Figure 6.2

and 6.3 depict graphical representations of the corresponding development on these dimensions for the friendship types. We ran repeated measures analyses of variance with closeness and balanced relatedness on all five waves as dependent variables and the four groups (interdependent boys, disengaged boys, interdependent girls, and disengaged girls) as between-subject factor to test whether differences between groups were significant. Time and membership of the four groups interacted significantly for closeness ( $F(4, 904) = 2.69, p < .01$ ) and balanced relatedness ( $F(4, 904) = 4.47, p < .01$ ). Post-hoc Bonferroni tests revealed significant ( $p < .05$ ) differences in the following way. Adolescents in interdependent friendships reported higher mean levels of closeness than adolescents in disengaged friendships, irrespective of gender. That is, girls in interdependent friendships perceived highest closeness, followed by boys in interdependent friendship, who were followed by girls in disengaged friendships. Finally, boys in disengaged friendships perceived lowest mean levels of closeness. Furthermore, for boys and girls in interdependent friendships and for girls in disengaged friendships, the slope of closeness was not significant. This suggests that for these three groups, closeness remained stable across adolescence. However, for the disengaged friendships boys, the slope of closeness was positive and significant ( $p < .01$ ), indicating that closeness for this group increased from early to late adolescence. Even though closeness increased over time for disengaged friendships boys, by age 20, closeness was equally high for boys and girls in disengaged friendships and still lower than either boys or girls in interdependent friendships.

Table 6.2  
*Means and Variances of Intercepts and Slopes of Closeness and  
 Balanced Relatedness for Males and Females by Friendship Type*

Dimension	Males				Females			
	Class 1		Class 2		Class 1		Class 2	
	Interdependent	Disengaged	Interdependent	Disengaged	Interdependent	Disengaged	Interdependent	Disengaged
	M	$\Delta$	M	$\Delta$	M	$\Delta$	M	$\Delta$
Intercept								
closeness	4.16**	.13**	3.36**	.13***	4.53**	.06**	3.93**	.06**
Slope								
closeness	.00	<.01*	.05**	<.01*	-.01	<.01*	<.01	<.01*
Intercept								
balanced	3.29**	.04**	2.89**	.04**	3.54**	.03**	3.12**	.03**
relatedness								
Slope								
balanced	.04**	<.01*	.02**	<.01*	.04**	<.01*	<.01	<.01*
relatedness								

\*  $p < .05$ , \*\*  $p < .01$

When examining balanced relatedness, the classes again showed the same pattern of distinct mean levels irrespective of gender: girls in interdependent friendships perceived highest balanced relatedness, followed by boys in interdependent friendships, followed by girls in disengaged friendships girls. Boys in disengaged friendships perceived lowest balanced relatedness of all groups. The slopes of all groups were positive and significant, indicating that balanced relatedness increased across adolescence, with one exception: for girls in disengaged friendships girls, balanced relatedness did not increase from early to late adolescence.

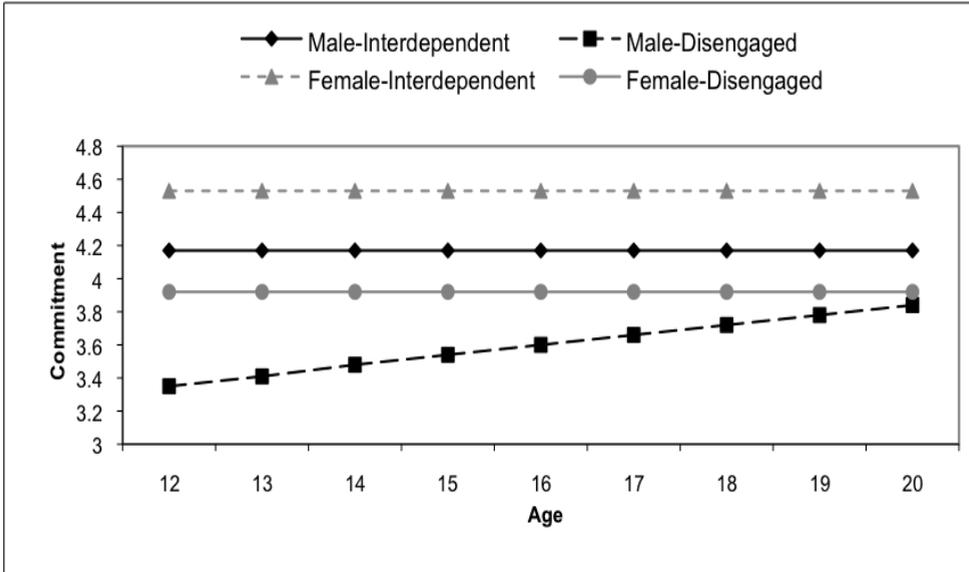


Figure 6.2. Developmental trajectories of commitment for males and females by friendship type

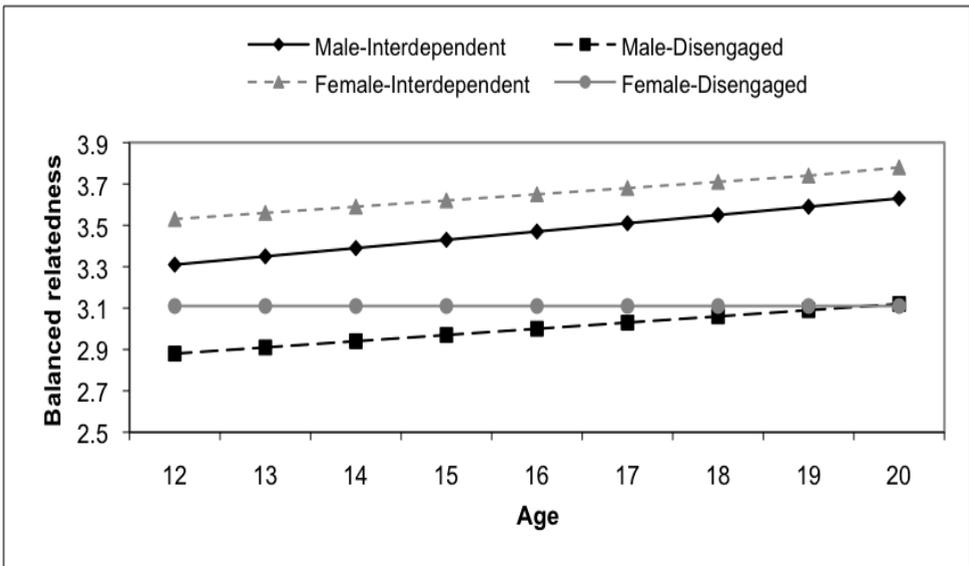


Figure 6.3. Developmental trajectories of balanced relatedness for males and females by friendship type

In sum, two different friendship classes were found with distinct developmental trajectories of perceived closeness and balanced relatedness across adolescence. Hypotheses concerning mean level differences between these classes were confirmed, whereas hypotheses concerning differences in the developmental shapes were confirmed only for girls and balanced relatedness. Although the overall shapes of the developmental trajectories were similar across classes and gender, there were two exceptions. Unexpectedly, for boys in disengaged friendships, perceived closeness increased from early to late adolescence. Nevertheless, their perceived closeness was still lower at age 20 compared to boys and girls in interdependent friendships. Also, for girls in disengaged friendships, perceived balanced relatedness did not show the expected lack of increase over time.

In the final distribution of the two-class solution, adolescents were found significantly ( $\chi^2(1, N = 911) = 17.70, p < .01$ ), more often in the disengaged type (57%) than in the interdependent type (43%). Furthermore, gender had a significant effect on class membership ( $\chi^2(1, N = 911) = 11.15, p < .01$ ), with more adolescents in interdependent friendships among girls (46.3%) than among boys (38.7%). The proportion of adolescents in the younger cohort and older cohort did not significantly differ from each other ( $\chi^2(1, N = 911) = .04, p > .10$ ), indicating that the distribution of adolescents in interdependent and disengaged friendships is equal when comparing younger to older adolescents.

### *GMM analyses: Constructive Problem Solving, Depression, and Friendship Type Membership*

The univariate growth models of constructive problem solving and depression all showed that linear models fit the data best (see Table 6.1),

with one exception: for depression, quadratic growth fitted the data significantly ( $p < .05$ ) better for girls in the older cohort. The slope of constructive problem solving was significant and positive for both boys and girls. The slope of depression was significant and negative for boys, whereas the slope was positive and significant for girls, with the quadratic term being significant and negative for the older cohort girls only.

Table 6.3

*Friendship Stability and Intercepts and Slopes of Constructive Problem Solving and Depression Predicting Latent Class Membership of Disengaged friendship*

	Boys		Girls	
	Logit	OR	Logit	OR
Stability	-.78**	.46**	-.15	.86
IC constructive problem solving	-1.89**	.15**	-1.86**	.16**
SL constructive problem solving	-1.12**	.33**	-1.36**	.26**
IC depression	.62	1.86	2.24***	9.40***
SL depression	-.14	.87	1.46	4.31
QD depression	-.92	.40	-.32	.73

Note. IC = Intercept, SL = Slope, QD = Quadratic

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

Next, GGMM was used to examine the extent to which friendship stability and intercepts and slopes of constructive problem solving and depression predicted latent class membership. This was done by entering friendship stability and the longitudinal growth models of constructive problem solving and depression in the previous model

of friendship type class membership. Table 6.3 shows the effects of friendship stability and intercepts and slopes of constructive problem solving and depression on latent class membership of friendship type for boys and girls separately. Because gender composition of the friendship dyad did not predict latent class membership for either boys or girls, loglikelihood and odd ratios for this variable were omitted from this table.

For boys only, a higher stability of friendship predicted a lower chance of being in the disengaged friendship class. Thus, these results show that boys in disengaged friendships have less stable friendships across adolescence compared to boys in interdependent friendships. For both boys and girls, a higher intercept as well as a higher slope on constructive problem solving predicted a lower chance of being in the disengaged group. These results indicate that adolescents in disengaged friendships perceive lower mean levels of constructive problem solving, as well as a smaller increase in constructive problem solving across adolescence (see Figure 6.4).

Furthermore, for girls, a higher intercept of depression predicted a higher chance of disengaged class membership across adolescence (see Figure 6.5). In sum, adolescents in disengaged friendships were found to have lower levels of and increase less in constructive problem solving, and reported lower levels of depression from early to late adolescence.

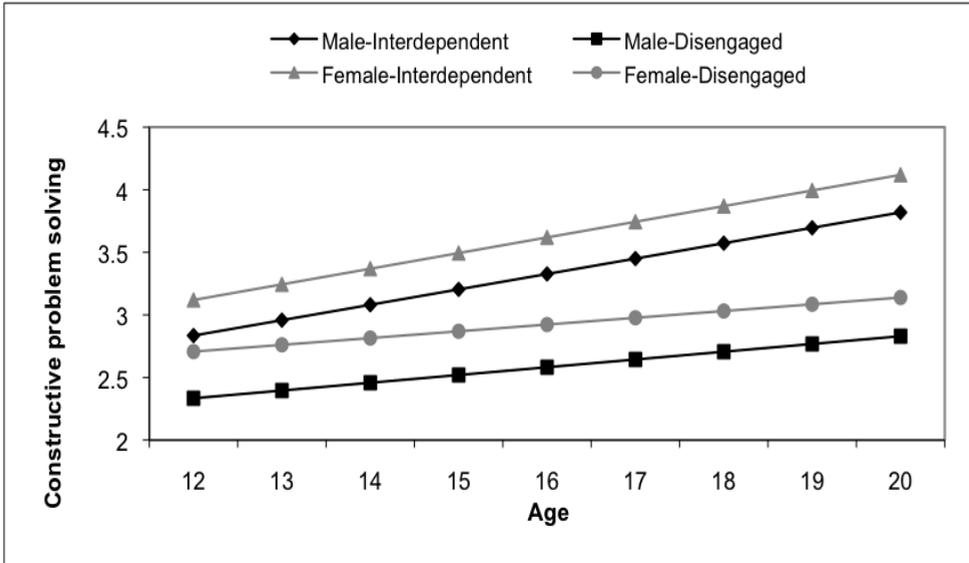


Figure 6.4. Developmental trajectories of constructive problem solving for males and females by friendship type.

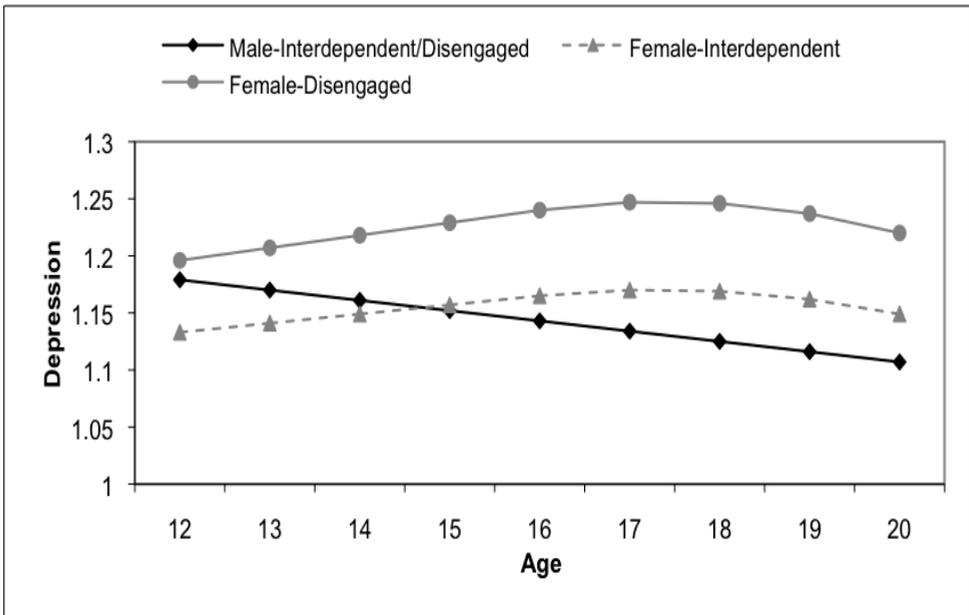


Figure 6.5. Developmental trajectories of depression for males and females by friendship type.

## 6.4 Discussion

The first aim of the current study was to examine whether interdependent and disengaged friendship types could be found based on developmental trajectories of perceived closeness and balanced relatedness. This study was the first to examine friendship type differences by investigating developmental trajectories of perceived closeness and balanced relatedness from age 12 to age 20. Results indicate that development of friendship characteristics in adolescence primarily occurs for perceived balanced relatedness and constructive problem solving: for both boys and girls, these characteristics increased across adolescence. Perceived closeness already was relatively high in early adolescence and remained stable across adolescence. Thus, friendships in general seem to become more mature in perceived balanced relatedness and constructive problem solving across adolescence. These findings partially support the theoretical framework proposed by Selman (1990) concerning the development of closeness and individuality within friendships: from middle adolescence onwards, closeness is expressed by sharing emotions with regard to individuals' own feelings and thoughts as well as friend's feelings and thoughts. Therefore, adolescents perceive that their individuality is relatively more accepted by their friend across adolescence. These results fit within other larger theoretical frameworks dealing with close relationships, such as attachment theory (Bowlby, 1973), in which optimal adaptation within close relationships involves use of a partner not only as a source of closeness, but also as a secure base for individual exploration. In addition, these results fit in theoretical frameworks concerning closeness and individuation (Grotevant & Cooper, 1986) that suggest that normative development across adolescence implies maintenance of closeness in the relationship with parents and peers, which is

accompanied by increases in individuation. Finally, current findings extended theories dealing with parenting practices (Baumrind & Black, 1967) to the peer context, by indicating that an optimal balance between emotional closeness and encouraging individual expression within peer relationships are associated with positive developmental outcomes.

Furthermore, evidence was found for different types of friendships in these developmental trajectories. Replicating and extending previous findings (Shulman, 1993, 1995; Shulman & Knafo, 1997; Shulman & Laursen, 2002), we found two types of friendships with different developmental trajectories of perceived closeness and balanced relatedness from early to late adolescence. Taken together, results largely confirm expectations based on the theoretical models of Shulman and Knafo (1997). Adolescents in interdependent friendships were characterized by perceiving relatively high, stable closeness in their friendships, while at the same time increasingly perceiving their individuality to be accepted by their best friend. In contrast, adolescents in disengaged friendships were characterized by perceiving stable but relatively low closeness to their best friend and less individuality in their best friendship. The distribution of these two types of friendships was similar to distributions found in prior studies, with around half of all best friendships represented in the interdependent type, and the other half represented in the disengaged type. Unexpectedly, these differences between friendship types emerged from early adolescence onwards instead of starting from middle adolescence onwards. Still, these results are consistent with the notion that individuality becomes an issue in friendships already in early adolescence and continues across adolescence (Laursen, 1993).

One unexpected result was that adolescents in interdependent friendships did not show stronger increases in perceived closeness:

in fact, adolescents in interdependent friendships did not increase in perceived closeness across adolescence. Because perceived closeness was already relatively high for adolescents in interdependent friendships, increases in closeness may not occur because of the ceiling-effect. Related to this finding, the mean level of perceived social support of best friends has been shown to not change significantly from age 14 to age 16 (Cleveland, 2004). For males in disengaged friendships, however, perceived closeness was relatively low, and they increased in perceived closeness and perceived balanced relatedness over time. Nevertheless, these friendship intimacy characteristics were at a mean level comparable to girls in adolescents in disengaged friendships at age 20. In other words, they still perceived lower closeness and balanced relatedness compared to than adolescents in interdependent friendships.

Results furthermore showed that boys were found more often in the disengaged friendship type than girls. This confirms prior results concerning perceptions of friendship quality to typify adolescents in disengaged friendships (Way et al., 2001), and is consistent with findings showing that boys perceive lower friendship quality than girls (e.g., Brendgen, Markiewicz, Doyle, & Bukowski, 2001). Boys may value multiple relationships in peer groups more than girls (Urberg, Degirmencioglu, Tolson, & Hallidayscher, 1995) and may therefore be found more in adolescents in disengaged friendships than girls. Girls, on the other hand, may invest more time and afford in one particular friendship (Shulman, 1993), which explains why they are found more often in adolescents in interdependent friendships than boys.

The second research question concerned differences between adolescents in interdependent and disengaged friendships in the developmental trajectory of constructive problem solving from early to late adolescence. As expected, for all groups, constructive problem solving increased from early to late adolescence (Laursen, 1993).

Furthermore, interdependent friends showed higher mean levels and greater increases in constructive problem solving compared to disengaged friends. These results are partly consistent with the theoretical model of Selman (Selman, 1990), which suggests that from middle adolescence onwards, higher closeness and balanced individuality results in more constructive conflict solving in which the perspective of both the individual and the friend is taken into account. It might be that because adolescents in disengaged friendships do not integrate each others' opinions when negotiating a conflict as much as adolescents in interdependent friendships, they sustain the feeling that they do not accept each other's individuality while remaining less close to each other. These results furthermore confirm the idea that interdependent and disengaged friendship represent meaningful, distinct categories of friendships in the minds of adolescents, with different ways of experiencing constructive problem solving from early to late adolescence.

The third research question concerned differences between adolescents in interdependent and disengaged friendships in the developmental trajectory of depression. Although depression has been shown to increase from early adolescence until adulthood for girls (e.g., Galambos et al., 2003), in the current study, depression slightly increased from age 12 to around age 17, followed by a decrease from age 17 to 20. This is consistent with findings showing that internalizing problem shows a curvilinear shape across adolescence (Keiley, Lofthouse, Bates, Dodge, & Pettit, 2003; Lansford et al., 2006). For boys, depression decreased from early to late adolescence, which is consistent with prior findings. Although the developmental trajectories of depression were of similar shape for interdependent and adolescents in disengaged friendship types, girls in disengaged friendships showed higher mean levels of depression across adolescence compared to boys and adolescents in interdependent

friendships. This difference between friendship types was not found for boys. These results may be explained by two processes in girls' friendships. First, girls have been found to exhibit a stronger relational orientation and greater emotional needs in adolescence compared to boys (Rudolph, 2002) and it may be that girls are therefore more sensitive to negative exchanges within best friendships (Borelli & Prinstein, 2006; Prinstein et al., 2005). Second, depression may negatively affect friendship intimacy more for girls than for boys, because girls seem to focus more on their feelings and ruminate more with their best friends compared to boys (Burwell & Shirk, 2007). In sum, girls in disengaged friendships seem to develop higher levels of depression across adolescence.

Several limitations of the current study should be noted. First, only including the perception of friendship intimacy by the target adolescent, and not the perception of the best friend, limits the findings of the two friendship types only to the perceptions of these adolescents. Future studies should examine the developmental trajectories of closeness and balanced relatedness using perceptions of both friends. Additionally, using observations to examine friendship intimacy might yield different class-solutions, because self-reports and observations of friendship intimacy may expose different characteristics of friendship intimacy. For example, friends typically present a more positive image of their friendship when using self-reports than is revealed by observations (Poulin et al., 1999). Yet, perceptions of attitudes or behaviours may be more consequential for adolescent attitudes and behaviours than actual attitudes or behaviours. For example, whether the friendship actually *is* of low quality may be of minor relevance to the development of adolescent depression; the perception of the relationship may affect depression more than the actual state of the relationship (Brendgen, Vitaro, Turgeon, & Poulin, 2002). Third, because the number of

stable friendships and mixed-gender friendships was too small to use in the GMM-analyses, future studies should examine to what extent interdependent and disengaged friendships are found in both stable and unstable friendships as well as in same-gender and mixed-gender friendships. Finally, findings are primarily descriptive in the sense that no claims on causality can be made when discussing the differences between interdependent and disengaged types in the developmental trajectories of depression and constructive problem solving. For example, based on this study, we cannot tell whether perceptions of higher friendship intimacy lead to a decrease in depression, or whether higher depression leads to a decrease in perceived friendship intimacy. However, additional analyses did show that friendship intimacy did not predict depression and constructive problem solving, and that depression and constructive problem solving did not predict friendship intimacy. This suggests that the development of friendship intimacy on the one hand and constructive problem solving and depression on the other develop more or less simultaneously and other factors may affect all these processes.

