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Socialization of Depressive Symptoms in Pre- and Early Adolescent Peer Cliques

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SOCIALIZATION OF DEPRESSIVE SYMPTOMS IN PRE- AND EARLY ADOLESCENT PEER CLIQUES

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by

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Abstract

This study examined socialization of depressive symptoms in pre- and early adolescent peer cliques, and clique characteristics (clique gender and friendship density) that may moderate the contribution of clique depression to the prediction of youths' depressive symptoms over time. Social cognitive mapping identified 162 peer cliques involving 999 youths from Grades 4 through 8 (*M* age = 11.84; *SD* = 1.52) in Southwestern Ontario. As expected, multi-level modeling revealed that clique depressive symptoms in fall contributed significantly to the prediction of youths' depressive symptoms in spring. Null findings regarding clique friendship density and gender as moderators of clique depression socialization suggest that friendship characteristics involving intimacy and mutual self-disclosure, and cognitive and behavioral characteristics associated with girls (e.g., depressogenic thoughts) may not be essential to clique depression socialization. Future research should examine whether members of depressed cliques become more depressed due to external factors impinging on cliques, such as victimization.

Keywords: Peer Clique, Depression, Socialization, Preadolescence, Early Adolescence, Peer Influence

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Introduction

As children transition into adolescence, they begin to place greater emphasis on establishing and maintaining peer relationships while achieving increased autonomy from parents and caregivers (Adler & Adler, 1998). Although substantial research has been conducted on youths' friendships (i.e., dyadic relationships), peer relations researchers acknowledge that youth interact in many different peer configurations and that the majority of peer interactions are situated within group contexts by the time children enter adolescence (Crockett, Losoff, & Peterson, 1984). As such, increasing attention is being paid to empirical research on youths' peer groups in recent years (e.g., Dijkstra & Veenstra, 2011).

Through the present research, my aim was to contribute to the literature on youths' peer groups by examining socialization of depressive symptoms in pre- and early adolescent peer cliques (a type of peer group). Following from extant research (e.g., Prinstein, 2007; Stevens & Prinstein, 2005), my main thesis is that through frequent exposure to depressed clique-mates, youth are likely to become more like their clique-mates over time (i.e., youth become more depressed). To set the stage for my research, I first review current theories and empirical findings about peer and clique influence more generally, and then focus on peer and clique socialization of depressive symptoms. Thereafter, I examine peer clique characteristics (i.e., clique gender, clique friendship density) that may moderate the contribution of clique depression to youths' depressive symptoms over time to create a more nuanced view of clique socialization of depression.

Friends, Peers, and Peer Groups: How Are They Different?

Use of the term "peers" has been quite varied across social science disciplines

(Prinstein & Dodge, 2008). Some prior research has referred to "peers" as best and closest friends, involving either a single dyadic best friendship or multiple dyadic best friendships identified by each youth (e.g., Gottman, 1983). Other researchers have used the term "peers" in a broader, group context, such as small interaction-based groups or cliques, classrooms, schools, and other larger social configurations (Prinstein & Dodge, 2008). Current nomenclature has attempted to reconcile these varied definitions. There is general agreement among researchers that "friends" consist of dyads that are characterized by reciprocity (mutual regard), mutual liking (preference for spending more time with one another than with others), and mutual affection and enjoyment (Bukowski, Newcomb, & Hartup, 1996). A "friendship network" is created when multiple reciprocated friendships exist within a defined setting, and each network member has at least one mutual friend who is also a network member (Liu & Chen, 2003).

For the purposes of the present study, the term "peers" is used to describe members of interaction-based peer groups. The importance of peer groups in the lives of youth has been highlighted in the literature. For instance, through peer group interactions, youth strive to attain social competence by honing their understanding of intra-and inter-group processes, their perspective-taking skills, and their abilities to align their actions and behavior with others (Adler & Adler, 1998). For many years, researchers studying children's peer relations have used the term "peer group" to refer to a cluster of children who make frequent contact with each other, often in a classroom setting (Coie, Dodge, & Kupersmidt, 1990). Subsequently, the term "peer clique" was introduced and defined as a group of three or more members who interact with each other frequently (i.e., interaction-based) and who share the same norms and social environment (Brown, 1990; Dijkstra &

Veenstra, 2011). Within a clique, not all members may consider each other as friends, even though they frequently associate with one another (Bagwell, Coie, Terry, & Lochman, 2000).

In the context of adolescence, Brown (1990) categorized peer groups as cliques or "crowds." According to Brown (1990), crowds are larger than cliques and are defined on the basis of reputation or a distinctive characteristic (e.g., "jocks," "nerds," or "Goths"). In contrast to cliques, youth within crowds may not necessarily interact with one another

2007). The tendency for people who affiliate with one another to share similar characteristics has been termed "homophily" (Lazarsfeld & Merton, 1954). Since then, the concept of homophily has been discussed frequently in relation to concepts of selection and socialization (Kandel, 1978). Selection refers to the tendency for youth to choose and associate with peers who are similar to them on various physical, psychological, and/or behavioral characteristics (Prinstein, 2007). Socialization refers to the tendency for youth and their peers to become more similar over time based on these characteristics (Prinstein, 2007). As an example of socialization, Patterson (1993) found that associating with deviant peers in early adolescence was significantly related to an increase in youths' problem behavior over time.

Socialization effects in peer