In sum, the current study is the first to provide evidence for two types of friendships based on developmental trajectories of perceived closeness and balanced relatedness, which represent meaningful, distinct categories in the minds of adolescents. Adolescents in interdependent friendships seem to balance both individuality and closeness across adolescence, and increasingly develop acceptance for each other's individuality. In contrast, adolescents in disengaged friendships seem to maintain a friendship with lower closeness and lower acceptance for each other's opinions, ideas, and needs. Furthermore, adolescents in disengaged friendships seem to lag in their development of constructive problem solving, which might sustain the low perceived closeness and balanced relatedness in this friendship. Finally, girls in disengaged friendships experience highest

levels of depression across adolescence, suggesting that girls in these friendships may be at risk for developing depression, while at the same time depressed girls may develop disengaged friendships.





## **Chapter 7.**

# **Internet, Friendship Quality, and Emotional Adjustment<sup>8</sup>**

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<sup>8</sup> Selfhout, M., Branje, S., Ter Bogt, T., Delsing, M., & Meeus, W. (in press). Different types of Internet use, depression, and social anxiety: The role of perceived friendship quality. *Journal of Adolescence*.

### **Abstract**

The current study examined the longitudinal associations of time spent on Internet activities for communication purposes (i.e., IM-ing) versus time spent on Internet activities for non-communication purposes (i.e., surfing) with depression and social anxiety, as well as the moderating role of perceived friendship quality in these associations. Questionnaire data were gathered from 307 Dutch middle adolescents (average age 15 years) on two waves with a one-year interval. For adolescents who perceive low friendship quality, Internet use for communication purposes predicted less depression, whereas Internet use for non-communication purposes predicted more depression and more social anxiety. These results support social compensation effects of IM-ing on depression and poor-get-poorer effects of surfing on depression and social anxiety, respectively.

## 7.1 Introduction

Growing concern over the recent exponential increase of Internet use among teenagers has spawned a surge of research into the possible adverse effects of Internet use on well-being, with a primary focus on internalizing problems (e.g., Caplan, 2003; Gross, 2004; Kraut et al., 1998; Weiser, 2001). Recent US (Gross, Juvonen, & Gable, 2002), Canadian (Hampton & Wellman, 2001), and Dutch (Sikkema, 2005) studies have shown that the vast majority of adolescents spends several hours daily online. Further, surveys show that adolescents consider the Internet a highly important medium in their everyday social life and use it to form and maintain social relationships (Subrahmanyam, Smahel, & Greenfield, 2006; Valkenburg & Peter, 2007b; Wolak et al., 2003). One theoretical approach to this phenomenon is that Internet use robs individuals of their social activities and might intervene with the development and maintenance of social relationships (e.g., Amichai-Hamburger & Ben-Artzi, 2003; Caplan, 2003; Nie & Erbring, 2000; Weiser, 2001). In line with this reasoning, several cross-sectional survey studies have found that Internet use was associated with more depression for adolescents (Sun et al., 2005) and adults (Amichai-Hamburger & Ben-Artzi, 2003; Caplan, 2003; Nie & Erbring, 2000; Weiser, 2001). In contrast, another theoretical approach is that Internet use expands, rather than displaces, possibilities to contact peers, and thus enhances feelings of self-esteem and wellbeing (e.g., Morgan & Cotten, 2003; Valkenburg & Peter, 2007b). In accordance with this, cross-sectional survey studies have shown that college students' Internet use was directly (Morgan & Cotten, 2003) and indirectly (LaRose, Eastin, & Gregg, 2001a) related to *less* depression. Furthermore, studies have revealed that Internet use can lead to online relationship formation, and thereby to more social support (Nie & Erbring, 2000; Wellman et al., 2001;

Wolak et al., 2003), which may subsequently lead to less internalizing problems. One longitudinal study (Kraut et al., 1998) found that, over a period of 8 to 12 months, both loneliness and depression increased with time spent online for adolescent and adult first-time Internet users. In a one-year follow-up study (Kraut et al., 2002), however, the observed negative effects of Internet use had disappeared. Thus, studies concerning cross-sectional and longitudinal associations between Internet use and adolescent well-being have provided inconsistent results.

### *Internet Use for Communication Purposes versus Internet Use for Non-Communication Purposes*

The two previously mentioned theoretical approaches might adhere to different types of Internet activities that may have differential effects on well-being. One type of activities is *surfing*, which can be described as visiting websites on the Internet for non-communication purposes. Surfing seems to be strongly associated with Internet Addiction Disorder (Lijuan, Xin, Mingzheng, & Aihong, 2006; Yang & Tung, 2006; Zhu & Wu, 2004). Symptoms of this disorder include preoccupation with Internet, deception regarding time spent online, mood modification through Internet use, and experiencing environmental distress. Being addicted to the Internet seems to lead to a vicious negative cycle, in which individuals receive short-term gratification every time they go online, making them want to go online more to seek this gratification (Hall & Parsons, 2001). Nevertheless, because surfing does not seem to have any long-term rewards usable in real-life, it does not seem to increase long-term gratification (LaRose, Mastro, & Eastin, 2001b) and therefore may lead to depressive and socially anxious feelings (Morgan & Cotten, 2003). In short, surfing may increase depression and social anxiety.

In contrast to surfing, *Instant Messaging* (IM-ing) consists of sending messages directly to others one has invited to the online conversation. Because of its dyadic, real-time, and private format, IM-ing has been seen as an excellent 'training ground' for adolescents in terms of their social skills (Morgan & Cotten, 2003; Valkenburg & Peter, 2007b). Adolescents seem to have a high need for developing social skills and relationships (Steinberg, 1996) and IM-ing may be seen as a relatively safe medium in which especially adolescents can practice and improve their social skills. Some researchers have suggested that with the increased individualization and physical distance between individuals and their family and peers in industrialized countries, less opportunities for normal face-to-face interaction with peers arise and IM-ing provides an excellent bridge across distance (Wolak et al., 2003). Thus, IM-ing might be a medium by which adolescents to interact with others, and could therefore be associated with the development of less depression and social anxiety.

Consistent with these expectations, a cross-sectional survey study among freshmen college students showed that whereas increased time spent IM-ing was uniquely associated with less reported depression, increased time spent surfing was uniquely associated with more reported depression (Morgan & Cotten, 2003). In contrast, a recent longitudinal study showed that IM-ing predicted *more* depression over a six-month period among 12 to 15 year old adolescents (Van den Eijnden, Meerkerk, Vermulst, Spijkerman, & Engels, 2008). Further, although socially anxious adolescents may use Internet activities aimed at communication as a relatively safe way to explore social relationships (Shepherd & Edelman, 2005; Valkenburg, Schouten, & Peter, 2005), Internet users spending most time IM-ing were not more socially anxious than Internet-users spending less time IM-ing (Campbell, Cumming, & Hughes, 2006). Therefore, although it seems conceptually important to

distinguish between IM-ing and surfing when examining their links to internalizing problems, empirical studies thus far show inconsistent results regarding depression and indicate that IM-ing is not associated with social anxiety.

### *Social Compensation or Rich-Get-Richer Effects?*

Theories on effects of Internet use stress the need to consider moderating factors, such as individual traits and the social context in which Internet use occurs (Kraut et al., 1998; McKenna, 1999; Valkenburg & Peter, 2007c). Because individual traits, especially Introversion, and their role in Internet use have received attention in several other studies (Amichai-Hamburger, Wainapel, & Fox, 2002; Kraut et al., 1998; Peter, Valkenburg, & Schouten, 2005), we will focus on one important aspect of the social context in adolescence: the quality of friendships. Theoretically, friendship quality may moderate Internet use effects on internalizing problems because it might reflect *how* certain individuals use the Internet: it might provide the motivation for using the Internet in a specific way. Two hypotheses are relevant in this respect. The first hypothesis is the *rich-get-richer hypothesis*, which suggests that IM-ing may have beneficial effects for individuals with high quality friendships, because IM-ing presents the ideal medium to maintain these friendships: its dyadic, real-time character makes it possible to closely interact with best friends. Adolescents with high quality friendships may also use IM-ing to expand their social network in a relatively easy way, because they may have better social skills, which can be used to connect to new friends online (Anderson, 2001). In short, higher friendship quality may enhance beneficial effects of IM-ing on wellbeing.

In contrast, the *social compensation* hypothesis states that adolescents with low quality friendships will benefit from IM-ing,

because constraints that make them interact poorly in real-life face-to-face encounters with their friends are not present so much in an online environment (Campbell et al., 2006; Walther, 1996). That is, adolescents with poor friendships may find the new online environment an ideal place to explore their identity (Valkenburg et al., 2005), develop their social skills (Wolak et al., 2003), and interact with new peers (Peter et al., 2005), which may all enhance their feelings of self-worth and wellbeing. Thus, IM-ing for adolescents with low quality friendships may reduce internalizing problems.

One study examined the role of friendship quality, thereby testing the social compensation hypothesis and the rich-get-richer hypothesis. For 11 to 17 year old adolescents who perceived low closeness with friends, chatting with strangers was cross-sectionally associated with higher wellbeing (Valkenburg & Peter, 2007b). Thus, cross-sectional evidence supports the social compensation hypothesis, and not the rich-get-richer hypothesis when examining the role of friendship quality as a moderator in effects of Internet use on internalizing problems.

### *The Current Study*

The current study extends prior research on the associations of Internet use with internalizing problems by examining the unique longitudinal associations of Internet activities for both communication purposes (i.e., IM-ing) and non-communication purposes (i.e., surfing) with depression and social anxiety. Because especially adolescents use the Internet very frequently and may therefore be susceptible to influences of Internet use (Gross et al., 2002; Valkenburg et al., 2005), we focus on the longitudinal effects of Internet use on internalizing problems in an adolescent sample. In addition, the moderating role of perceived friendship quality in these associations was examined to test two

competing hypotheses derived from the rich-get-richer perspective and the social compensation perspective. If IM-ing uniquely predicts fewer subsequent internalizing problems only for adolescents who perceive high friendship quality, the rich-get-richer hypothesis would be supported. If, on the other hand, IM-ing uniquely predicts fewer subsequent internalizing problems only for adolescents who perceive low friendship quality, the social compensation hypothesis would be supported. We will explore whether time spent surfing uniquely predicts depression and social anxiety differently for adolescents who perceive their friendship quality to be low and for adolescents who perceive their friendship quality to be high. Because prior researchers have suggested that girls may be more susceptible to adverse effects of IM-ing on well-being because they place relatively higher importance on the social aspects of Internet to communicate with best friends (Subrahmanyam et al., 2006), we will explore whether effects of Internet use on depression and social anxiety differ between boys and girls.

## **7.2 Method**

### *Participants*

Participants came from the early adolescent cohort participating in the CONflict And Management Of RElationships study (CONAMORE) (Meeus et al., 2005). Adolescents came from twelve high schools that were randomly selected in the province of Utrecht, the Netherlands. Questionnaires used in the current study were partially gathered at school (i.e., perceived friendship quality, depression, social anxiety) and partially at home (i.e., Internet use). For more details regarding the selection of the school and family sample of CONAMORE, see

Van Doorn, Branje, Meeus (2007). Questionnaires concerning Internet use were only filled out by individuals in the family sample ( $n = 307$ ) at Wave 4. We compared the 307 participants to the 323 non-participants on depression, social anxiety, and perceived friendship at wave 4 and Wave 5. No significant differences (F-values ranging from .19 to .87,  $p > .10$ ) were found between these groups at either wave. From now on we will refer to Wave 4 as Time 1 and to Wave 5 as Time 2.

Of the 307 participants, 150 were boys (48.8 %). At Time 1, the mean age of the adolescents was 15.5 years (ranging from 14 to 17 years,  $SD = 0.6$ ). Most adolescents (99.3 %) named Dutch as their main ethnic identity. Adolescents were relatively highly educated with approximately 51 % of the adolescents at schools preparing for university, 34 % of the adolescents at schools preparing for higher professional education, and 15 % of the adolescents at schools preparing for blue-collar work.

### *Procedure*

Before the study, both adolescents and their parents received written information and, if the adolescent wished to participate, were required to provide written informed consent. Interviewers visited the schools and asked participating adolescents to gather in classrooms to fill out a questionnaire. Interviewers also visited the families at home. During these home visits, adolescents filled out an additional questionnaire. Results were processed anonymously. Each wave, families received € 27,- for participating and adolescents received an additional amount of € 10,- for participating at school.

## Measures

*Depression.* Depression was assessed with the Children's Depression Inventory (CDI; Kovacs, 1992). This questionnaire contains 27 items. Example items include: "I feel sad all the time", "I often think other people do not like me", and "I hate myself". The items were scored on a 3-point scale, ranging from *false*, through *a bit true*, to *true*. A summed, total score was computed by adding the responses of all items. The CDI is a well-established instrument for measuring depression in non-clinical samples of children and adolescents (Craighead et al., 1998; Kovacs, 1992). The recommended clinical cut-off score used in community samples is 19 (Craighead, Curry, & Ilardi, 1995; Craighead et al., 1998). In the current sample, this means that 4.8% ( $n=15$ ) of the total sample score above the clinical cut-off score, which is comparable to what prior studies in the United States have found (Craighead et al., 1998). Furthermore, the mean score on depression for this specific sample ( $M = 5.19$ ) was considerably lower than those reported for clinical samples ( $M = 12.56-16.25$ ) (Comer & Kendall, 2005; Craighead et al., 1998). The internal consistencies of this measure were .93 and .89 at Time 1 and 2, respectively.

*Social Anxiety.* Social anxiety was measured by the Social Anxiety subscale of the revised version of the Screen for Child Anxiety Related Emotional Disorders (SCARED; Hale et al., 2005). The items were scored on a 3-point scale, ranging from *almost never*, through *sometimes*, to *often*. This scale contained 4 items: "I do not like to be around people I do not know", "I get nervous around people I do not know well", "I find it hard to talk to people I do not know", and "I get shy around people I do not know well". A total score was obtained by summing the responses to each item. Although no clinical cut-off scores are available for this measure, prior research among early to

middle adolescents showed that this subscale of the SCARED is a valid measure of social anxiety in both non-clinical samples (Hale et al., 2005) and clinical samples (Birmaher et al., 1999). Furthermore, it has been demonstrated that the SCARED has strong sensitivity and specificity when compared with the Anxiety Disorders Interview Schedule for Children (A-DISC) in a study of schoolchildren (Muris, Merckelbach, Korver, & Meesters, 2000). The mean score and variances on social anxiety for this specific sample ( $n = 307$ ) did not differ significantly ( $p > .10$ ) from means and variances of the total sample ( $n = 728$ ). The internal consistencies of the social anxiety scale were .92 and .90 at Time 1 and 2, respectively.

*Internet Use.* Adolescents were asked to fill out questions about Internet only if they ever used it. Of the 309 participating adolescents in the family sample, 307 (97.5%) filled out questions about using Internet, namely surfing and IM-ing. Participants were first asked to make an estimation of the average weekly frequency spent chatting or surfing on a five-point scale, ranging from “never”, through “less than once a week”, through “about once a week”, through “several times a week”, to “every day”. Further, participants estimated how much time on average they spent on an average weekly session of surfing and IM-ing on a four-point scale, ranging from *shorter than half an hour*, through *half an hour to an hour*, through *longer than an hour*, to *longer than two hours*. The total time adolescents spent surfing and IM-ing on average a week was calculated by multiplying the frequency they used IM-ing and surfing during the week by the time they spent IM-ing and surfing, respectively.

*Perceived Friendship Quality.* The Support scale of the Network of Relationship Inventory (NRI; Furman & Buhrmester, 1985) was used to assess the target adolescent’s perceived quality of the best friend-

ship. This scale contained 12 questions, such as: “How often do you turn to your best friend for support with personal problems?”. Participants were asked to answer questions about relationship characteristics on a five-point scale (1 = *never*, 5 = *always*). The NRI has good predictive, factorial, and construct validity (Buhrmester & Furman, 1987; Furman, 1996). Internal consistencies of support were .89 and .91 at Time 1 and 2, respectively.

### *Statistical analysis*

To examine the effects of Internet use on depression and social anxiety, two series of hierarchical regression analyses were performed: one with depression at Time 2 as dependent variable, and one with social anxiety at Time 2 as dependent variable. For each step, we tested whether adding the additional variables resulted in a significant ( $p < .05$ ) increase in explained variance. In step 1, we entered gender (0 = male, 1 = female), depression, and social anxiety at Time 1 to predict depression and social anxiety at Time 2. In step 2, perceived friendship quality, time spent IM-ing, and time spent surfing at Time 1 were used to predict depression and social anxiety at Time 2, thereby controlling for the previously entered variables. In step 3, we included four additional variables: the interaction between IM-ing and friendship quality at Time 1, the interaction between surfing and friendship quality at Time 1, the interaction between gender and IM-ing at Time 1, and the interaction between gender and surfing at Time 1. All independent variables were centred to avoid multicollinearity.

If in the last step one of the interaction terms was significant, we used post-hoc testing according to formulas of Aiken and West (1991) for the variables included in the significant interaction term in question. Finally, we explored differences between boys and girls in interaction effects between Internet use and perceived friendship

quality by entering three-way interaction between perceived friendship quality, IM-ing, and gender, as well as the three-way interaction between perceived friendship quality, surfing, and gender, while controlling for all previously mentioned independent variables.

### 7.3 Results

#### *Descriptives.*

In Table 7.1, descriptive results of Internet use and internalizing problems for the total sample. Additionally, we examined differences between the low, medium, and high perceived friendship quality groups, to provide more insight into the moderating role of friendship quality in the link between Internet use and internalizing problems. A MANOVA showed significant mean differences between the low, medium, and high best friendship quality groups regarding means of Internet use, depression at Time 1 and Time 2, and social anxiety at Time 1 and Time 2:  $F(14, 590) = 5.28, p < .01$ . Bonferoni post-hoc tests showed that adolescents with low perceived friendship quality spent significantly ( $p < .05$ ) less time IM-ing than adolescents with high perceived friendship quality at Time 1. In addition, adolescents with low perceived friendship quality reported significantly ( $p < .01$ ) higher depression and social anxiety at both Time 1 and Time 2 compared to adolescents with medium to high friendship quality. A chi-square test showed no significant differences in the frequency distribution of the three groups made by using perceived friendship quality only at Time 1 compared to the frequency distribution of the three groups made by using perceived friendship quality only at Time 2:  $\chi^2 = 11.5, df = 4, p > .05$ . This suggests that few individuals changed between the three friendship quality groups over time.

Table 7.1

*Descriptive Statistics of Internet Use and Internalizing Problems by Low, Medium, and High Perceived Friendship Quality Groups*

Dimension	Mean (SD)			
	All (N = 307)	Low (N = 81)	Medium (N = 165)	High (N = 61)
T1 Perceived friendship quality	3.87 (.92)	2.89 (.42)	3.85 (.38)	4.86 (.20)
T2 Perceived friendship quality	3.86 (.74)	2.91 (.38)	3.85 (.31)	4.83 (.23)
T1 IM-ing	8.24 (4.83)	7.42 (4.53) <sup>a</sup>	8.01 (4.94) <sup>ab</sup>	9.23 (5.02) <sup>b</sup>
T1 surfing	7.85 (4.28)	8.07 (4.22) <sup>a</sup>	7.69 (4.11) <sup>a</sup>	7.64 (4.41) <sup>a</sup>
T1 Depression	1.23 (.22)	1.32 (.22) <sup>a</sup>	1.21 (.16) <sup>b</sup>	1.18 (.25) <sup>b</sup>
T1 Anxiety	1.24 (.25)	1.29 (.23) <sup>a</sup>	1.21 (.22) <sup>b</sup>	1.20 (.28) <sup>b</sup>
T2 Depression	1.25 (.19)	1.30 (.20) <sup>a</sup>	1.22 (.15) <sup>b</sup>	1.17 (.21) <sup>b</sup>
T2 Anxiety	1.23 (.23)	1.27 (.22) <sup>a</sup>	1.23 (.24) <sup>b</sup>	1.20 (.25) <sup>b</sup>

*Note.* Numbers in each cell refer to means and standard deviations (between brackets), respectively. Differing superscripts (<sup>a, b</sup>) indicate significant ( $p < .05$ ) differences between low, medium, and high quality groups.

*Longitudinal Associations between Internet Use, Friendship Quality, Depression, and Social Anxiety over Time*

Table 7.2 shows the results of the hierarchical regression analyses concerning the longitudinal associations of Internet use and perceived friendship quality with depression and social anxiety at Time 2. In step 1, gender, depression, and social anxiety at Time 1 were used to predict depression and social anxiety at Time 2. Results showed that variance explained by these variables was significant:  $F(3, 303) = 46.09, p < .05$ , for depression, and  $F(3, 303) = 57.22, p < .05$ , for social anxiety. First, girls tended to be more depressed and more socially anxious than boys.

Table 7.2

*Longitudinal Associations between Depression, Social Anxiety, Internet Use and Friendship Quality at Time 1 and Depression and Social Anxiety at Time 2*

	Depression T2	Social anxiety T2
Step 1		
Sex (1 = female)	.15**	.08*
Social anxiety T1	.10*	.61**
Depression T1	.50**	.02
<i>R<sup>2</sup> change</i>	.29**	.38**
Step 2		
Sex (1 = female)	-.05	-.06
Social anxiety T1	.09*	.59**
Depression T1	.49**	.02
IM-ing T1	-.03	-.01
Surfing T1	.06	.02
Friendship quality T1	-.03	-.08
<i>R<sup>2</sup> change</i>	.01	.01
Step 3		
Sex (1 = female)	-.05	-.06
Social anxiety T1	.08*	.59**
Depression T1	.49**	.02
IM-ing T1	-.02	-.00
Surfing T1	.06	.02
Friendship quality T1	-.02	-.05
IM-ing T1 * Friendship quality T1	-.23**	.03

*Table 7.2 continues*

Table 7.2 continued

	Depression T2	Social anxiety T2
Surfing T1 * Friendship quality T1	.20**	.13*
Sex * IM-ing T1	.00	.00
Sex * surfing T1	.00	.01
<i>R<sup>2</sup> change</i>	.09**	.02*
<i>Total R<sup>2</sup></i>	.38	.40

Note. All independent variables were centred. T1 = Time 1; T2 = Time 2;

\*  $p < .05$ ; \*\*  $p < .01$

Further, medium rank-order stability of depression and social anxiety was found across a one-year period. In step 2, we examined main effects of Internet use as well as perceived friendship quality on depression and social anxiety over time. Therefore, IM-ing, surfing, and friendship quality at Time 1 were additionally included in the regression analyses. Results showed that variance explained by these variables did not significantly whole; both IM-ing and surfing are not longitudinally associated with depression and social anxiety over time.

Next, we tested whether perceived friendship quality moderated longitudinal associations between Internet use and internalizing problems. Thus, at step 3, we included the interactions of friendship quality with IM-ing and surfing at Time 1, while controlling for all previous effects. Interactions of gender with IM-ing and surfing were also included. Results showed that variance explained by these variables increased significantly for depression

( $F(10, 296) = 25.09, p < .05$ ) and for social anxiety ( $F(10, 296) = 10.22, p < .05$ ). Specifically, whereas the interaction between IM-ing and perceived friendship quality predicted less depression at Time 2, the interaction between surfing and perceived friendship quality at Time 1 predicted more depression at Time 2. Further, the interaction between surfing and perceived friendship quality at Time 1 predicted more social anxiety at Time 2. Interaction effects of gender with IM-ing and surfing at Time 1 on depression and social anxiety at Time 2 were not significant, indicating that effects of IM-ing and surfing on depression and social anxiety did not differ between boys and girls.

We used post-hoc testing according to Aiken and West's (1991) formulas to follow up the significant interactions, assessing the effect of IM-ing and surfing for groups of adolescents with low, medium and high friendship quality. We trichotomized friendship quality as follows. Scores one standard deviation above and below the mean of perceived friendship support at Time 1 were used to make three perceived friendship quality groups. Those adolescents scoring one standard deviation below the mean at Time 1 were labeled low friendship quality group ( $n=81$ ) and those scoring one standard deviation above the mean at Time 1 were labeled high friendship quality group ( $n=61$ ). Other adolescents were labeled medium friendship quality group ( $n=165$ ).

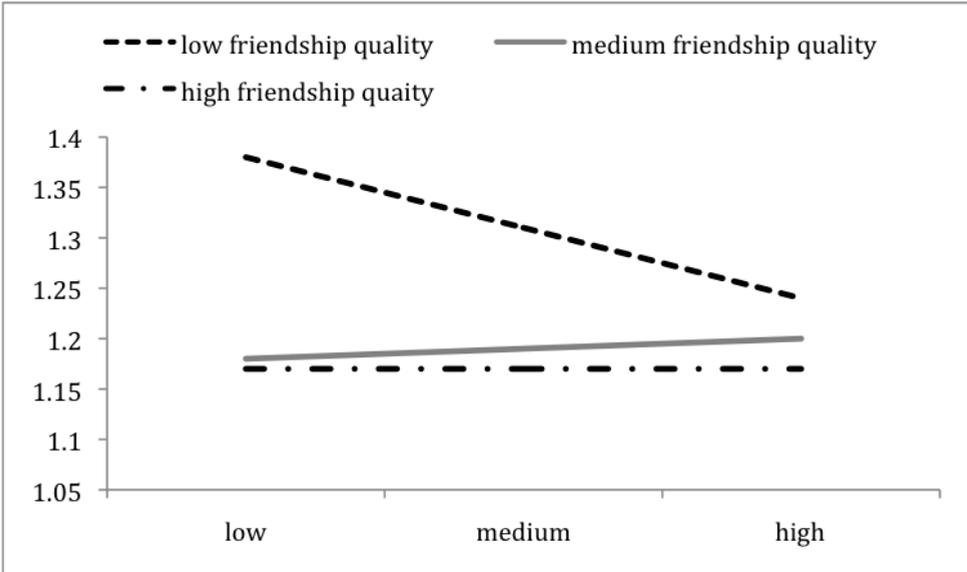


Figure 7.1. Associations between IM-ing at Time 1 and depression at Time 2 for adolescents with low, medium, and high perceived friendship quality.

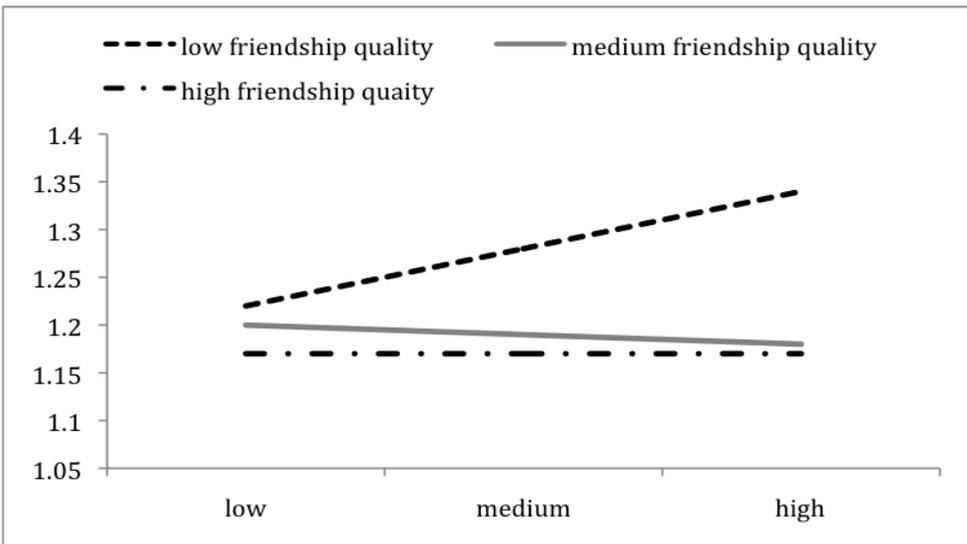


Figure 7.2. Associations between surfing at Time 1 and depression at Time 2 for adolescents with low, medium, and high perceived friendship quality.

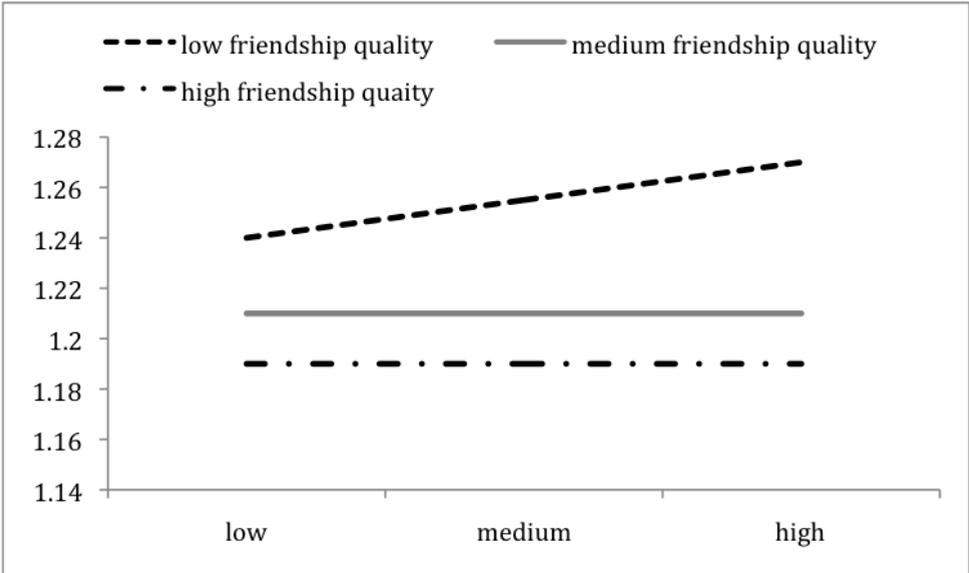


Figure 7.3. Associations between surfing at Time 1 and social anxiety at Time 2 for adolescents with low, medium, and high perceived friendship quality.

First, higher levels of IM-ing at Time 1 were associated with less depression at Time 2 only for adolescents with low friendship quality (see Figure 7.1:  $\beta = -.27, p < .01; \beta = .03, p > .05; \beta = .02, p > .05$ , for low, medium, and high friendship quality, respectively). Second, higher levels of surfing at Time 1 were associated with more depression at Time 2 only for adolescents with low friendship quality (see Figure 7.2:  $\beta = .33, p < .01; \beta = .04, p > .05; \beta = .05, p > .05$ , for low, medium, and high friendship quality, respectively). Third, higher levels of surfing at Time 1 were associated with more social anxiety at Time 2 only for adolescents with low friendship quality (see Figure 7.3:  $\beta = .22, p < .01; \beta = .01, p > .05; \beta = .03, p > .05$ , for low, medium, and high friendship quality, respectively).

Finally, we explored three-way interactions between perceived friendship quality, IM-ing, and gender, and between perceived

friendship quality, surfing, and gender to test whether boys and girls differ in interaction effects between internet use and perceived friendship quality. Because none of these three-way interaction terms ( $F(2, 303) = 1.02, p > .05$ , for depression, and  $F(2, 303) = 0.33, p > .05$ ), for social anxiety) added significantly to the model, we omitted these interaction terms from Table 7.2.

In sum, friendship quality seems to moderate longitudinal associations between time spent on the Internet and internalizing problems: only for adolescents with a low perceived quality of friendship, time spent IM-ing predicted less depression, and time spent surfing predicted more depression and social anxiety over a one-year period. In the group that perceived medium to high friendship quality, no associations between time spent IM-ing or surfing and internalizing problems were found.

## 7.4 Discussion

The current study examined the longitudinal associations between time spent on Internet activities for communication purposes (i.e., IM-ing) and time spent on Internet activities for non-communication purposes (i.e., surfing) with depression and social anxiety. Results showed no longitudinal associations between either time spent IM-ing or time spent surfing and changes in internalizing problems for the sample as a whole. Although a previous study has found IM-ing to predict more depression over a six month period (Van den Eijnden et al., 2008), this study did not take the unique associations of IM-ing and surfing with depression into account. Effects of IM-ing on internalizing problems may be confounded with effects of surfing on internalizing problems, because adolescents who spend more time IM-ing also tend to spend more time surfing (Subrahmanyam,

Greenfield, Kraut, & Gross, 2001). The results of the current study suggest that IM-ing or surfing do not affect adolescent internalizing problems for adolescents in general. Thus, no support was found for generalized “bad versus good” effects of Internet use on youth, and therefore the context in which Internet use occurs needs to be taken into account.

As expected, we found that the social context in which Internet use occurs moderates effects of Internet use on internalizing problems, perhaps because the social context pertains to how the Internet is used (Kraut et al., 1998; McKenna, 1999; Valkenburg & Peter, 2007c). For adolescents with low quality friendships, surfing longitudinally predicted more depression and more social anxiety. Time spent surfing may have adverse effects on well-being only for these adolescents because especially for these adolescents, surfing might be linked with Internet Addiction Disorder (Yang & Tung, 2006). Surfing may be linked to a negative cycle in which going online creates direct gratification, but no long-term gratification (LaRose et al., 2001b). This result provides evidence for what could be called ‘poor-get-poorer’ effects: adolescents with already low quality friendships who spend more time on Internet activities for non-communication purposes may develop more internalizing problems.

In contrast, if adolescents with low quality friendships spend more time IM-ing, they seem to develop less depression over time. IM-ing may increase their chance of getting (or perceiving) social support and may strengthen their social skills, because these adolescents can safely explore peer relationships from behind their computer (Morgan & Cotten, 2003; Peter et al., 2005; Subrahmanyam et al., 2006). However, no longitudinal social compensation effects were found for social anxiety: IM-ing did not predict less social anxiety over time for adolescents who perceive low friendship quality. Although for adolescents with low social skills IM-ing might increase the feeling

that one is supported and as such lead to less depression (Peter et al., 2005), results of the current study confirm suggestions that IM-ing does not reduce the fear of 'off-line' social situations (Campbell et al., 2006). Future research should examine whether increased social skills and perceived social support are indeed the mechanisms that explain the link between IM-ing and the development of less depression.

Even though results showed that adolescents with high quality friendships use IM-ing even more than adolescents with low quality friendships, no support was found for rich-get-richer effects: surfing and IM-ing seem to have neither beneficial nor detrimental effects on internalizing problems of adolescents with high quality friendships. These adolescents may be less prone to adverse influences from Internet activities for non-communication purposes as they have a high quality friendship to fall back upon. At the same time, they may not need Internet activities for communication purposes due to already strong social skills or strong ties to friends (Peter et al., 2005). Note that all the previously discussed results apply to both boys and girls, which is consistent with recent evidence showing gender differences in Internet use and effects of Internet use on well-being to be not as sizeable as they once were (Gross, 2004; Valkenburg et al., 2005).

Several limitations to this study should be noted. First, the sample consisted of relatively highly educated adolescents from two-parent families, and future studies need to examine whether results of the current study can be generalized to other samples. Nevertheless, a study using a sample of adolescents with lower and higher educational backgrounds also showed that online communication was cross-sectionally associated with less social anxiety for adolescents who experienced low closeness to friends (Valkenburg & Peter, 2007a), suggesting that the current results also apply to adolescents with

lower educational backgrounds. Nevertheless, future studies should examine differences between adolescents with low versus high educational backgrounds and adolescents with different family structures regarding effects of Internet use on well-being. Second, the current study assessed the perception of friendship quality by the target adolescent, which may differ from perceptions of the best friends and from objective criteria concerning friendship quality. However, it may be especially the *perception* of friendship quality that is most consequential for Internet use and adolescent adjustment instead of the *actual* friendship quality. For example, whether the friendship actually *is* of low quality may be of minor relevance to adolescent Internet use; the perception of the relationship may guide his or her actions more than the actual state of the relationship. In addition, if self-report data on perceived friendship quality are biased in some way, this bias would be present in all three friendship quality groups and can therefore not explain differences across groups in effects of Internet use on depression and social anxiety. Additional analyses using the perception of the best friend instead of the target adolescent showed similar results, which suggests that these effects are independent of the source of information on friendship quality. A third limitation of the current study is that longitudinal data were available only on depression and social anxiety, not on Internet use. Results only provide evidence for an association between earlier Internet use and later wellbeing. Although the longitudinal design of the current study allows for conclusions about predictive effects of Internet use on subsequent internalizing problems, claims on causality should be made with caution: results cannot definitively prove whether Internet use *leads* to less or more internalizing problems. The causal chain may be different: individuals who feel more depressed and social anxious may start surfing more and IM-ing less. Future studies should examine the bidirectional longitudinal

associations between different types of Internet use and internalizing problems.

In sum, the current study suggests that Internet use has beneficial as well as detrimental effects on adolescent internalizing problems. Whereas Internet use based on communication seems to have beneficial effects on depression for adolescents with poor friendships, Internet use based on non-communication seems to have detrimental effects on these adolescents' depression and social anxiety. Adolescents who report having medium to high quality friendships seem unaffected by either type of Internet use. Thus, models regarding Internet use are needed regarding effects of Internet use on adolescent internalizing problems depending on the type of Internet use and the social context in which Internet use occurs.



## **Chapter 8.**

# **Adolescent Delinquency and Friends' Behaviors<sup>9</sup>**

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<sup>9</sup> Selfhout, M., Branje, S., & Meeus, W. (2008). The development of delinquency and perceived friendship quality in adolescent best friendship dyads. *Journal of Abnormal Child Psychology*, 35, 929-941.

### **Abstract**

The current study examines both the unique and the combined role of best friends' delinquency and perceived friendship quality in the development of adolescent delinquency. Questionnaire data were gathered from 435 Dutch adolescent best friends (mean age at first wave = 12.97) over a period of five years with annual assessments. Results showed that mean levels of delinquency and perceived friendship quality increased over time. Adolescent best friends were highly similar in both mean levels and changes in delinquency over time. For boys, similarity in mean level delinquency between best friends was higher than for girls. In addition, only for boys, friends' delinquency is associated with increases in adolescent delinquency over time, and adolescents' delinquency is associated with increases in friends' delinquency over time. No bidirectional longitudinal associations were found between perceived friendship quality and adolescent delinquency. No interaction effects between friendship quality and friends' delinquency on adolescent delinquency were found. Thus, findings were more in support of the differential association theory than of the social control theory.

## 8.1 Introduction

A growing body of evidence suggests that adolescent delinquency is strongly associated with delinquency of best friends (Ackerman, 2006; De Kemp, Scholte, Overbeek, & Engels, 2006; Fergusson et al., 2002; Haynie & Osgood, 2005; Regnerus, 2002; Van Lier, Vuijk, & Crijnen, 2005; Vitaro, Brendgen, & Tremblay, 2000). However, more research is needed to examine to what extent delinquency of best friends predicts adolescent delinquency over time. Furthermore, although friendship quality may directly affect the development of adolescent delinquency (e.g., Hirschi, 1969; Swenson, 2004), previous studies have not yet examined the longitudinal bidirectional associations between adolescent delinquency and perceived friendship quality. Finally, few studies have examined the interactive effects of both friendship quality and friends' delinquency on adolescent delinquency. The current study examined the developmental trajectories of delinquency from early to middle adolescence for boys and girls separately. In addition, we examined the two major theories of crime and deviance, namely differential association theory (Sutherland, 1947; Sutherland & Cressy, 1978) and social control theory (Hirschi, 1969), in the development of delinquency in friendship dyads. The differential association theory was tested by examining the associations between adolescents' delinquency and best friends' delinquency, by using adolescent and friends' reports on their own delinquency over a period of five years. The social control theory was tested by examining the bidirectional longitudinal associations between perceived friendship quality and adolescent delinquency. Finally, we examined interaction effects between friends' delinquency and perceived friendship quality on adolescent delinquency.

### *The Role of Best Friends' Delinquency*

Several studies have shown that on average, adolescents become more delinquent from early to middle adolescence, and tend to become less delinquent from ages 16 to 17 years onwards (Duncan, Duncan, & Strycker, 2000; Landsheer & Van Dijkum, 2005; Martin, 1998; Meeus, Branje, & Overbeek, 2004; Van Lier et al., 2005; Windle, 2000). Nevertheless, individual differences exist in the developmental trajectories of adolescents and different theoretical explanations have been provided to explain these differences. *Differential association theory* (Sutherland, 1947) is a learning theory that assumes that the motivation to commit delinquent acts is related to social conditions that encourage individuals to behave more delinquent. The basic principle of this theory is “a person becomes delinquent because of an excess of definitions favourable to violation of law over definitions unfavourable to violation of law” (Sutherland, 1947, p. 7). The learning of definitions favourable to violation of the law primarily occurs within intimate personal relationships (Sutherland & Cressy, 1978). Adolescents are more likely to adopt pro-deviant beliefs when associating with friends who are deviant. Thus, the differential association theory predicts that friends' delinquency will influence adolescent delinquency by increasing adolescent delinquent norms.

Many studies examining adolescent delinquency have focused on the role of delinquent behavior of adolescents' best friends (e.g., Fergusson et al., 2002; Kandel, 1978a; Landsheer & Van Dijkum, 2005; Van Lier et al., 2005; Warr, 2002). These studies have controlled for initial selection processes, which make delinquent adolescents tend to choose delinquent friends, when examining influence processes in which interactions with deviant peers stimulate delinquent behavior (Kandel, 1978a; Thornberry & Krohn, 2001). That is, they controlled for stability of delinquency and initial associations between friends'

delinquency and adolescent delinquency when examining the effects of friends' delinquency on adolescent delinquency. Because these latter processes are the focus of the differential association theory, we will examine on these processes when discussing selection versus influence processes. Several studies found evidence for effects of friends' delinquency on adolescent delinquency over time, while controlling for initial similarity in delinquency between friends (Duncan et al., 2000; Fergusson et al., 2002; Lacourse, Nagin, Tremblay, Vitaro, & Claes, 2003). In one of these studies, delinquency of friends are associated with increases in self-reported delinquency over a period of 14 to 21 years, while controlling for initial similarity at the start of the study (Fergusson et al., 2002). However, analyses in which adolescents themselves report on both their own and their friends' delinquent behaviors might overestimate the association between friend delinquency and adolescent's own delinquent behavior because of projection (Bauman & Ennett, 1996; Ennet & Baumann, 1994; Kandel, 1978a; Regnerus, 2002).

A few studies used reports of the friends themselves on their own behavior and found more inconsistent results regarding effects of friends' delinquency on adolescent delinquency. Among 13-14 year old boys, friends' delinquency did not predict increases in adolescent delinquency over a period of two years (Poulin et al., 1999). Similarly, for 11-14 year-olds higher delinquency was associated with the selection of more delinquent friends over a period of 6 months, but friends' delinquency did not predict adolescent delinquency over this period (De Kemp et al., 2006). In contrast, delinquent behavior of mutual best friends was found to be predictive of changes in adolescent delinquency while controlling for prior adolescent delinquency over a period of one to two years for adolescents between ages 12 to 17 (Haynie & Osgood, 2005; Vitaro et al., 2000). Moreover, reductions in adolescent antisocial behavior were related to decreased affiliations

with deviant mutual friends over a period of four years (Van Lier et al., 2005). In sum, these longitudinal studies provide inconsistent support for longitudinal effects of best friends' delinquency on adolescent delinquency.

### *The Role of Quality of Friendships*

Perceived friendship quality may be another important factor in the development of adolescent delinquency (e.g., Haynie & Osgood, 2005; Poulin et al., 1999). *Social control theory* posits that variations in the strength of social bonds produce variations in rates of deviance. Weakly bonded individuals are more likely to engage in law violation if the course of action appears beneficial (Hirschi, 1969). By increasing the anticipated costs of deviance, social bonds reduce the likelihood of its occurrence. Thus, according to the basic premise of social control theory, the greater an individuals' social attachments to significant others, such as family, friends, and teachers, the lower the probability of engaging in deviance.

Theoretically, social control theory would predict that a stronger bond between adolescent and his or her best friend would inhibit the development of delinquent behavior. That is, if an adolescent has a strong emotional bond to a best friend, he or she is less likely to behave defiantly because that will increase the risk of losing their high quality friendship. Research on the associations between perceived friendship quality and delinquency shows inconsistent results. Supporting the social control theory, higher perceived friendship quality was found to be negatively associated with less delinquency in cross-sectional studies (Junger-Tas, 1992; Lansford et al., 2003; Rankin, 1976; Swenson, 2004). Nevertheless, positive cross-sectional associations have also been found between perceived friendship quality and delinquency (Barton & Figueira-McDonough,

1985; Conger, 1976; Gardner & Shoemaker, 1989; Hindelang, 1973; Shoemaker, 1994), suggesting that a stronger bonding with friends is associated with *more* delinquency. Several cross-sectional studies (Baerveldt, Van Rossem, & Vermande, 2003; Johnson, 2003; Matsueda, 1982; Solomon, 2006) found no significant correlations between friendship quality and adolescent delinquency. Moreover, several short-term longitudinal studies on this topic (Haynie & Osgood, 2005; McElhaney, Immele, Smith, & Allen, 2006; Poulin et al., 1999; Zimmerman, Ramirez-Valles, Zapert, & Maton, 2000) failed to find any direct effects of perceived friendship quality on adolescent delinquency. Thus, to what extent friendship quality can prevent the development of adolescent delinquency remains unclear.

### *Interaction between Friends' Delinquency and Perceived Friendship Quality*

Because adolescent friendships are multidimensional and perceived friendship quality exists along side with delinquent behaviors of the best friend, effects of perceived friendship quality and delinquent behavior of the friend may interact in affecting adolescent delinquency. Both differential association theory and social control theory suggest an interaction of perceived friendship quality and friends' delinquency, although the interpretation of the interaction is slightly different. Differential association theory suggests that friendship quality moderates the effect of friends' delinquency on adolescent delinquency. Opp (1974) proposed that a stronger attachment between individuals will lead to stronger excess of positive definitions of deviant behavior, which in turn will lead to more delinquent behavior. In other words, friendship quality enhances the negative effects of best friends' delinquency on adolescent delinquency. Social control theory suggests that friends' delinquency

moderates the effect of friendship quality on the development of adolescent delinquency. Social control theory proposes that bonding to more conventional institutions, including peers, reduces the risk of developing delinquency, because specifically the conventional norms will refrain them from performing delinquent acts (Hirschi, 1969). In other words, if an adolescent friend has a less delinquent friend, higher friendship quality predicts less adolescent delinquency. If, on the other hand, an adolescent friend has a more delinquent friend, higher friendship might predict more adolescent delinquency. Thus, although social control theory and differential association theory emphasize different main effects on adolescent delinquency, with social control theory emphasizing perceived friendship quality and differential association theory emphasizing friends' delinquency, both suggest that these two factors might interact in predicting adolescent delinquency .

Several studies have examined the moderation of best friends' delinquency effects by perceived friendship quality. For example, early adolescents with high peer acceptance and high perceived friendship quality were found to be more apt to conform to friends' alcohol and cigarette use (Urberg, Luo, Pilgrim, & Degirmencioglu, 2003). Furthermore, adolescents who identified more strongly with their friends also showed stronger cross-sectional associations between perceived friends' delinquent behaviors and adolescents' norms regulating deviancy (Bruinsma, 1992). Thus, following this line of reasoning, best friends' delinquency can be expected to predict increases in adolescent delinquency more in high quality friendships than in low quality friendships. However, the extent to which friends' delinquency moderates longitudinal effects of friendship quality on adolescent delinquency needs to be further examined.

*Moderation of Gender, Friendship Stability, and Reciprocity*

Because most theories and studies of delinquency only focus on boys' delinquency in adolescence (Moffit, Caspi, Dickson, Silva, & Stanton, 1996), relatively little is known about the correlates of developmental trajectories of delinquency for girls. One study showed that the developmental trajectories of status violations, aggression, and property violations were not different in shape for girls and boys from age 4 to 18 years (Bongers, Koot, Van der Ende, & Verhulst, 2004). In addition, boys may be more influenced by their friends' delinquency than girls (Ackerman, 2006; Heinze, Toro, & Urberg, 2004). For example, adolescent delinquency was found to be cross-sectionally associated to the number of delinquent peers more strongly for boys than for girls (Heinze et al., 2004). Nevertheless, it remains unclear to what extent gender moderates the effects of friends' delinquency on subsequent adolescent delinquent behavior.

Furthermore, prior studies have suggested that similarity in delinquency between friends may be moderated by specific friendship characteristics, namely reciprocity of the friendship (Hicks, 2006) and friendship stability (Brendgen et al., 2000; Griffon-Smith & Brownwell, 2003; Urberg et al., 1998). That is, if the friendship is more intimate as indicated by higher stability and reciprocity, friends are thought to resemble each other more in delinquent behaviors because they are more intimate and have more opportunities to influence one another (Griffon-Smith & Brownwell, 2003). For example, in early to middle adolescence, similarity in delinquency between friends has been found to be higher in stable friendships than in unstable friendships (Urberg et al., 1998). Furthermore, early adolescents' alcohol use was found to be predicted more by reciprocated friends' alcohol use than by unreciprocated friends' alcohol use (Hicks, 2006). However, the moderating role of friendship stability and reciprocity of friendship

in longitudinal effects of friends' delinquency and friendship quality on adolescent delinquency needs further examination.

### *The Current Study*

As shown in the discussion of prior studies concerning the associations between friends' delinquency, friendship quality, and adolescent delinquency, further long-term longitudinal research using more measurement waves is needed to investigate the differential association theory and the social control theory simultaneously when examining the development of delinquent behavior. The current study will use Longitudinal Growth Modelling (LGM) to examine effects of friends' self-reported delinquency on adolescents' delinquency over a period of five years with annual measurements, while controlling for initial similarity in delinquency prior to the first wave of the study. One advantage of using LGM over the more commonly used autoregressive models is that mean developmental trajectories of delinquency as well as individual differences in and association between friends in these trajectories can be modelled instead of associations between changes in rank-order distribution of scores only. In autoregressive models, a cross-lagged positive regression coefficient may indicate that one variable leads to an increase in a second variable, but the mean scores on the second variable may actually decline for everyone in the sample. When using LGM, the variability in each individual's trajectory of delinquency is investigated in terms of initial status (intercept) and rate of growth (slope). By associating variances of mean intercepts and slopes of different variables with each other, one is modelling inter-individual differences in associations between developmental trajectories of delinquency and developmental trajectories of friends' delinquency and friendship quality. Therefore, LGM offers the opportunity to

investigate the mean level development of delinquency from early to middle adolescence, as well as examining to what extent the rate of increases or decreases in development of delinquency are associated with the development of friends' delinquency and friendship quality. In addition, by examining LGM's over a relatively long time-frame with multiple measurements, bidirectional associations between friends' delinquency and friendship quality on the one hand and adolescent delinquency on the other can be modelled as a continuous process instead of focusing on time-to-time effects as usually is done in autoregressive models. Therefore, LGM can provide new insights into the mean development of adolescent delinquency as well as the longitudinal associations of adolescent delinquency with friends' delinquency and friendship quality over a relatively long timeframe. Additionally, by performing multiple-group analyses, we will examine to what extent friends' delinquency moderates effects of perceived friendship quality on the development of adolescent delinquency, and to what extent perceived friendship quality moderates effects of friends' delinquency on the development of adolescent delinquency.

Finally, we will examine the moderating role of friendship stability and reciprocity of friendship in the longitudinal associations between adolescents' delinquency and their best friends' delinquency with multiple group comparisons. Because comparisons between the effects of best friends' delinquency (first nominated friend) and other friends' delinquency (second, third, or fourth nominated friend) have shown that only the former significantly predicts later deviant behaviors (Vitaro et al., 2000), the current study focuses only on the role of best friends' delinquency in the development of adolescent delinquency.

To summarize, the current study examines the following research questions:

1. In what way does delinquency develop from early to middle adolescence? Based on earlier research, we expect that delinquency increase over time. Although boys are expected to show higher mean levels of delinquency, no gender differences in the growth rate of delinquency are expected to be found.
2. To what extent does best friends' delinquency predict increases in adolescent delinquency over time, controlling for initial similarity in delinquency? According to the differential association theory, friends' delinquency predicts increases in adolescent delinquency over time. Furthermore, the moderating role of gender in these effects will be examined. We expect that associations of delinquency between best friends will be stronger for males than for females. We will examine moderation of gender, friendship stability, and reciprocity of friendship in effects of friends' delinquency on adolescent delinquency.
3. To what extent does the perceived friendship quality predict the development of adolescents' delinquency? According to the social control theory, perceived friendship quality predicts less adolescent delinquency over time. In addition, we will explore whether adolescent delinquency predicts best perceived friendship quality over time as well as whether there are gender differences in the bidirectional associations between perceived friendship quality and adolescent delinquency. We will examine moderation of friendship stability and reciprocity of friendship in effects of friendship quality on adolescent delinquency

4. To what extent does perceived friendship quality moderate the longitudinal associations between adolescents' delinquency and friends' delinquency? Two hypotheses will be tested

a. According to social control theory (Hirschi, 1969), perceived friendship quality predicts less adolescent delinquency when friends' delinquency is low.

b. According to differential association theory (Opp, 1974), friends' delinquency predicts more adolescent delinquency in particular when perceived friendship quality is high.

## 8.2 Method

### *Participants*

Participants in this study were 435 adolescents and their best friends selected from 938 respondents of the early adolescent cohort participating in the CONflict And Management Of RELationships study (CONAMORE) (Meeus et al., 2005). CONAMORE is an ongoing longitudinal study that examines the relationships of Dutch adolescents with parents and peers as well as their emotional states. In the current study, data were used from annual waves one to five. Four steps were used to select best friendship dyads. First, adolescents were excluded if they did not nominate a best friend who participated in the study at two or more waves ( $n = 343$ ). Next, if there was a friendship dyad that was mutual at a specific wave (i.e., A selected B as best friend and B selected A as best friend), half of them were randomly selected at that wave to insure that none of the mutual dyad members was already present in the dyadic analyses. This resulted in an exclusion of 112 adolescents with mutual friendships over five waves. In addition, 8 adolescents were excluded from the analyses because they formed mixed-gender friendship dyads across all five waves. Finally, if a best friend was mentioned more than once by different target adolescents, one adolescent was randomly selected, resulting in the exclusion of 40 target adolescents. This resulted in a selection of 435 target adolescents (938-343-112-8-40) who nominated a best friend who participated in the study at two or more waves. The total group and the selected group of adolescents showed no significant ( $p > .10$ ) differences in gender, age, educational level and delinquency at all waves. Note that although non-mutual friendship dyads were retained in all analyses, we controlled for moderation of reciprocity of friendship in effects of friendship quality and friends' delinquency

on adolescent delinquency.

The 435 friendship dyads consisted of 51.5% boys and 48.5% girls. The mean age of all adolescents at the first wave was 12.97 ( $SD = 1.57$ ), with a age range between 11 and 14 years at Wave 1. Note that the 435 adolescents labelled hereafter as target adolescents were the same individuals across waves, whereas the best friends at each wave they were coupled with could change across waves. Best friends in each dyad were unique in the sense that each best friend was not nominated as someone else's best friend at that specific wave.

The attrition was low across the five waves: of the 435 target adolescents, 4.6% ( $n = 20$ ) dropped out at one of the waves. The participants that dropped out of the study did not significantly ( $p > .10$ ) differ from participants that continued the study on gender, age, delinquency, and perceived friendship quality on all five waves. Therefore, we estimated their scores using Full Information Maximum Likelihood within the program Mplus (Muthén & Muthén, 1998-2006). Furthermore, best friends that stayed in the study at all five waves ( $n = 292$ ) and best friends that dropped out at one to three waves ( $n = 43$ ) did not differ significantly ( $p < .05$ ) on all these dimensions. Therefore, we estimated their scores using the same procedure. Because missing data at each wave of either target adolescents or best friends was below 8%, we used the same method to impute scores for adolescents having missing data.

### *Procedure*

Participants came from twelve high schools in Utrecht and surroundings. Parents and students received a letter in which the aims of the study were described and information was given about the option of not participating. Students and their parents were required to provide written informed consent at Wave 1: 99% of participants

eligible for this study decided to do so. Participants completed a series of questionnaires in their classroom after school hours. Teachers of the participants cooperated in this study. They introduced the study to the students and scheduled the questionnaire assessments at hours in which all students could participate. They were paid an amount of € 100,- (around \$ 130,-) at each wave. Furthermore, research assistants, who attended the administration, gave verbal instructions about filling out the questionnaires; written instructions were also included. Confidentiality of their given answers was guaranteed explicitly. For students who were absent on the day of testing a second assessment time was organized. Students who were absent on both days of testing were not assessed. Each wave, respondents received € 10,- (around \$ 13,-) after completing the questionnaires.

### *Measures*

*Best Friendships.* Best friendships were assessed by asking each respondent to name their best friend who was not a brother or sister and not someone they had an intimate relationship with. Of these 435 target adolescents, 145 (33,3%) had the same best friend across all five waves. Furthermore, 97 (22,3%) of the 435 target adolescents had mutual best friends on all waves, although not necessarily the same friends on each wave. Finally, 33 (34,0%) of these 97 adolescents who had mutual friends on all waves had the same best friend across all waves. *Friendship Stability and Reciprocity of Friendships.* Friendship stability was examined by comparing dyads in which target adolescents consistently nominated the same best friend across five waves ( $n = 145$ ) to dyads consisting of target adolescents who nominated another best friend at one or more waves ( $n = 290$ ). Furthermore, reciprocity of the friendship was examined by comparing dyads in which the nominated best friend reciprocated the best

friendship nomination at all waves ( $n = 97$ ) to dyads in which the best friend did not reciprocate the best friendship nomination at one or more waves ( $n = 338$ ).

*Delinquency.* Both the target adolescent and the best friends filled out a questionnaire pertaining to minor delinquency that showed to be reliable in a Dutch adolescent sample (Baerveldt et al., 2003). Respondents were asked to indicate on four-point scales how many times they had committed 14 minor offences, such as shoplifting, petty theft, vandalism, and unarmed fights in the previous twelve months (1 = *never*, 2 = *once*, 3 = *two or three times*, 4 = *four times or more*). A mean score was computed by adding the responses to each item and dividing these scores by the total number of items. Internal consistencies of this measure ranged from .88 to .92 from Wave 1 to Wave 5.

*Quality of Best Friendship.* To assess perceived quality of the best friendship by the target adolescent, the support scale of the short form of the Network of Relationship Inventory (Furman & Buhrmester, 1985) was used. This scale contained 12 questions pertaining to perceived support (e.g., "My best friends supports me when I have problems"). Participants were asked to answer questions about relationship characteristics on a five-point scale (1 = *never*, 5 = *always*). An exploratory factor analysis showed that all 12 items loaded higher than .45 on one factor at each wave. Furthermore, Confirmatory Factor Analyses (CFA) revealed high factor loadings ( $> .41$ ) as well as adequate fit indices ( $(X^2(54, N = 835) > 103.45, p < .01; CFI's > .98, RMSEA's < .04)$  in models in which all items loaded on one single factor. Internal consistencies of this measure ranged from .92 to .95 from Wave 1 to Wave 5.

*Strategy of analyses*

Several steps were undertaken to answer the research questions. First, to examine the development of adolescents' delinquency, best friends' delinquency, and quality of best friendship as perceived by the adolescent over five waves (research question 1), we examined univariate latent growth curve models (LGM) in Mplus (Muthén & Muthén, 1998-2006) for each of the three dimensions separately. Different types of latent growth models were estimated to determine which growth model best applied the data, that is, no growth, linear growth, freely estimated growth, or quadratic growth (Duncan, Duncan, Strycker, Li, & Alpert, 1999). This was done by using chi-square difference tests to see which model fitted the data best. Furthermore, the fit of the final model was evaluated by examining RMSEA's, and CFI's. RMSEA's smaller than .05 and CFI's larger than .95 indicate adequate fit of the model (Kline, 1998). Intercepts and slopes within the same growth model were correlated because this significantly improved the fit in all models.

Second, a multivariate longitudinal growth model (see Figure 8.3) was examined, in which associations between the three growth curves were simultaneously estimated: delinquency of the target adolescent over the five waves, delinquency of the best friend over five waves, and quality friendship perceived by the target over five waves. This way, associations between friends' delinquency and adolescent delinquency (differential association theory) and associations between perceived friendship quality and adolescent delinquency (social control theory) can be compared (research questions 2 and 3), respectively. Because members of a best friendship are indistinguishable in the sense that there is no consistent, clear way to order the two members, we followed the procedure of Olsen and Kenny to estimate LGM's for interchangeable dyads. When using this

procedure, the mean level development of delinquency is modelled simultaneously for both dyads members but by adding constraints to the model, this mean level development is held constant for both dyad members. Specifically, estimated loadings on the growth factor, the means of the slopes and intercepts, the variances of the slopes and intercepts, and the variances of the measurement errors at each measurement wave were constrained to be equal for both friends. This way, dependency in delinquency reported by the adolescent and delinquency reported by the best friend because of nesting of individuals in friendship dyads was controlled for. This approach is equivalent to a multilevel latent growth curve approach, because means and variances of intercepts and slopes are constrained to be equal within dyads. The intercept and slopes of delinquency reported by target adolescent were correlated with the intercept and slopes reported by best friend. Note that unconstraining the means of intercepts and slopes of the adolescent and the best friend did not significantly ( $p > .10$ ) worsen the fit, indicating that adolescent delinquency and friends' delinquency develop similarly from early to middle adolescence.

The intercept and slope of the target adolescent's delinquency were further correlated with both the intercept and the slope of perceived quality friendship by the target adolescent, to examine whether mean levels and change over time in delinquency were related to mean levels and change over time in friendship quality as perceived by the target adolescent. Note that in the upper part of the model the social control theory (i.e., associations between perceived friendship quality and adolescent delinquency) is tested, whereas in the lower part of the model the proposition of the differential association theory (i.e., associations between best friends' delinquency and adolescent delinquency) are tested. Thus, in this model, associations between friends' delinquency with adolescent delinquency are controlled for

associations between perceived friendship quality and adolescent delinquency and vice versa.

To examine moderating effects of gender, stability of friendship, and reciprocity of the friendship in the multivariate longitudinal growth model, multiple group analyses were run in which each of the means, variances, and correlations were unconstrained one by one between boys ( $n=224$ ) versus girls ( $n=211$ ), stable ( $n=147$ ) versus nonstable ( $n=288$ ) friends, and mutual ( $n=97$ ) versus nonmutual ( $n=338$ ) friendships. If unconstraining one parameter significantly improved the fit, confidence intervals of this parameter for the groups were examined to determine differences between parameters.

Finally, to examine the interactions between friendship quality and friend delinquency (research question 4), we tested two moderation models. To examine the moderating effect of perceived friendship quality on the longitudinal associations between friends' delinquency and adolescent delinquency, we estimated a multi-group model in which the effects of friends' delinquency on adolescent delinquency were compared between a low quality friendship group and a high quality friendship group, using the method of Kenny and Olson. Girls and boys were divided separately into two (almost) equal groups of lower and higher perceived friendship quality through a median split of the mean perceived support score across all waves. This was done for boys and girls separately because girls scored higher on quality of friendship and otherwise the low quality would consist primarily of boys and the high quality group would consist primarily of girls. This resulted in a low quality ( $n=217$ ) and high quality group ( $n=218$ ). Thus, a total of four groups were examined in the multiple group analyses: low quality males ( $n=112$ ), low quality females ( $n=105$ ), high quality males ( $n=112$ ), and high quality females ( $n=106$ ). Correlations between friends were unconstrained one by one across the low and high quality groups in multi-group

analyses. Next, interaction effects of gender by perceived quality were examined by unconstraining means, variances, and correlations across the four groups.

Second, to examine the moderating role of friends' delinquency on associations between perceived friendship quality and adolescent delinquency, we made a delinquent and a non-delinquent group for boys and girls separately. Those participants committing at least one delinquent act across all five waves (33.1% for girls and 53.7% for boys, respectively) were labelled the delinquent groups and those who did not commit at least one delinquent act across all five were labelled the non-delinquent groups. We performed the same multi-group analyses as used when examining the moderating role of perceived friendship quality on associations between friends' delinquency and adolescent delinquency. Interactions effects of gender by friends' delinquency were examined by unconstraining means, variances, and correlations across the four groups.

### **8.3 Results**

#### *Descriptives*

Table 8.1 provides the descriptives of delinquency of adolescent, delinquency of best friend, and perceived quality of friendship by the adolescent. These descriptives show that on average, males tend to score higher on delinquency reported by the adolescent and delinquency reported by the friend than females. Furthermore, the scores of delinquency seem to increase over time. Scores on quality of best friendship seem to be higher for females than for males, and also seem to increase over time.

Table 8.1  
*Descriptives of Delinquency and Perceived Friendship Quality by Sex*

	Wave 1				Wave 2				Wave 3			
	Boys		Girls		Boys		Girls		Boys		Girls	
	<i>M</i>	<i>SD</i>										
Delinquency target	1.21	.38	1.05	.32	1.22	.38	1.07	.15	1.23	.34	1.08	.16
Delinquency friend	1.21	.44	1.04	.42	1.23	.26	1.06	.12	1.23	.35	1.08	.12
Perceived friendship quality target	2.70	.78	3.32	.78	2.77	.69	3.38	.69	2.80	.73	3.39	.69
	Wave 4				Wave 5							
	Boys		Girls		Boys		Girls					
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>				
Delinquency target	1.25	.39	1.09	.18	1.26	.38	1.07	.15				
Delinquency friend	1.24	.25	1.09	.19	1.26	.26	1.06	.12				
Perceived friendship quality target	2.89	.71	3.52	.69	2.97	.69	3.38	.69				

*Note.* Boys: *n* = 224; Girls: *n* = 211.

*Univariate LGM Analyses: Change of Delinquency and Perception of Friendship Quality*

These patterns in delinquency of adolescent, delinquency of best friend, and perceived quality of friendship were modelled in three univariate latent growth curve models. Fit statistics indicated that for all three univariate models, linear models fit the data best compared to no growth, free growth, and quadratic growth models: final models showed the lowest chi-square values (Table 2). Means and variances of intercepts and slopes of the final models are shown in Table 2. Figure 1a and Figure 1b show the developmental trajectories of adolescent and friends' delinquency as well as perceived friendship quality from age 12 to age 16 (i.e., Wave 1 to Wave 5, respectively) by sex. Intercepts in all models had significant variance, indicating that adolescents differ in the mean levels of delinquency and mean levels of quality of friendship. There was a significant positive slope for delinquency of both the adolescent and the best friend, indicating that on average, delinquency increased over time. Furthermore, the variances of the slopes of delinquency of both the adolescent and the friend were significant, indicating that adolescents and best friends differ in the rate they change in delinquency over the five years. The mean slope of quality was significant and positive, indicating that on average, perceived friendship quality increases over time. In addition, there was significant variance in the slope of perceived friendship quality, indicating that adolescents differ in the rate they change in perceived support over the five years.

Table 8.2

*Fit Indices and Final Parameter Estimates of Univariate Latent Growth Curve Models*

Dimension	<i>Df</i>	$\chi^2$	RMSEA	CFI	$\Delta\chi^2$	$\Delta df$	<i>p</i> (d)
Delinquency target							
No growth	11	38.10	.06	.94			
Linear growth	10	16.85	.02	.96	21.25	1	<i>p</i> <.01
Free growth	9	19.09	.04	.92	-2.24	1	<i>p</i> >.05
Quadratic growth	6	13.17	.02	.96	3.68	4	<i>p</i> >.05
Final Model	10	16.85	.02	.96			
Delinquency friend							
No growth	11	29.04	.05	.93			
Linear growth	10	15.93	.02	.97	13.11	1	<i>p</i> <.01
Free growth	9	18.94	.02	.97	-3.01	1	<i>p</i> >.05
Quadratic growth	6	14.12	.02	.97	1.81	4	<i>p</i> >.05
Final Model	10	15.93	.02	.97			
Perceived friendship quality target							
No growth	11	38.90	.06	.91			
Linear growth	10	20.64	.04	.96	18.26	1	<i>p</i> <.01
Free growth	9	18.63	.04	.96	2.01	1	<i>p</i> >.05
Quadratic growth	6	13.81	.03	.96	6.83	4	<i>p</i> >.05
Final	10	20.64	.04	.96			

*Note.* RMSEA = Root mean square error of approximation; CFI = Comparative fit index. <sup>a</sup> All slope factors were fixed at 2, 3, and 4, respectively, to estimate linear growth.

\* *p* < .05. \*\* *p* < .01. \*\*\* *p* < .001.

Table 8.3

*Model Comparisons and Fit Indices for Nested Models with Sex as Moderator*

Model	$\chi^2$	df	RMSEA	CFI	$\Delta\chi^2$	$\Delta df$
1. Fully constrained	566.40**	211	.07	.76		
2. Model 1 with IC's of delinquency target and friend unconstrained	510.19**	210	.06	.83	56.21***	1
3. Model 2 with IC of perceived friendship quality unconstrained	386.84**	209	.06	.83	123.35***	1
4. Model 3 with IC variances delinquency target and friend unconstrained	263.49**	208	.04	.90	61.21***	1
5. Model 4 with correlation between IC target delinquency and IC friend delinquency unconstrained	226.27**	207	.01	.99	37.22***	1
6. Model 5 with correlation between IC delinquency target and SL delinquency friend and vice versa unconstrained	217.36**	206	.01	.99	8.91**	1

*Note.* IC = Intercept; SL = Slope; RMSEA = Root mean square error of approximation; CFI = Comparative fit index.

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

Table 8.4  
*Parameter Estimates for Final Multivariate Latent Growth Curve Models for Total Group and for Males and Females Separately*

Dimension	Intercept		Slope <sup>a</sup>	
	<i>M</i>	$\Delta$	<i>M</i>	$\Delta$
Total Group ( <i>N</i> = 435) <sup>b</sup>				
Delinquency adolescent/friend <sup>c</sup>	1.14***	.03***	.01**	<.01*
Perceived friendship quality target	3.10***	.31***	.04**	.01**
Boys ( <i>n</i> = 224) <sup>d</sup>				
Delinquency adolescent/friend <sup>c</sup>	1.20***	.06**	.01**	.01*
Perceived friendship quality target	2.78***	.30***	.04**	.02**
Girls ( <i>n</i> = 211) <sup>d</sup>				
Delinquency adolescent/friend <sup>b</sup>	1.07***	<.01*	.01**	<.01*
Q Perceived friendship quality target	3.43***	.30***	.04**	.02**

*Note.* RMSEA = Root mean square error of approximation; CFI = Comparative fit index.

<sup>a</sup> all slope factors were fixed at 2, 3, and 4, respectively, to estimate linear growth.

<sup>b</sup> For the total group,  $X^2(100, N = 435) = 133.43, p < .01$ ; RMSEA = .02; CFI = .97.

<sup>c</sup> Because friends are exchangeable, intercepts and slopes of delinquency of adolescent and delinquency of best friend were estimated simultaneously. The means of the slopes and intercepts,

the variances of the slopes and intercepts, and the variances of the measurement errors at each measurement wave were constrained to be equal for both friends.

<sup>d</sup> For the multigroup approach,  $X^2(206, N = 435) = 217.36, p < .01$ ; RMSEA = .01; CFI = .99. \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

### *Multivariate LGM Analyses: Testing Direct Effects of Friends' Delinquency and Perceived Friendship Quality*

Next, the multivariate longitudinal growth model of associations between delinquency of adolescent, delinquency of best friend, and perceived quality of friendship was estimated. Moderation effects of reciprocity of best friendship and stability of best friendship on these associations were not found and therefore not reported. Because moderation effects of gender on these associations were found, Table 8.3 shows model comparisons of moderation effects of gender in the multivariate longitudinal growth model. First, differences between boys and girls in means and variances were found (see model comparisons 1 to 4 in Table 8.3). Estimation of means and variances for boys and girls are shown in Table 8.4. Boys were found to show higher intercept means of delinquency, greater variance in the intercepts of delinquency, and greater variance in slopes of delinquency. Furthermore, a higher intercept mean of perceived friendship quality was found for girls than for boys.

Next, two gender differences in correlations between intercepts and slopes of delinquency of adolescent and delinquency of best friend were found (see model comparisons 5 and 6 in Table 8.3). These correlations are shown in Figure 8.3 for males and females separately. First, the intercept of adolescent delinquency is positively and significantly associated with best friends' intercept of delinquency for both boys and girls, but a Fisher  $Z$ -test revealed

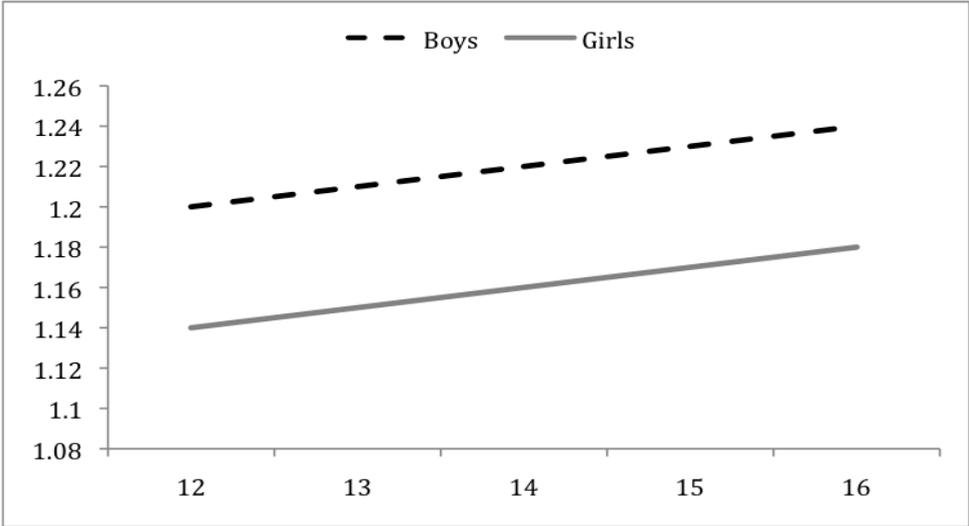


Figure 8.1. Delinquency of adolescents and their best friends from age 12 to age 16 by gender.

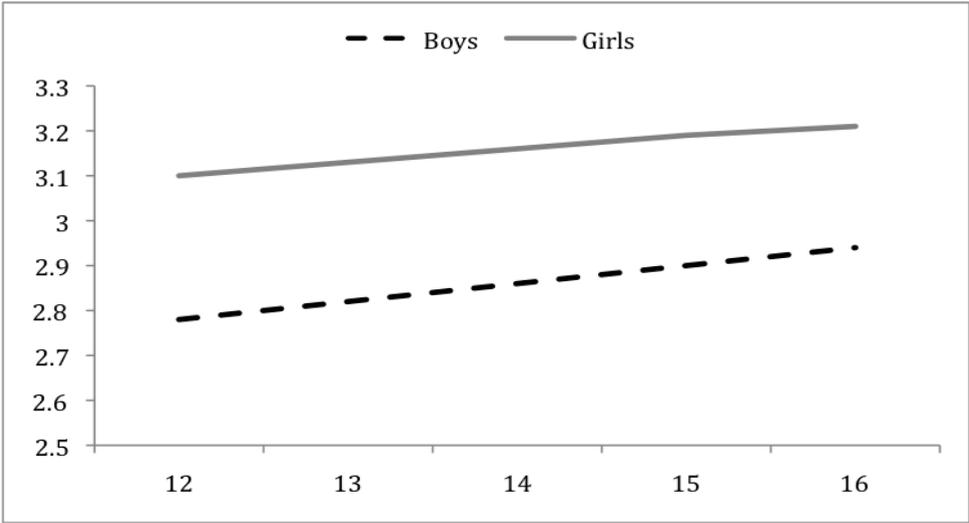


Figure 8.2. Perceived friendship quality according to the target adolescent from age 12 to age 16 by gender.

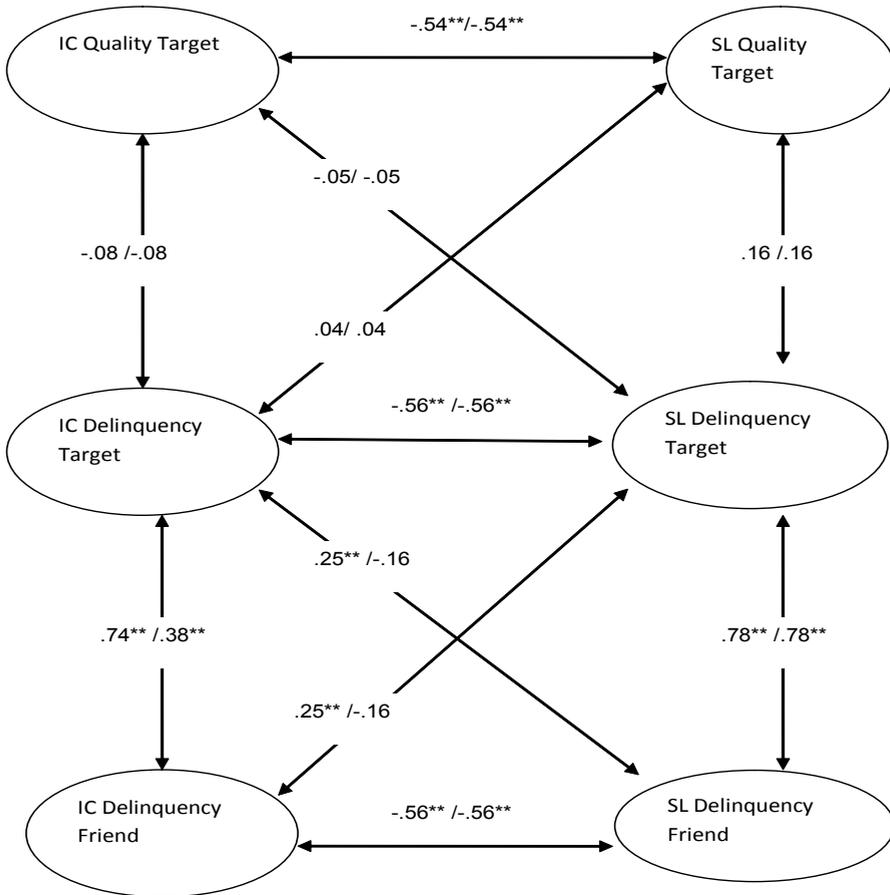


Figure 8.3. Multivariate longitudinal growth model for best friends.

Note. IC = Intercept; SL = Slope. Correlations between intercepts and slopes of perceived quality of friendship by target, adolescent delinquency, and best friends' delinquency in the multivariate latent growth curve model for boys and girls. The first correlations are correlations for boys and the second correlations are for girls, respectively. If different correlations are given for boys and girls, correlations between boys and girls differed significantly at  $p < .05$ .

\*\* $p < .01$ ; \* $p < .05$ .

that this correlation is significantly ( $p < .05$ ) higher for boys ( $r = .78$ ) than for girls ( $r = .38$ ). This indicates that a higher mean level of adolescents' delinquency is associated with a higher mean level of best friends' delinquency for both boys and girls, and that male friends are even more similar in their mean levels of delinquency than girls. Second, a Fisher  $Z$ -test revealed significant ( $p < .05$ ) differences in the correlations between intercept of delinquency with slope of delinquency between friends: the intercept of best friends' delinquency predicts increases in adolescents' delinquency over time for boys ( $r = .25, p < .05$ ), not for girls ( $r = -.16, p > .05$ ). Because this correlation was constrained to be equal to the correlation between the intercept of target adolescents' delinquency and slope of best friends' delinquency, the same gender difference was found here. Note that unconstraining this correlation to be different between friend's intercept with target's slope and target's intercept with friend's slope did not result in significant improvements in the fit for either boys ( $\Delta X^2(435, \Delta 1) = .03, p > .05$ ) or girls ( $\Delta X^2(435, \Delta 1) = .04, p > .05$ ), suggesting that friend's mean level in delinquency is associated as strongly with changes in target's delinquency over time as is the target's mean level in delinquency associated with changes in friends' delinquency over time. Results in Figure 8.3 showed that the slopes of delinquency were positively and significantly associated for both boys and girls ( $r = .78$ ), indicating that changes in delinquency over time of both male and female adolescents are associated with changes in their best friends' delinquency over time. Results revealed that there were no associations between intercepts and slopes of perceived friendship quality by the target adolescent and intercepts and slopes of delinquency of adolescent. Thus, perceived friendship quality is not related to changes in delinquency, and adolescent delinquency is not related to changes in perceived friendship quality.

In all models, correlations of intercept with slopes within

the individual (intercept delinquency with slope delinquency for adolescent, intercept delinquency with slope delinquency for best friend, and intercept quality with slope quality) were significant and negative, indicating regression to the mean over time for all variables. Finally, note that using the 112 mutual friendship dyads that were dropped from the analyses to avoid double entry of the data showed equivalent associations between intercepts and slopes of friends' delinquency and friendship quality with adolescent delinquency.

*Multiple group MLGM analyses: Testing Interaction Effects of Perceived Friendship Quality and Friends' Delinquency*

Finally, we examined interactions between perceived friendship quality and friends' delinquency by testing two moderation models. When examining the model comparisons of the moderation effects model, the same gender differences were found as in the direct effects model. Therefore, the fit indices of these model comparisons are not reported. First, the moderation effects of friendship quality and the interaction between friendship quality and gender on the associations between friends' delinquency and adolescent delinquency were examined. The final model showed adequate fit ( $X^2(203, N = 435) = 257.83, p < .01; RMSEA = .03; CFI = .97$ ). No differences were found between the low and high quality groups, or between low quality male, high quality male, low quality female, and high quality female groups in the associations between delinquency of target adolescent and delinquency of best friend. This indicates that there are no moderation effects of either friendship quality or the interaction between gender and friendship quality on the cross-sectional and longitudinal associations between delinquency of target adolescent and delinquency of best friend.

Second, we examined moderation of adolescent delinquency

in effects of friendship quality on adolescent delinquency, following the same procedure as when examining moderation of friendship quality in effects of friends' delinquency on adolescent delinquency, but using the delinquent group to the non-delinquent group instead of the friendship quality groups). For both boys and girls, none of the associations of intercept and slope of friendship quality with intercept and slope of adolescent delinquency differed significantly ( $p < .05$ ) between the delinquent and the non-delinquent groups. Furthermore, no differences were found in these associations for male delinquent, male non-delinquent, female delinquent, and female non-delinquent groups. This suggests that effects of friendship quality on adolescent delinquency do not differ according to the context of the conventional agencies: friends' delinquency did not moderate the effects of perceived friendship quality on adolescent delinquency.

#### **8.4 Discussion**

The current study first examined the development of adolescent delinquency from early to middle adolescence, as well as gender differences in these developmental trajectories. Results showed that the mean level of adolescent delinquency increased from age 12 to age 16. This pattern was also found in earlier studies (e.g., Duncan et al., 2000; Van Lier et al., 2005) and indicates that, on average, Dutch adolescents become increasingly delinquent from early to middle adolescence. Furthermore, consistent with prior studies (Bongers et al., 2004), although boys have a higher mean level of delinquency, no gender differences were found in the shape of the developmental trajectories of delinquency from early to middle adolescence.

Second, the current study tested two dominant theories of crime and delinquency, namely the differential association theory

(Sutherland, 1947; Sutherland & Cressy, 1978) and the social control theory (Hirschi, 1969), by examining associations between best friends' delinquency, friendship quality, and adolescent delinquency from early to middle adolescence with five annual assessments. Adolescents and friends reported on their own delinquency, ensuring that associations found between friends' delinquency and adolescent delinquency would not be inflated because of shared observer variance (Ennet & Baumann, 1994; Kandel, 1978a). The current study clearly showed that adolescent delinquency is strongly associated with best friends' delinquency, both at the mean level and in changes over time. These results were found even when controlling for moderation effects of stability of the friendship and reciprocity of the friendship. Thus, adolescent best friends seem to start and develop similarly in delinquency over time from early to middle adolescence. Other studies have also shown that best friends' may develop similarly in delinquency, especially in adolescence (Van Lier et al., 2005; Van Lier, Wanner, & Vitaro, 2007). Thus, it seems that as a specific adolescent increases at a certain rate in his or her delinquency over time, his or her best friend increases at a similar rate in his or her delinquency over time. According to this study, adolescent best friends might be viewed in this sense as 'partners in crime'.

For boys, however, best friends' delinquency seemed to play an even larger role in adolescent delinquency than for girls. The mean level of adolescent delinquency was even stronger associated with best friends' delinquency for boys than for girls, indicating that male friends are even more similar in their mean levels of delinquency than girls. This result is consistent with prior studies reporting that males are more similar in delinquency than females (Ackerman, 2006; Heinze et al., 2004). Perhaps even more importantly, best friends' delinquency is associated with increases in adolescents' delinquency over time, and adolescents' delinquency are associated with increases

in best friends' delinquency over time for boys only. This latter result provides evidence for the central proposition of the differential association theory (Sutherland, 1947; Sutherland & Cressy, 1978) for boys: delinquent best friends may increase delinquency of adolescents over time, because adolescents adopt the social norms of their delinquent friends. Specifically, having a delinquent male friend may increase delinquency because delinquent boys may influence each other's deviant behavior more through the deviancy training process than girls (Ackerman, 2006; Capaldi, Dishion, Stoolmiller, & Yoerger, 2001; Solomon, 2006). Delinquent boys have been found to exchange more positive signals when discussing antisocial topics, which may reinforce antisocial behaviors (Dishion, Spracklen, Andrews, & Patterson, 1996). Recent evidence has shown that incarcerated girls delinquents primarily have male friends, which may partially explain their delinquent behavior (Solomon, 2006). Because the current study only examined same-gender friendships, girls' friends' delinquency may have no influence on girls' development of delinquency because girls may not reinforce delinquent behaviors in general as much as boys do. Future studies should include other-gender friendships to examine effects of other-gender friends' delinquency on the development of adolescent delinquency.

Caution should be warranted when interpreting the effects of friends' delinquency on adolescent delinquency and vice versa in light of the differential association theory. First, because we did not measure deviant norms of adolescent, we could not explicitly test the indirect link proposed by Sutherland: that is, whether best friends' delinquency increases delinquent norms of adolescents, which in turn increases actual delinquent behaviors. Second, because the design of our study allowed adolescents to nominate different best friends across the five waves, the bidirectional associations between friends' delinquency and adolescent delinquency might suggest both

selection effects (i.e., delinquent adolescents select other delinquent friends) or influence effects (interactions with delinquent friends will stimulate delinquent behavior). Nevertheless, results do indicate that friends' delinquency predicts increases in adolescent delinquency and vice versa while controlling for relatively strong initial similarity in delinquency over a period of five years, suggesting that best friends' delinquency may play an important role in the development of adolescent delinquency.

The current study furthermore showed that perceived friendship quality did not have an important role in the development of adolescent delinquency. Results revealed that there were no cross-sectional or longitudinal bidirectional associations between adolescent delinquency and quality of best friendship. These results suggest that, when controlling for previous levels of adolescents' own delinquency and best friends' delinquency, the quality of friendship does not directly affect the development of delinquency. Prior studies also found that perceived friendship quality did not predict later adolescent delinquency when controlling for previous delinquency (e.g., Zimmerman et al., 2000). Thus, no evidence was found for the role of perceived friendship quality according to the social control theory (Hirschi, 1969). Furthermore, results of the current study showed that adolescent delinquency did also not predict changes in perceived friendship quality over time. Consistent with findings that delinquent friends experience the same quality in their friendships as non-delinquent friends do (Solomon, 2006), these results indicate that delinquency does not disrupt perceived friendship quality.

Third, when examining interaction effects between perceived friendship quality and friends' delinquency on the development of adolescent delinquency, no evidence was found for either a moderating role of friends' delinquency in effects of perceived friendship quality on adolescent delinquency as suggested by social control theory, or

a moderating role of perceived friendship quality in effects of friends' delinquency on adolescent delinquency as suggested by differential association theory. A reason for differences between results found in prior studies (Bruinsma, 1992; Urberg et al., 2003) and results of the current study regarding differences in influence processes between lower and higher quality friendship might be that prior studies did not always take into account possible gender differences in quality of friendships and gender differences in effects of friends' delinquency on adolescent delinquency (Urberg et al., 2003).

It must be noted that consistent with the notion that relationships with friends become increasingly important to adolescents from early to middle adolescence (Daddis, 2005; Furman & Buhrmester, 1992; Sippola, 1999), the mean level of perceived social support of best friends was found to increase from age 12 to age 16. Although girls consistently report higher mean level perceived quality in friendship than boys (Cheng & Chan, 2004; Mathur & Berndt, 2006), gender differences in the developmental trajectories of perceived friendship quality were not found, indicating that boys and girls perceive the same level of growth of friendship quality from early to middle adolescence.

Several limitations of the current study should be noted. Because questionnaires were collected at schools and adolescent best friends in the current study only participated if they were in the same dataset, the current study deals with best friendships within schools only. Recent research has shown that friends outside the school context may be more influential on adolescent delinquency than best friends within the school context (Burk, 2006). Furthermore, we used a relatively normative sample, which does not contain many truly delinquent adolescents. However, an average of 13.7% of girls and 38.1% of boys reported vandalism, 25.2% of the girls and 40.1% of the boys reported property offenses, and 12.6% of girls and 30% of boys

reported violent acts across five waves. The total percentage of girls and boys reporting a delinquent act was 33.1% and 53.7% across all five waves, respectively. Thus, delinquent acts were not uncommon among adolescents in the present normative sample (also see Luijpers, 2000). Thus, although the group of very delinquent adolescents may be relatively small, the group of adolescents displaying minor delinquent acts is substantially larger, and individual differences in delinquent behavior among adolescents are expected to be sufficient for commonly employed analyses. Nevertheless, the associations of friends' delinquency and friendship quality with adolescent delinquency may differ between truly delinquent adolescents and adolescents from a normative sample, and therefore the former should be included in future studies. In addition, perceived quality of friendships was measured of only one person in the dyad and because studies using more objective measures of friendship quality did find differences between delinquent and non-delinquent adolescents in friendship quality (Poulin et al., 1999), we might have found associations between friendship quality and delinquency when these measures would have been used. It may be, for example, that although actual friendship interactions display low perceived friendship quality characteristics, which may increase effects of friends' delinquency on adolescent delinquency, adolescents perceive their friendship to be of relatively high quality. In addition, we focus only on mutual and non-mutual best friendships, whereas studies have shown that other types of friends may also influence each other in problem behaviors to a certain extent (e.g., Mounts & Steinberg, 1995). Finally, the focus of the current study was on positive aspects of friendship quality. Including the negative aspects of friendship quality, such as conflict and peer victimization, might have shown that perceptions of more negative aspects in friendships are associated with more adolescent delinquency (Kupersmidt, Burchinal, & Patterson, 1995). Future

studies should therefore incorporate perceptions of both friends or more objective measures of perceived friendship quality when examining longitudinal associations between perceived friendship quality and adolescent delinquency.

In sum, the present shows that adolescent best friends play an important role in the development of delinquency from early to middle adolescence: adolescents show high similarity in mean levels of delinquency and changes in delinquency over time. For boys, similarity in mean level delinquency is even higher, friends' delinquency are associated with increases in adolescent delinquency over time, and adolescents' delinquency are associated with increases in friends' delinquency over time. These results provide evidence for the differential association theory for boys. Reciprocity in best friendship, and stability of best friendship did not moderate these results. No support was found for the social control theory: Perceived friendship quality played no direct or indirect role in the development of adolescent delinquency, and adolescent delinquency did not predict development of quality over time.





**Chapter 9.**  
**General Discussion**

## **Chapter 9. General Discussion**

The aim of the current dissertation was two-fold: to examine the role of traits and preferences in adolescent friendship formation, and to examine the importance of friends' behaviors and friendship quality in adolescent friendship socialization. First, a summary is provided of all the research results according to their respective research questions. This is followed by a discussion and conclusions drawn from these results, limitations and strengths of the current dissertation, and suggestions for future research. Finally, we end with concluding remarks.

### 9.1 Summary of Main Findings

#### 9.1.1 Adolescents' Traits and Preferences in Friendship Formation

##### 9.1.1.1 Similarity in Music Preferences in Friendship Formation

*To what extent do adolescents form friendships with others who have similar specific and similar overall musical preferences?*

The extent to which adolescents form friendships with others who have similar individual preferences was examined in Chapter 2. Specifically, we examined whether adolescent best friends tend to form friendships on the basis of a) profile similarity between adolescents across all music preferences (overall music similarity) and b) similarity between adolescents in specific music domains (specific music similarity). Actual similarity was studied in both instances: that is, we examined the 'true' similarity between persons by examining independent reports of similarity in musical preferences.

Results provided consistent support for both specific and

overall similarity in music preferences within friendships, over and above the general tendency of adolescents to be similar in these preferences. Findings further suggest that adolescents tend to form friendships with others who have similar specific non-mainstream preferences. Adolescents also tended to form friendships with others who have a similar overall musical taste, especially if they are more highly educated. Adolescents with higher educational background have been suggested to have a more differentiated musical taste (Ter Bogt, 2000), indicating that there is more variation in musical taste to choose from among friends with a higher educational background. Additional analyses showed that similarity in Big Five personality traits did not mediate effects of similarity in music preferences on friendship formation. Thus, no support was found for the suggestion that music preferences are used as markers for personality traits in the formation of friendship formation (Rentfrow & Gosling, 2006). In other words, adolescents tended to select others as friends who have similar music preferences, regardless of any similarity in personality traits. Finally, both specific and overall music similarity did not predict friendship ending.

Taken together, these findings stress the importance of music preferences in friendship choices. Adolescents seemed to form friendships with others who were similar in their music preferences, irrespective of similarity in personality traits. Therefore, adolescents seem to form their friendships partially on the basis of similarity in music preferences.

### 9.1.1.2 Similarity in Specific Personality Traits and Friendships

*To what extent are adolescent friends similar in specific Big Five personality traits?*

We examined the extent to which friendships are based on similarity in specific individual traits in Chapter 3. To this purpose, actual specific similarity in the Big Five personality traits between adolescents and their best friends was examined in middle adolescence. Actual specific similarity pertains to similarity in adolescents' and their friends' independent reports on their own specific Big Five personality traits. We additionally examined actual similarity in aggression, depression, and perceptions of relationship characteristics in friendships. Finally, we examined gender differences in all similarity domains.

Results showed that adolescents tended to be more similar to their mutual same-gender best friend in the specific Big Five personality traits Extraversion and Agreeableness than to random pairs of adolescents.. These findings confirm theoretical suggestions that especially these two personality traits are linked to social behaviors (Denissen & Penke, 2008a; Strauss, Barrick, & Connerley, 2001) and peer reputation (Jensen-Campbell et al., 2002). Thus, similarity in personality traits seems to form an intricate part of adolescent friendships.

Adolescent mutual best friends were additionally found to have more actual similarity than random pairs of adolescents in problem behaviors as well as perceptions of relationships characteristics. Interestingly, similarity in aggression, depression, and perceptions of two relationship characteristics, namely support and balanced relatedness, was almost non-existent for boys. This indicates that similarity in these domains within friendships tend to be different for boys and girls. Nevertheless, the same was not true for personality

traits: girls tended to be similar in Extraversion and Agreeableness to the same extent as boys. Thus, in short, Chapter 3 underlines the importance of similarity in Big Five personality traits within adolescent friendships, irrespective of gender differences.

### 9.1.1.3 Specific Personality Traits and Friendship Formation

*To what extent do adolescents form friendships with others based on specific personality traits?*

After finding support for similarity in individual traits within friendships, we examined processes underlying similarity in Chapter 4. We examined whether personality traits directly predicted friendship formation. In addition, the role of actual similarity in specific Big Five personality traits in choice of friends was studied. Finally, the importance of social networks in the choices of new friends was examined. To be able to study the formation of new friendships, we examined to what extent personality traits predicted the formation of friendships among just-acquainted freshmen. We applied a social network approach to study the role of the friendship network as a whole in friendship formation.

Findings in Chapter 4 offer empirical support for the theoretical notion that Extraversion and Agreeableness are most important in choice of friends. Extraversion predicted selecting more friends over time. This is consistent with suggestions that more extraverted individuals are more socially active during acquaintanceship than less extraverted individuals (Denissen & Penke, 2008a; Elphick et al., 1998; Fleeson et al., 2002; Freedman & Doob, 1968). Agreeableness, however, predicted being selected as a friend over time, indicating that more agreeable adolescents are more popular as friend than less agreeable adolescents (Denissen & Penke, 2008a; Holmes, 2002).

Thus, these findings are the first to empirically show that two specific personality traits tend to directly affect adolescents' choices of friends.

Further, similarity in three personality traits between two persons mattered as well. Actual similarity in Extraversion, Agreeableness, and Openness was predictive of friendship formation, irrespective of previously discussed main effects of Extraversion and Agreeableness. In other words, adolescents tended to select others as their friends who were similar to them in these three traits. Therefore, a match in Extraversion, Agreeableness, and Openness between two adolescents may enhance friendship formation.

Finally, we demonstrated that adolescents' choices of friends tend to be affected by the social network in which adolescent friendships are embedded. The social network approach helped to show that over and above dyadic tendencies, such as reciprocating a friendship, adolescents tended to form triadic friendships: individuals tended to form friendships with their friends' friends over time. Thus, using this approach to study the role of personality traits in friendship formation was shown to provide a more realistic approach compared to using only dyadic approaches (see also Burk et al., 2007; Snijders et al., 2007; Steglich et al., 2006).

In sum, results indicated that adolescents tend to form friendships according to their own specific personality traits. Further, adolescents tend to choose others as friends who are similar to them in certain personality traits. Finally, adolescents seemed to form friendships partially on the basis of specific structures of the social network their friendships are embedded in.

#### 9.1.1.4 Overall Personality Traits and Friendship Formation

*To what extent do adolescents form friendships with others who have similar overall personality traits?*

In Chapter 5, we focused on overall similarity in personality traits, that is, we examined the extent to which similarity in the overall pattern of personality traits predicted friendship formation. We distinguished between three different perspectives on similarity between adolescents. Perceived similarity was assessed by examining one person's reports on his or her own personality traits as well as the others' personality traits. Actual similarity was examined by taking similarity between two individuals according to each individual's independent report on their own personality traits. Peer-rated similarity was studied by examining similarity between two persons in mean scores of peers' ratings on these persons' overall personality traits. In order to see which of these similarity types was most important, we examined associations of the three similarity types in adolescents' choices of friends simultaneously. Further, in order to get more insight into *how* each of these similarity types may enhance friendship formation, we examined the mediational role of communication frequency in these similarity effects.

Findings provided unique insight into the relative importance of similarity in friendship formation according to the eye of the beholder. Results indicated that, in contrast to the original assumption of the *similarity-attraction hypothesis* (Byrne & Nelson, 1965), actual overall similarity was not associated with friendship intensity. In other words, adolescents did not seem to become friends because they were similar in overall personality traits. In contrast, perceived similarity predicted friendship intensity, and friendship intensity predicted perceived similarity consistently over time. These

results are consistent with suggestions that how similar individuals *think* they are is more important in adolescents' choices of friends than how actually similar they are (Sunnafrank & Ramirez, 2004). At the same time, adolescents may start to perceive more similarity due to the formation of friendships (Morry, 2005, 2006). Thus, these results suggest that whereas adolescents' own perceptions of overall personality traits may enhance friendship formation, actual similarity in overall personality traits does not affect friendship choices.

Moreover, results suggested that peers surrounding adolescents affect their choices in friendships, over and above the tendency of individuals to follow their own perceptions. Specifically, findings indicated that peer-rated similarity predicted more communication, which, in turn, predicted more friendship intensity over the first three months. During the last month, however, peers' perception on similarity directly predicted friendship intensity as well. Thus, overall similarity in personality traits as perceived by peers seems to enhance friendship formation at first through communication. In later stages of acquaintance, peers' perceptions on similarity may affect friendship choices directly.

In sum, findings of Chapter 5 indicated that adolescents' own perceptions of similarity in overall personality traits and peers' perceptions of these traits have important functions for the formation of friendships. In contrast, how actually similar adolescents are in overall personality traits does not seem to affect friendship choices.

## 9.1.2 Friendship Socialization: Friendship Quality and Friends' Behaviors

### 9.1.2.1 Depression and Friendship Quality

*What is the combined importance of individuality and closeness within adolescent friendships in the development of adolescent depression?*

The combined development of perceptions of closeness and individuality within best friendships was examined from early to late adolescence in Chapter 6. Perceived commitment, or the extent to which adolescents feel bonded to their friend, was used as an indicator of perceived closeness within friendships. Balanced relatedness, or the extent to which adolescents perceive that their individuality is respected by their friend, was used as indicator of perceived individuality within friendships. A person-centred approach was applied to cluster adolescents in different friendship types on the basis of their developmental trajectories of perceived commitment and balanced relatedness. Differences between friendship types in adolescents' ways of solving problems with their friends were examined to test the usefulness of friendship typology approach. Next, friendship type differences were studied in both starting levels and changes in depression from early adolescence until late adolescence. This way, differences in the development of depression were examined according to unique combinations of both closeness and individuality within friendships. To test gender differences in friendship types and developmental differences in depression according to friendship types, we examined models separately for boys and girls.

Results provided evidence for two types of perceived friendships, with unique combinations of perceived closeness and

individuality: interdependent and disengaged friendships. These combinations have been found previously in cross-sectional studies (Shulman, 1993, 1995; Shulman & Laursen, 2002). This study expanded these findings by examining the development from early adolescence until late adolescence. Adolescents perceiving interdependent friendships reported higher commitment and balanced relatedness throughout adolescence compared to adolescents perceiving disengaged friendships. Furthermore, girls perceiving disengaged friendships did not report increases in balanced relatedness from early to late adolescence. In contrast, balanced relatedness did increase in the perceived interdependent friendship type. Thus, especially girls perceiving disengaged friendships may experience difficulties with expressing their individuality in their friendship, and additionally feel less close to this best friend.

Further, longitudinal findings expanded results from previous cross-sectional studies (Shulman et al., 1994; Shulman & Laursen, 2002) in that perceived friendship types were reflected in different ways of solving problems in their friendship across adolescences. Adolescents perceiving interdependent friendships reported using more constructive problem solving in their friendships across adolescence than adolescents perceiving disengaged friendship. Moreover, the former seemed to increase in constructive problem solving more than the latter. Thus, support was found for different types of problem solving according to friendship type: interdependent friends increasingly use more constructive ways of solving problems in their friendship than disengaged friends.

Finally, results provided evidence for differences in depression from early to late adolescence regarding friendship types: girls in disengaged friendships experienced more depressive symptoms across adolescence than girls in interdependent friendships. For boys, no differences in depression according to friendship type were

found. These results suggest that perceiving both high closeness as well as high individuality within girls' friendships is associated with less depression from early to late adolescence. Thus, as suggested by Selman (1990), findings of the current study provide empirical support for the idea that fostering both closeness and individuality in friendships is associated with better emotional development.

#### 9.1.2.2 Internet use, Friendship Quality, and Emotional Adjustment

*To what extent does friendship quality moderate effects of Internet use on depression and social anxiety?*

In Chapter 7, we examined longitudinal effects of Internet use on depression and social anxiety, while controlling for prior levels of depression and social anxiety. We differentiated between two types of Internet use, namely communication based Internet use and non-communication based Internet use. Both these types of Internet use were used simultaneously to predict changes in depression and social anxiety over a one-year period. To study the moderating role of friendship quality in these effects, we first included effects of adolescents' perceptions of support on depression as well as on social anxiety. Next, we examined whether effects of perceived friendship quality interacted with effects of the two Internet types.

Findings indicated that for adolescents who perceive low friendship quality, communication based Internet use predicted less depression, and non-communication based Internet use predicted more depression and social anxiety. For adolescents who perceive medium to high friendship quality, Internet use did not predict depression and social anxiety over time.

Thus, results support the idea that adolescents who perceive high to medium friendship quality are protected against adverse

effects of Internet use (Valkenburg & Peter, 2007a, 2007c; Wolak et al., 2003). Nevertheless, adolescents who perceive higher quality friendships also do not seem to benefit from using communication based Internet use.

### 9.1.2.3 Adolescent Delinquency and Friends Behaviors

*What is the relative and combined importance of friendship quality and friends' delinquency in the development of adolescents' delinquency?*

In Chapter 8, the functions of friends' delinquent behaviors and perceptions of closeness in adolescent development of delinquency were compared and combined. To this aim, the development of adolescents' delinquency, their best friends' delinquency, and adolescents' perceptions of support in their friendships were examined from early to late adolescence with five annual measurements. Next, the extent to which starting levels of friends' delinquency and perceptions of support predicted changes in adolescents' delinquency were examined. We controlled for possible similarity at the starting levels between adolescents and their friends in delinquency as well as effects of adolescents' starting levels in delinquency on changes in friends' delinquency and perceptions of support.

Findings showed that for both boys and girls, both mean levels of and changes in delinquency are relatively strongly associated with changes in friends' delinquency from early to middle adolescence. Similarity in changes in delinquency, however, was stronger for boys than for girls. This suggests that the development of delinquency for both boys and girls co-occurs with the development of their best friends' delinquency. Moreover, for boys only, friends' delinquency predicted changes in adolescent delinquency across five years.

This indicates that friends' delinquency may affect the development of boys' delinquency.

In contrast, perceptions of friendship quality were not associated with mean levels or changes in adolescent delinquency. Moreover, no evidence for interactions between friends' delinquency and friendship quality on adolescent delinquency was found. This indicates that friends' delinquency may influence boys' delinquency in both high and low quality friendships. Thus, no direct or indirect role of perceptions of friendship quality in the development of adolescent delinquency was found.

To summarize, friends' delinquency seems more important in the development of boys' delinquency from early to middle adolescence than perceptions of friendship quality. For girls, both friends' characteristics and perceived friendship quality did not seem to affect their delinquent behaviors.

Table 9.1

*Summary of Results.*

**Friendship Formation**

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- |           |  |
|-----------|--|
| Chapter 2 | <ul style="list-style-type: none"><li>• Early adolescents tended to select friends who showed actual similarity to them in specific and overall music preferences</li></ul>  |
| Chapter 3 | <ul style="list-style-type: none"><li>• Same-gender mutual best friends in middle adolescence showed actual similarity in specific individual traits, namely the personality traits Extraversion and Agreeableness</li></ul>   |
| Chapter 4 | <ul style="list-style-type: none"><li>• Late adolescents with higher levels of Extraversion and Agreeableness selected more friends and were selected more as friends, respectively, in late adolescence</li><li>• Late adolescents tended to select friends who showed actual similarity to them in Extraversion, Agreeableness, and Openness</li><li>• Late adolescents tended to select the friends of their friends, forming triadic friendships</li></ul>   |
| Chapter 5 | <ul style="list-style-type: none"><li>• Perceived similarity in overall personality traits predicted higher friendship intensity in late adolescence</li><li>• Friendship intensity predicted higher perceived similarity in overall personality traits in late adolescence</li><li>• Actual similarity in overall personality traits did not predict friendship formation in late adolescence</li><li>• Peer-rated similarity in overall personality traits predicted higher friendship formation through communication frequency in late adolescence</li></ul> |
- 

*Table 9.1 continues*

*Table 9.1 continued***Friendship Socialization**

- 
- |           |   |
|-----------|---|
| Chapter 6 | <ul style="list-style-type: none"> <li>• Interdependent friendships were characterized by higher, stable levels of perceived commitment as well as higher and increasing levels of perceived individuality across adolescence than disengaged friendships</li> <li>• Adolescents in interdependent friendships reported higher and increasingly more constructive problem solving and lower depression than adolescents perceiving disengaged friendships throughout adolescence</li> </ul> |
| Chapter 7 | <ul style="list-style-type: none"> <li>• For adolescents who perceive low quality friendships, communication based Internet use predicted less depression, and non-communication based Internet use predicted more depression and social anxiety</li> </ul>   |
| Chapter 8 | <ul style="list-style-type: none"> <li>• Boys showed stronger similarity in changes of delinquent behaviors than girls</li> <li>• Friends' delinquency, rather than perceived friendship quality, predicted increases in boys' delinquency from early to middle adolescence</li> </ul>  |
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## **9.2 Conclusions and General Discussion**

### **9.2.1 Traits and Preferences in Friendship Formation**

The first part of the current dissertation focused on the role of adolescents' traits and preferences in friendships formation. In accordance with Hinde's (1997) suggestion, we examined the functions of traits and preferences in friendship formation on three levels: the individual level, the dyadic level, and the group level. Although traits and preferences are individual characteristics, and therefore tend to be regarded as characteristics on the individual level, they may nonetheless exist on all three levels. On the dyadic level, similarity between two persons in traits and preferences may determine adolescents' choices of friends. On the group level, the way peers view adolescents' traits and preferences may partially determine adolescents' own friendship choices. We start with discussing the dyadic level, followed by the individual and the group level. Next, we discuss results in the context of specific and overall similarity.

#### **9.2.1.1 The Dyadic Level and Friendship Formation**

The importance of individual traits and individual preferences in adolescent friendship formation was examined in the first part of the current dissertation. Studies in Chapter 2 to Chapter 5 suggest that specific traits and preferences of adolescents on the dyadic level, or similarity between adolescents in these characteristics, may partially determine how and with whom adolescents form friendships.

First, individual preferences, namely musical preferences, seem to have their own unique function in adolescents' choices of friends (Chapter 2). These findings are unique in that they represent the first empirical test of theoretical suggestions regarding musical

preferences and friendships. Especially a recent adaptation (Tarrant et al., 2001) of the Social Identity Theory (SIT; Tajfel, 1978) stresses the importance of music preferences in relationships with others. SIT maintains that individuals gain a social identity from the groups to which they belong in an attempt to foster self-esteem and feelings of belonging. Musical preferences have been shown to form the core of most peer groups and peer cliques (Brown et al., 1986) and tend to be regarded by adolescents as the most valued and important dimension of their social identity (Tarrant et al., 2001). Thus, adolescents' social identity may be based on the music preferences of the peer crowd or clique they belong to, and this identity in the group may help promote their feelings of self-esteem and belonging. Adolescents may therefore form friendships with others who match their own preferences, in order to maintain their own social identity.

Moreover, music preferences do not seem to be mere indicators of one's individual traits: they seem to affect how friendships are formed irrespective of similarity in personality. These findings contrast with results showing that emerging adults tend to use music preferences only as indications of other's personality traits; the latter are suggested to be used to choose friends (Rentfrow & Gosling, 2006). Particularly for early adolescents, however, music preferences may be considered unique markers of their individuality, which are not necessarily represented by other individuality markers (Bennet, 2001; Ter Bogt, 2000). Therefore, early adolescents may particularly use music preferences as a basis to form friendships on. Taken together, these results indicate that musical preferences may be used as salient individual markers through which adolescents form friendships, over and above individual traits.

Similarity in specific individual traits seems to matter additionally for friendship formation (Chapter 3 and 4). Similarity in Extraversion and Agreeableness may each enhance friendship

formation in their unique, own ways. Adolescents who are more similar in Extraversion may approach each other and interact in similar ways more than adolescents who are less similar in Extraversion (Paulhus & Trapnell, 1998). This would mean that similarity in Extraversion is especially important during interaction in acquaintanceship. Adolescents who are more similar in Agreeableness may work together in more effective ways than adolescents who are less similar in Agreeableness (Denissen & Penke, 2008a; Nettle, 2006). This suggests that similarity in Agreeableness may be particularly important in contexts where collaboration between friends is salient, such as in school and university contexts. Nevertheless, the result may be the same for both traits: the interaction may be seen as more pleasurable and effective for adolescents who are more similar in these traits, and therefore adolescents with similar Extraversion and Agreeableness may become friends.

Late adolescents specifically tended to form friendships with others who were similar in Openness as well. These results support the perspective on Openness as a trait being connected to social relationships through individuals' interests, values, and occupational choices (Denissen & Penke, 2008a; McCrae, 1996). In modern, westernized societies, late adolescence may become the most important period in which adolescents can explore their own interests, values and choices (Arnett, 2004; Asendorpf & Wilpers, 1998). Therefore, especially late adolescents may prefer to talk and interact with others who are similar to them in these aspects, and therefore choose friends who are similar to them in Openness.

Taken together, these empirical findings offer more insight into broader theoretical frameworks as well. The similarity-attraction hypothesis by Byrne and Nelson's (1965) suggests that similarity between individuals enhances positive affect and interaction patterns, which may subsequently lead to friendship formation.

Prior experimental studies testing these assumptions have been criticized for their limited generalizability, because most of these studies have been conducted in laboratory settings (Montoya et al., in press; Sunnafrank, 1986). The studies in Chapter 2 to 5 focused on best friendships and just-acquainted adolescents outside laboratory settings. Thus, findings of these studies can be taken to suggest that similarity in specific traits and preferences may enhance friendship formation in real-life settings as well. Further, the ‘filtering’ perspective of Duck and Craig (1978) specifies the similarity-attraction hypothesis to suggest that directly observable information about other individuals provides the initial filter in the formation of friendships. This initial filter consists of selecting others who are similar in visible characteristics. As friendships progress, directly observable information is suggested to become less important in the stability of friendships. Results of this dissertation offer the unique possibility to test whether this filtering perspective is supported. Although music preferences themselves may not be visible, especially non-mainstream preferences may be directly inferred by clothing, hairstyles, use of language, and postures of adolescents (Christenson & Roberts, 1998; Ter Bogt, 2000). Consistent with the filtering perspective, especially non-mainstream preferences were found to predict friendship formation. Furthermore, findings supported the filtering perspective further in that similarity in music preferences did not seem to affect friendship stability. Regarding personality traits, the traits Extraversion and Agreeableness seem to be most visible in outward social behaviors (Asendorpf & Van Aken, 2003; Denissen & Penke, 2008a; McCrae & Costa, 1994) and others seem to make an accurate estimation of particularly these two traits upon acquaintance (Kenny et al., 1994). Thus, although Big five traits have been proposed to be “core” traits (Asendorpf & Denissen, 2006), these two specific traits may be directly visible upon acquaintance. In accordance with

this, these two traits were most important when forming friendships in the acquaintanceship process. Taken together, findings support the broader theoretical frameworks regarding specific traits as proposed by the similarity-attraction hypothesis and the filtering perspective.

#### 9.2.1.2 The Individual Level and Friendship Formation

Results of the current dissertation furthermore pointed out that adolescents' traits as well as their own perceptions on the individual level seem to affect adolescents' choices of friends. Unique insight was provided into the direct role of specific personality traits, namely Extraversion and Agreeableness, in friendship formation (Chapter 4). Both these traits seem to increase the number of friendships adolescents have. Nevertheless, the reasons for having friends, however, seem to differ for Extraversion and Agreeableness: whereas higher Extraversion may make adolescents more socially more active, higher levels of Agreeableness may make them more popular. Thus, these individual traits seem to affect adolescents' choices of friends directly in their own unique ways. These findings empirically support theoretical suggestions concerning behavioral differences for these two traits: whereas Extraversion may increase individuals' social activity, Agreeableness may be expressed in more altruistic behaviors (Asendorpf, 2000; McCrae & Costa, 1994).

The current dissertation provides additional insight into the importance of adolescents' own perceptions of overall similarity in personality traits in friendship formation (Chapter 5). These perceptions of similarity showed only moderate overlap with actual similarity, indicating that they are not firmly grounded in reality (Funder & Colvin, 1991; Kenny & Acitelli, 2001; Kenny et al., 1994). Moreover, perceptions of overall personality traits, rather than actual similarity in overall traits, seem to enhance forming friendships.

These findings support Sunnafrank's and Ramirez's (2004) adaption of the similarity-attraction hypothesis: individuals are suggested to make an estimate of similarity on first encounters. When these estimates indicate a high degree of perceived similarity with another person, they seek out future interactions with that person. These perceptions of similarity might create a feeling of recognition, self-confirmation, and self-reassurance, which may enhance friendship formation (Berg & Clark, 1986). Thus, findings of the current dissertation empirically support the idea that adolescents' perceptions of similarity in overall similarity traits are more likely to determine whether adolescents will become friends with others than the actual similarity.

Results of this study further suggest that the Balance theory as proposed by Heider (1958) applies to friendships in adolescence as well. This theory states that cognitions are organized in a harmonious (i.e., balanced) fashion. Having a close relationship with someone who shows traits and behaviors that are different from one's own will lead to a cognitive imbalance. This cognitive imbalance is countered by illusions of similarity, because of the persistent belief that friends *should* be similar in traits (Morry, 2005). In other words, adolescents tend to perceive similarities in overall personality traits that may not be there because of their friendship.

In sum, individual traits seem to partially determine the frequency in which adolescents form friendships. Moreover, current findings challenge core assumptions of the "Law of Attraction" (Byrne, 1971) regarding similarity in overall traits. These assumptions namely suggest that actual similarity in traits will increase attraction between persons. Instead, adolescents' own perceptions of themselves and others' overall traits may have a more important function in the formation of their friendships than which traits these others really have.

### 9.2.1.3 The Group Level and Friendship Formation

Next to the individual and the dyadic level, the group level seemed to have an important function in how adolescents form friendships. Specifically, the structure of the whole group seemed to affect whom adolescents choose as friends. Adolescents tended to use social networks of friendships they are embedded in to form new friendships, as they tended to choose the friends of their friends (Chapter 4). These findings confirm conceptual suggestions that the social network of friendships as a whole needs to be taken into account when developing realistic models of adolescents' friendship formation (Carrington et al., 2005; Wasserman & Faust, 1994). In that sense, findings of this dissertation suggest that the general principle of Gestalt Theory (Von Ehrenfels, 1890; Wertheimer, 2000), "the whole is more than the sum of its parts", applies to the formation of adolescent friendships. That is, research concerning friendships needs to go beyond the dyadic level and study larger structures of networks in which friendships seem to be part of, as these have a role in adolescent friendships.

Moreover, results provided unique insights into functions of peers' views on others in the formation of adolescent friendships. The way peers view similarity in personality traits between two individuals seemed to affect their choices of friends (Chapter 5). The Social Comparison Theory (Festinger, 1954) may be used to explain these findings. According to this theory, when there is doubt about the appropriateness of certain preferences, individuals will compare their own preferences to peers' ideas and try to confirm to these preferences. Especially during acquaintanceship with persons adolescents do not know yet, peers' perceptions on adolescents may affect the social choices these adolescents make. In short, friendship formation may be partially determined by how peers judge similarity.

This dissertation showed that these assumptions were supported in the context of friendship formation in late adolescence.

Further, the current dissertation empirically tested *how* peers may affect adolescents' choices of friends. Peers seem to facilitate the formation of friendships initially by increasing the frequency of communication between adolescents. Peers may leave adolescents they think should become friends talking more among themselves, or perhaps verbally encourage certain persons to become talk more with others. Adolescents may follow these cues especially under conditions of uncertainty, which seems to apply to just-acquainted freshmen: these adolescents commonly start a whole new phase in their lives, especially regarding their social relationships. It seems that the effects lasted over three months, suggesting that even after initial acquaintance, peers seem to influence adolescents' friendship formation. Moreover, in the last month, peers tended to directly affect adolescents' choices of friends, as communication no longer had a role in the way peers' view on similarity enhanced the formation of friendships. Perhaps the peer norm of "similar persons should become friends" was ever more apparent in later stages of acquaintance, and therefore directly affected adolescents' friendship choices.

In sum, the current dissertation demonstrated that the group level in which choices of friendships are embedded seems to influence who adolescents choose as friends. Both the structure of the social network of friendships and peers' view on similarity between adolescents tended to affect adolescents' friendship formation.

#### 9.2.1.4 Overall and Specific Similarity

The current dissertation contributes to knowledge regarding the meaning of similarity in friendships by studying overall similarity and specific similarity. In the case of individual preferences, studying similarity in both specific and overall music preferences provided consistent support for a function of similarity in music preferences in the formation of friendships (Chapter 2). Nevertheless, whereas specific similarity in personality traits did seem to enhance friendship formation (Chapter 4), overall similarity in personality traits did not (Chapter 5). Why is this the case? There are at least two explanations for these different findings. Results could be explained by the 'blurring' of specific effects of Extraversion, Agreeableness, and Openness on friendship formation by taking all the different personality traits together in the case of overall similarity. That is, because overall similarity includes traits that may not be important for choices of friends, we underestimated the way actual similarity in personality traits affect friendship formation by taking overall similarity in these traits in Chapter 5. A second explanation may be that there really are no effects of actual similarity in any of the personality traits: if perceived similarity would have been taken into account in Chapter 3, perhaps specific personality effects would have disappeared as well. Other reasons for different results may include the different ways of operationalization of friendship (dichotomous friend/acquaintance vs. continuous friendship intensity) and the way of studying relationship changes (a social network approach vs. a dyadic approach) for Chapter 4 and Chapter 5, respectively. In short, although direct comparisons between these studies remain ambiguous due to the mentioned differences between the studies, speculations about the function of actual similarity in personality traits in adolescent friendship choices give suggestions for future research.

In sum, these results together stress the importance of distinguishing between specific and overall similarity in different domains, because each of these may have own unique effects on friendship formation.

### 9.2.2 Friendship Socialization: Friendship Quality and Friends' Behaviors

Findings of the last three studies provided more insight into friendship socialization in adolescent development on the dyadic level. This dyadic level was addressed by examining two different aspects in friendships: perceived friendship quality and friends' behaviors. In perceived friendship quality, the role of both perceptions of individuality and perceptions of closeness in emotional problems were studied. The importance of friends' behaviors in adolescent problem behaviors was examined as well. These different aspects seem to have unique functions in the development of specific problems for boys and girls.

#### 9.2.2.1 Friendship Quality

Findings of the current dissertation suggested that balancing both individuality and closeness within friendships is important from early to late adolescence. Developing a greater sense of individuation within friendships seems become more and more important across adolescence (Chapter 6). Further, the development of two indicators of closeness were examined: support and commitment. Support in friendships seems to increase from early to middle adolescence, irrespective of gender differences (Chapter 5). Commitment, on the other hand, seems to remain relatively stable from early to late adolescence. Finally, balancing both individuation and closeness in friendships seem to characterize adolescents' cognitive

representations of friendships from early to late adolescence (Chapter 6). Taken together, these results fit several broader theoretical developmental frameworks regarding children's and adolescents' close relationships. Attachment theory (Bowlby, 1973) suggests that the most optimal emotional development involves the use of a partner both as a source of closeness and as a secure base for individual exploration. Similarly, theories concerning closeness and individuation (Grotevant & Cooper, 1986) suggest that normative development across adolescence is characterized by maintaining close relationships with parents and peers while at the same time increasing individuation. Individuation emerges gradually during adolescence, as adolescents strive to distinguish themselves from both parents and peers (Grotevant & Cooper, 1998). Furthermore, theories dealing with parenting practices (Baumrind & Black, 1967) suggest that providing warmth as well as encouraging children's psychological autonomy is associated with positive developmental outcomes. These theoretical frameworks primarily deal with parent-child relationships. Current results, however, provide unique empirical support for the suggestion that closeness and individuation characterize cognitive representations of adolescent friendships as well. This confirms the theoretical suggestions of Selman (1990), who emphasized that the co-development of perceived closeness and individualization is at the basis of developing healthy relationships with friends. In short, findings of the current study provide support for broad developmental theories in the context of friendship development across adolescence.

One important gender-specific finding was that only for girls, perceptions of closeness and individuality friendship seem to have a positive function in emotional development (Chapter 6). Girls specifically may be more sensitive to negative friendship quality, which may trigger higher levels of emotional stress for them (Prinstein

et al., 2005; Rudolph, 2002; Rudolph et al., 2000). The reason why girls, and not boys, may have different reactions to negative exchanges in peer relationships may be based on hormonal sensitivity: girls have been found to react more strongly in cortisol levels, a stress-related hormone, by problematic talk within friendship dyads (Byrd-Craven, Geary, Rose, & Ponzi, 2008). Alternatively, the direction of effects may be different: girls may start to perceive friendship quality more negatively because they feel depressed than boys do (Borelli & Prinstein, 2006). Findings indeed showed that for boys, perceptions of friendship quality in best friendships tended to affect their emotional development less: depression tended to decline for boys in general, irrespective of friendship quality. Boys may be less sensitive to negative exchanges in best friendships because they tend to be embedded more in peer groups (Knecht, 2008; Snijders et al., 2007; Urberg et al., 2000). Thus, findings in this study demonstrated clear mean differences in depression for girls who differ in the extent to which they balance perceptions of individuality and closeness. Therefore, results of this study stress the importance of considering both individuality and closeness in girls' emotional development.

Findings in Chapter 7 additionally provided insight into the indirect role of perceptions of closeness in friendships in middle adolescence. Closeness seems to have a salient indirect function in effects of Internet use on both boys' and girls' depression and social anxiety. For adolescents with low perceived closeness, Internet use seems to enhance adolescent emotional development as well as increase emotional problems. This depended on whether they use non-communication based or communication based Internet use, respectively. In contrast, adolescents who perceived medium to high support in friendships seemed to be unaffected by Internet use. Thus, empirical support was provided for theoretical suggestions that closeness within friendships can buffer against adverse effects of

the environment adolescents are embedded in (Bukowski & Kramer, 1986; Hartup, 1996; Laursen et al., 2007; Parker & Asher, 1993).

Findings in this study can also be seen as empirical support for part of the Ecological Systems theory of Bronfenbrenner (1979, 1989). Past empirical research has focused on peer relationships primarily on the *microsystems* level: the role of immediate surroundings in adolescent development, such as characteristics of friendships on the one hand or family characteristics on the other, is usually studied in isolation from one another. Bronfenbrenner further referred to *mesosystems* as the links between these microsystems: interactions between different specific contexts may additionally have important functions in adolescent development. Recently, research has shown that mesosystem models that link peer contexts with family contexts are important for understanding problem behaviors of adolescents (Dishion, Duncan, Eddy, Fagot, & Feltrow, 1994; Farrell & White, 1998; Scaramella, Conger, Spoth, & Simons, 2002). Current findings suggest that a mesosystem model linking friendships with media use adds to further insight into the emotional development of adolescents. That is, only when combinations of levels of friendship quality and specific Internet use were studied, differences between adolescents in their development of emotional problems were revealed. Thus, empirical findings in the current dissertation suggest that studying the combined functions of media use and friendships is necessary to improve our knowledge on the emotional development in adolescence.

To summarize, the current dissertation indicates that characteristics of friendships have unique functions in boys' and girls' emotional development across adolescence. Both individuality as well as closeness within friendships seems to increase in adolescence, and balancing both these characteristics was associated with a better emotional adjustment for girls from early to late adolescence. Combining perceptions of friendship quality with patterns of media

usage helped to gain insight into both boys' and girls' emotional adjustment.

#### 9.2.2.2 Friends' Behaviors

Results of this dissertation furthermore help to gain insight into the development of adolescent delinquency in adolescence. Both boys and girls tended to increase in adolescent delinquency from early to middle adolescence; nevertheless, boys showed higher levels of delinquent behaviors across this period. Moffit's theory (1996) of childhood-onset versus adolescent-onset disruptive behaviors maintains that an increase of delinquent behaviors in adolescence is part of a normative development, especially among boys. Adolescents who follow this developmental trajectory of delinquency are suggested to have 'adolescence limited' disruptive behaviors: minor delinquent behaviors primarily appear in adolescence. Further, this theory maintains that this increase in delinquent behaviors lasts until middle adolescence for these adolescents, after which delinquency typically declines. Thus, findings of this study provide empirical support for theories suggesting that a normative development of delinquency involves an increase from early to middle adolescence.

Moreover, results in Chapter 8 furthermore provided insight into the role of friendships in individual differences between adolescent in the development of delinquent behaviors. The developmental trajectories of adolescents' delinquent behaviors tended to be associated with the developmental trajectories of their best friends, especially for boys. That is, not only do friends tend to have related mean tendencies towards delinquent behaviors: if one friend declines or escalates in delinquent behaviors from early to middle adolescence, the other friend seems to do so too. In that sense, friends truly are "partners in crime". These findings expand prior short-term

longitudinal results, spanning from six months to two years (De Kemp et al., 2006; Fergusson et al., 2002; Haynie & Osgood, 2005; Poulin et al., 1999), by showing that this joint development of delinquency occurs from early to middle adolescence. Theoretically, this means that the Differential Association Theory (Sutherland, 1947) is supported in a developmental context. This theory maintains that the individual differences found in youth's delinquency arise because of variations in delinquent behaviors of close others, particularly friends (Sutherland & Cressy, 1978). In addition, empirical findings offer support for interventions that target delinquent youth by assuming delinquent friends tend to be befriended with one another (Dishion, McCord, & Poulin, 1999; Dishion & Snyder, 2004). The study in this dissertation suggests that this way of targeting delinquent youth may be useful from early to middle adolescence.

Furthermore, insight was provided into mechanisms that may explain *why* friends tend to be similar in delinquent behaviors. Findings indicated that perceptions of friendship quality did not seem to matter in the development of adolescent delinquency. Therefore, no support was found for the Social Control Theory of Hirschi (1969) in the contexts of friendships. Bonding between friends did not decrease or enhance adolescents' delinquent behaviors, irrespective of whether this friend is delinquent or not. Thus, this suggests that prevention and intervention strategies aimed at improving perceptions of friendship quality in delinquent youth peer relationships (Swenson, 2004) are unlikely to be effective.

Instead, friends' delinquency seemed to be a more important risk factor for increases in boys' delinquency from early to middle adolescence. The earlier mentioned Differential Association Theory suggests that this occurs because exposure to close others who have deviant beliefs and attitudes will increase one's deviant beliefs and attitudes, and therefore lead to more delinquent behaviors.

More specifically, the theoretical suggestions concerning *deviancy training* in boys' friendships (Dishion, 1990; Dishion & Patterson, 2006; Dishion et al., 1996) are supported by our empirical findings. According to these suggestions, delinquent boys tend to reinforce pro-deviant talk and express delinquent attitudes more than delinquent girls, which tends to increase boys' willingness to engage in delinquent behaviors. Findings of this dissertation indicate that these processes may occur from early to middle adolescence in boys' friendships.

For girls, however, perceived friendship quality and friends' delinquency did not seem to increase delinquent behaviors. Nevertheless, prior research (Fergusson et al., 2002; Luijpers, 2000; Reinecke, 2006) as well as findings in the current dissertation point out that adolescent girls also tend to show delinquent behaviors. Further, girls tend to be similar to their best friends in their development of delinquent behaviors. Thus, what processes explain why girls seem to develop similar delinquent behaviors as their friends? One explanation for this finding may be that most best friendships in the current studies concern same-sex best friendships. Research has indicated that in cross-sex friends, male friends' delinquency may be more influential on females than female friends' delinquency (Regnerus, 2002; Thornberry & Krohn, 2001). For example, recent evidence has shown that incarcerated delinquent girls primarily have male friends, which may explain their delinquent behavior (Solomon, 2006). Therefore, the extent to which friends influence girls' delinquency may have been underestimated because cross-sex friendships were relatively rare in this dissertation.

In sum, results of the current dissertation offer unique insight into the relative importance of friendship quality and friends' behaviors in the development of adolescent problem behaviors. It seems that only delinquent behaviors of friends, and not closeness in relationships with these friends, may affect adolescent delinquency.

### 9.3 Strengths and Limitations

An important strength of the current dissertation is that in all studies regarding similarity in friendships (Chapter 2, 4, 5, and 8), adolescents and their friends reported on their own characteristics and behaviors. Thus, through the use of independent reports, individuals' own perspectives on their characteristics and behaviors were studied. This has the advantage that actual similarity found in the current dissertation is not explained by intra-individual report biases, such as projection (Bauman & Ennett, 1996; Ennet & Baumann, 1994; Kandel, 1978a; Morry, 2005; Regnerus, 2002). Thus, similarity in traits, preferences, and problem behaviors reported on in the current dissertation is unlikely to be affected by adolescents' overestimation due to their own perceptions.

Another advantage is that the role of traits and preferences was studied on several different levels: the individual, the dyadic, and the group level. That is, although traits and preferences are commonly regarded as individual characteristics, they were found to have unique functions at three levels in the way adolescents form friendships with others. On the individual level, traits directly predicted friendship formation, and perceptions of overall traits seem to influence adolescents' choices of friends. On the dyadic level, similarity in specific traits and similarity in specific and overall preferences seemed to enhance friendship formation. Finally, at the group level, peers' views on similarity in overall traits may affect adolescents' friendship choices. Thus, by examining the role of traits and preferences on each of these levels, a more comprehensive view on the role of individual characteristics in the formation of adolescent friendships was provided.

Further, friendships themselves were studied from several perspectives. A more commonly used approach by focusing on best

friendships in adolescence was applied in chapters 2, 3, 6, 7, and 8. This approach has the advantage that persons in best friendships are likely to know one another and these friendship ties indicate strong ties between two persons. In other words, if any similarity in individual traits and behaviors exists between friends, it may most likely be found in best friendships. Findings indeed showed support for similarity in a variety of domains in best friendships, including personality traits, problem behaviors, music preferences, and perceptions of friendships.

Adolescent friendships seem to extend beyond best friendships as well, as they were shown to be embedded in larger social networks of friendship relationships. Chapter 4 used a more broad approach towards friendship by examining changes in a whole network of friendships over four months. Findings showed that it is important to control for both these dyadic and triadic tendencies because they seem to *affect* adolescents' choices of friends: individuals tend to choose their friends on the basis of their connections in the friendship network, irrespective of psychological and behavioral factors such as described in the prior discussed studies. Thus, using a social network approach allowed for additional insight into friendship formation processes.

Finally, 'friendships' may contain a whole range of different friendship types (Vulmer, McCormick, Broflovski, Cartman, & Marsh, in press). The abovementioned studies use a similar approach towards friendships, as they are either viewed as absent or present. In Chapter 5, friendship intensity was used to measure friendships, which ranged from being non-existent through acquaintanceship, through friend to a very best friend. Findings suggested that this continuous way of viewing friendships was longitudinally associated with their communicative behaviors and adolescents' and their peers' reports on similarity in personality. Thus, viewing friendships from a

continuous perspective seems to additionally be a realistic approach to study adolescent friendships.

Taken together, the current dissertation examined a variety of friendship relations, which all seemed to be connected to individual and behavioral characteristics. These results stress the need to examine friendships from an individual, dyadic, and group perspective, while combining continuous and dichotomous measures of friendships to get a more realistic view on the functions of friendships in adolescence.

Additionally, the current dissertation indicated that distinguishing between different similarity types helps clarifying the role of similarity in friendships. Specifically, individuals' own perceptions and peers' perceptions of similarity in overall traits seem to enhance friendship formation, whereas actual overall similarity in traits did not. Nevertheless, specific actual similarity in traits and preferences did seem to matter when adolescents form their friendships. Thus, findings indicate that "similarity" does not have a single, straightforward definition; instead, depending on the eye of the beholder as well as specificity, similarity can have different functions in adolescent friendships.

A limitation of the current dissertation is that the unique functions of overall versus specific similarity were not explicitly tested. This becomes most clear regarding seemingly contrasting results of Chapter 3 and 4: whereas specific actual similarity in personality was found to predict friendships formation, overall actual similarity in personality was not. Because specific and overall similarity were not studied simultaneously, the *unique* effects of specific versus overall similarity in personality according to the three levels remain unclear. A similar limitation is found within Chapter 5: although both specific and overall similarity in music preferences on friendship formation were studied, the unique effects of each of these types of similarity in music preferences needs to be disentangled by further examining

them simultaneously.

In addition, although friendship quality is suggested to pertain to both the individual level and the dyadic level, it was almost exclusively studied on the individual level. That is, only the target persons whose behaviors were studied were asked to report on their perceptions of friendship quality in Chapter 6 to 8. This may be problematic given that in Chapter 3, only modest similarity in their several perceptions towards friendship quality, and this similarity in views on friendships existed primarily for girls. Nevertheless, regarding friendship and depression in Chapter 6, prior studies indicated that individuals' own perceptions of friendship quality are more consequential for individuals' depressive feelings than friends' perspective on friendship quality (Brendgen et al., 2002). Further, additional analyses in Chapter 8 showed similar findings regarding the role of friendship quality in adolescent delinquent behaviors when using both friends' perceptions of friendship quality compared to using only the target adolescents' perspective. Regardless, the independent and combined functions of both individuals' own and friends' perceptions of friendship quality in adolescent emotional problems require further examination.

The limited generalizability of particularly Chapter 4 and 5, where a sample of highly educated primarily female college students was used, forms another limitation of this dissertation. This could be the reason why in Chapter 4, similarity in Openness predicted friendship intensity, and no support was found for similarity in Openness within best friendships in middle adolescence in Chapter 3. These results suggests that similarity in Openness may be important for late adolescents, perhaps particularly for highly educated freshmen. In the absence of a direct comparison between middle and late adolescents in this process, however, this assumption can only be tested if the development of similarity in personality from middle

to late adolescence had been studied. As the current dissertation did not examine such a direct comparison, this concern needs to be examined in future studies. In addition, findings regarding differences in perceived, actual, and peer-rated similarity may be different for adolescents with a lower educational background. Chapter 5 showed that similarity on overall music preferences predicted adolescents' choices of friends more strongly for higher educated adolescents than for lower educated adolescents, suggesting that being similar in music preferences when forming friendships is more important to the former than to the latter. Following this line of reasoning, for lower educated youth (perceptions of) personality may be of less importance when forming friendships than other factors, such as similarity in problematic behaviors (Ritt-Olson, 2005). In sum, more insight is needed into what function personality has in friendship formation across adolescence as well as for lower educated adolescents.

Another limitation concerns a contrasting finding possibly due to different indicators of problematic behaviors. In Chapter 3, girls were found to be more similar in aggression than boys. However, in Chapter 8, boys were found to be more similar than girls in delinquency, which included direct aggression items. These results may be explained by measurement differences between the two studies. In Chapter 3, both direct and indirect aggression within classes were used as indicators for total aggression. Gender differences in types of aggression seem to exist: whereas boys may be more directly aggressive (e.g., hitting someone), girls may be more indirectly aggressive (e.g., gossiping behind someone's back) (Björkqvist et al., 1992; Kereste & Milanovic, 2006; Wang & Lay, 2007). Therefore, indirect aggression may be particularly visible for girls, which makes it more likely they can use indirect aggression to choose their friends. Boys, on the other hand, may not display indirect aggression as frequently, and may use direct aggression more

to choose friends with because this behavior is more visible. In sum, the similarity in ‘aggression’ in Chapter 3 may pertain to similarity in indirect aggression more than similarity in direct aggression, and similarity in the former may be more important to girls’ friendship than to boys’ friendships. Nevertheless, because gender differences in similarity in these specific types of aggression were not studied, these speculations provide a basis for future studies.

#### **9.4 Future Directions**

From the discussion above, several suggestions can be found for future studies on the role of friendships in adolescence. First, regarding similarity in friendships, the need to account for similarity in individual traits and preferences in adolescent friendships was stressed by findings showing that these characteristics seem to be used in friendship formation. Similarity in individual traits and preferences may interact with similarity in other areas to affect friendship choices as well. Drawing from personality-environment interaction models (e.g., South & Krueger, 2008; Walsh, 1973), individuals’ own personality traits might interact with friends’ problematic behaviors in forming friendships. For example, a more extraverted, sensation-seeking adolescent may find problematic friends more interesting than a more introverted, calmer adolescent, and the former may therefore form more friendships with problematic others than the latter. Future studies should be conducted to disentangle the relative importance of individual traits, individual preferences, problematic behaviors, and possibly other areas of similarity in adolescent friendships. Further, these future studies could study whether individual traits and preferences interact with problematic behaviors in the formation of adolescent friendships.

Second, the current dissertation points out that differentiating

between different levels of relationships helps clarify the functions of traits and preferences in adolescents' choices of friends. Future studies could therefore continue along this path by including round-robin designs in which individuals rate both themselves and other peers in their surroundings on problematic behaviors, individual traits, and individual preferences. For example, the relative importance of perceptions of similarity in music preferences and problematic behaviors compared to actual similarity in these domains in adolescent friendships needs to be further studied. In short, future studies should include different perceptions of traits and preferences and behaviors in friendship formation and friendship socialization.

Third, findings suggest that friendships consist of a whole array of types of relationships. Findings of this dissertation call for studies that examine the differences between friendship types in order to find out what functions each of these types have in adolescent development. The social network approach in Chapter 3 supported that adolescent friendships extend beyond the dyad into triadic friendships. Future studies could extend this notion even further and look at the meaning of these triadic friendship group structures in the development of adolescents. Other different friendship types were included in this dissertation as well, such as differences between best friendships and acquaintanceships. Although the current dissertation included these different friendship types, differences between these types were not explicitly tested. Therefore, future studies could therefore examine the relative importance of traits, preferences, and problem behaviors in the formation of different friendship types. In addition, the extent to which distinguishing between these friendship types helps to gain insight into functions of friendships in adolescent development needs to be further examined.

Fourth, the relative importance of specific similarity and overall similarity in personality and music preferences should be

additionally addressed by studying effects of these similarity types on friendship formation simultaneously. That is, findings of the current dissertation do not provide definite conclusions about what is more important to the formation of friendships, the overall pattern of similarity in traits and preferences, or similarity in specific traits and preferences. In addition, future studies can examine the role of similarity in specific problematic behaviors for boys and girls separately, in order to see whether indirect aggression may be more important for girls' friendship formation than for boys' friendship formation. Alternatively, direct aggression may be more important for boys' friendship formation than for girls' friendship formation. This way, the relative importance of specific and overall problem behaviors in the formation of both boys' and girls' friendships may become more clear. Finally, studies should examine the unique and combined role of adolescents' own perceptions and their friends' own perceptions on friendship quality in the development of behavioral and emotional problems. By including both perceptions, more insight may be gained into what functions friendships have in the adolescent development.

## 9.5 Concluding Remarks

The current dissertation's aim was to provide insight into friendship formation and friendship socialization. Empirical findings improve prior knowledge on these processes in several ways. Early adolescents may use specific personality traits and music preferences as unique markers of their individuality and thereby base their friendships on these preferences. Moreover, findings challenge the basic assumption of the "Law of Attraction" (Byrne, 1971), according to which actual similarity in traits 'breeds' attraction. Adolescents may namely not need to be truly similar to become friends; their perceptions of such, however, may affect their choices of friends. These results indicate that it's about "Me, Myself, and I" in friendships.

Nevertheless, other empirical findings indicate that the 'You' has a place in friendships as well. The need for research to go beyond the dyadic level, or two people in a friendship, was stressed by results indicating that friendship networks as a whole seem to uniquely influence friendship formation. In that sense, the whole friendship network may be of greater importance for friendship formation than the sum of its dyadic parts. Further, the earlier described assumption of the "Law of Attraction" may have penetrated peer norms, which subsequently affected adolescents' choices of friends. Adolescents namely seem to conform to peer norms regarding similarity by talking more frequently to people peers view as being similar to these adolescents. Thereby, peers may indirectly affect adolescents' friendship choices.

After friendships are formed, others seem to become important in adolescents' emotional and behavioral development. Boys seem to risk escalating in problematic behaviors from early to middle adolescence due to problematic behaviors of friends. Whether friends are close, however, does not seem to have a role in the development

of these behaviors. Nevertheless, friendship closeness may influence adolescents' emotional development directly and indirectly, particularly for girls. Girls' depressive symptoms were associated with balancing both closeness and individuation in friendships. Internet use may influence only the emotional development of adolescents with low quality friendships, and not adolescents with a medium to high friendship quality. These findings provide unique empirical support for the idea that disentangling the importance of friendship quality and friends' behaviors helps to gain insight into adolescent development of behavioral and emotional problems. Further, results were among the first to show that studying the combined functions of Internet use and friendship quality is necessary in order to improve our knowledge on factors affecting adolescents' emotional development.

Taken together, it seems to be a matter of "Me, Myself, and You" in adolescent friendships. Adolescents' own traits, preferences, and particularly their perceptions seem to be important in how adolescents form friendships. Nevertheless, others' traits and behaviors may influence both adolescents and their friendships.

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## Summary

The current dissertation focused on processes of friendship formation and friendship socialization in adolescence. The role of individual characteristics in friendship formation were examined at the a) individual level (individuals' perceptions and traits), b) dyadic level (similarity between two persons in traits and preferences), and c) group level (peers' perceptions of traits). For friendship socialization, we examined the relative importance of friends' behaviors and perceptions of friendships in the behavioral and emotional development of adolescents.

Data were used from two longitudinal projects, CONAMORE and My First Year. In CONAMORE, questionnaires were filled out both at school and at home. Data were used up to five annual measurements, spanning from early to late adolescence. From this project, several subsamples of adolescents and their friends were used. Questionnaires concerned friendship nominations, personality traits, media use, problem behaviors, and perceptions of friendship quality. In the My First Year project, 205 just-acquainted University freshmen filled out online questionnaires in five monthly measurements. In this project, friendship intensity, Big Five personality traits, and communication were examined using a longitudinal round-robin design.

Findings regarding friendship formation indicate that individual characteristics have unique functions in friendship formation. On the individual level, Extraversion and Agreeableness predicted selecting others more and being selected by others more, respectively. Moreover, whereas adolescents' perceptions of similarity in overall personality traits predicted more friendship intensity, actual similarity in these traits did not. Friendship intensity, in turn, predicted perceptions of more similarity in overall personality traits.

On the dyadic level, adolescents tended to form friendships with others who were similar in specific personality traits Extraversion, Agreeableness, and Openness. Further, similarity in specific and overall music preferences predicted friendship formation. On the group level, peers' perceptions of similarity between just-acquainted late adolescents predicted the frequency they communicated. This, in turn, predicted friendship intensity over time.

Support was found for salient functions of friends' behaviors and perceptions of friendship in the development of individual characteristics. Whereas friends' delinquent behaviors predicted increases in boys' delinquent behaviors from early to middle adolescence, perceptions of closeness in friendships did not. For girls, however, perceptions of higher closeness and higher individuality were associated with lower levels of depression from early to late adolescence. Only for adolescents who perceive low closeness in friendships, non-communication based Internet use predicted more depression and social anxiety over time. For adolescents who perceive medium to high closeness, Internet use did not predict depression and social anxiety. In sum, perceptions of friendship quality and friends' behaviors both seem to have unique functions in behavioral problems for boys and emotional problems for both boys and girls, respectively.

Thus, both adolescents themselves and others seem to have an important role in adolescents' friendships and adolescents' development. Adolescents' own individual traits and preferences tend to partially determine their friendship choices. Moreover, adolescents' perceptions of others' personality may be more consequential for their friendship choices than how others' personality actually is. Nevertheless, peers' perceptions and friends' behaviors may additionally influence adolescents' friendship selection and behavioral and emotional development.

## **Samenvatting (Summary in Dutch)**

In deze dissertatie werd de rol van individuele kenmerken in zowel het vormen van vriendschappen als de socialisatie binnen vriendschappen in de adolescentie onderzocht. Binnen vriendschapsformatie werden drie verschillende niveaus onderscheiden: a) het individuele niveau (persoonlijkheid en percepties van persoonlijkheid) b) het dyadische niveau (gelijkenis tussen personen in persoonlijkheid en muziekvoorkeuren) en c) het groepsniveau (percepties van leeftijdsgenoten over persoonlijkheid). In het proces van socialisatie werd onderzocht wat de functies zijn van gedrag van de vriend(in) en percepties van vriendschapskwaliteit in de ontwikkeling van individuele kenmerken.

Om deze processen te onderzoeken werden gegevens gebruikt van twee longitudinale projecten, namelijk CONAMORE en Mijn Eerste Jaar. In CONAMORE werden vragenlijsten afgenomen bij jongeren van 11 tot 20 jaar zowel op school als binnen families thuis. Binnen dit project werden verschillende subsamples van adolescenten en hun vrienden geselecteerd. Deze vragenlijsten gingen over het nomineren van beste vrienden, emotionele en gedragsproblemen, persoonlijkheid, media gebruik en percepties van vriendschapskwaliteit binnen vriendschappen. In het project Mijn Eerste Jaar vulden 205 eerstejaars studenten die elkaar net leerden kennen maandelijks online vragen in gedurende 4 maanden. Deze vragen gingen over de Big Five persoonlijkheidstrekken, vriendschapsintensiteit en communicatie. Studenten vulden deze gegevens zowel over zichzelf als over elkaar in.

De resultaten suggereren dat individuele kenmerken specifieke functies in het vormen van vriendschappen hebben. Op het individuele niveau voorspelden meer Extraversie en Vriendelijkheid respectievelijk een hogere mate van het selecteren van vrienden en

het geselecteerd worden als vriend. Belangrijker nog, de percepties van deze adolescenten over gelijkens tussen hun en anderen in het gehele patroon van persoonlijkheidstrekken voorspelden hogere vriendschapsintensiteit, terwijl echte gelijkens in dit patroon dat niet deed. Ook voorspelde de mate van vriendschapsintensiteit meer waargenomen gelijkens in het gehele patroon van persoonlijkheidstrekken voor deze adolescenten. Op het dyadische niveau werd gevonden dat adolescenten anderen selecteerden als vrienden die specifieke gelijkens in Extraversie, Vriendelijkheid en Openheid vertoonden. Dit gold ook voor specifieke non-mainstream muziekvoorkeuren en het algemene patroon van muziekvoorkeuren. Tot slot voorspelde de perceptie van de groep over hoeveel gelijkens adolescenten vertoonden de hoeveelheid communicatie tussen adolescenten. Deze verhoogde communicatie voorspelde weer de mate van vriendschapsintensiteit.

Vriendschap had op zijn beurt weer een rol in de manier waarop probleem gedragingen zich ontwikkelden. Het delinquent gedrag van vrienden voorspelde een toename in delinquent gedrag van jongens, terwijl percepties van verbondenheid binnen de vriendschap geen invloed leek te hebben op delinquent gedrag van jongens en meisjes. Voor meisjes gold dat percepties van hogere verbondenheid en individualiteit beiden geassocieerd waren met lagere niveaus van depressie. Tot slot werd gevonden dat voor adolescenten die een perceptie van een lage vriendschapskwaliteit rapporteerden, internetgebruik dat op non-communicatie gebaseerd was een hogere mate van depressie en sociale angst voorspelde. Voor adolescenten met een perceptie van middelmatige tot hoge vriendschapskwaliteit had internetgebruik geen effect op depressie en sociale angst.

Concluderend blijken kenmerken die individualiteit van jongeren uitdrukken een belangrijke plaats te hebben in vriendschappen met anderen. Eigen percepties van gelijkens in

persoonlijkheidsprofielen bleken belangrijker te zijn in het vormen van vriendschappen dan de profielen die anderen echt hebben. Tegelijkertijd kozen adolescenten hun vrienden die bij hun eigen specifieke persoonlijkheidskenmerken en muziekvoorkeuren leken te passen. Verder leken gedragsproblemen van vrienden en percepties van verbondenheid binnen de vriendschap van invloed te zijn op respectievelijk het probleemgedrag van jongens en de emotionele problemen van jongens en meisjes.



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## **Curriculum Vitae**

Maarten Selfhout was born on the 30<sup>th</sup> of September 1981 in Hengelo, the Netherlands. He completed his pre-university education at the Twickel College in Hengelo in 1999 and attended Psychology at the Utrecht University from 1999 until 2005. In 2005, he earned his master's degree and started his PhD project at the Research Centre Adolescent Development at the Utrecht University. From 2005 until 2009, Maarten worked on his dissertation concerning friendships in adolescence, organizing symposia and presenting at several national and international conferences each year. He wrote eleven articles as main author and co-authored four others during these four years. Two of the articles he wrote as main author are currently in press at journals ranking among the five highest impact journals in Social Psychology. In 2005, he acquired the International Traveling Award of the Dutch Organization for Scientific Research (NWO). With this award, he visited and worked together with an expert in the area of dyadic data analysis, Prof. Dr. David Kenny at the University of Connecticut, USA. He gained funds, organized, and coordinated the unique longitudinal round-robin project My First Year in 2006. In this project, just-acquainted freshmen monthly filled out questionnaires regarding themselves and all their group members across their first year of University. In 2007, he acquired the prize for the "Best National Article from the Institute for Study of Education and Human Development (ISED). He further gained the prize for "Best International Article" from ISED in 2008. He also organized two statistical workshops regarding the program Mplus at the Örebro University, Sweden and the program SIENA at the University of Konstanz, Germany. From 2006 onwards, he gained funds for setting up and carrying out several cooperation projects with researchers from international research groups. Examples of these include collaborations with Prof. Dr. Denissen at the Humboldt

University, Germany, and Prof. Dr. Stattin and Prof. Dr. Kerr at the Örebro University, Sweden. From September 2009 onwards, he will start working at the research institute Youth and Society at the Örebro University, Sweden.

## Publications

This dissertation:

Selfhout, M., Branje, S., Ter Bogt, T., & Meeus, W. (2009). The role of music preferences in the formation and stability of best friendships. *Journal of Adolescence*, 32, 95–107.

Selfhout, M., Branje, S. , Raaijmakers, Q., & Meeus, W. (2007). Similarity in adolescent best friendships: the role of gender. *Netherlands Journal of Psychology*, 63, 50-57.

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Selfhout, M., Denissen, J., Branje, S., & Meeus, W. (2009). In the eye of the beholder: Perceived, actual, and peer-rated similarity in personality, communication, and friendship intensity during the acquaintanceship process. *Journal of Personality and Social Psychology*, 96, 1152-1165.

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Selfhout, M., Branje, S., & Meeus, W. (2008). The development of delinquency and perceived friendship quality in best friendship dyads. *Journal of Abnormal Child Psychology*, 36, 471-485.

### **Other publications-submitted papers:**

Selfhout, M., Delsing, M., Meeus W., & Ter Bogt, T. (2008). Heavy metal and hip-hop style preferences and externalizing problem behavior: A two-wave longitudinal study. *Youth & Society*, 39, 435-452.

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Mulder, J., Klugkist, I., Van de Schoot, R., Meeus, W., Selfhout, M. & Hoijtink, H. (2009). *Informative hypotheses for repeated measurements: A Bayesian approach*. Manuscript submitted for publication.

Ter Bogt, T., Delsing, M., Selfhout, M., & Meeus, W. (2008). *Intergenerational continuity of taste: The relationship between parental and adolescent music preferences*. Manuscript submitted for publication.





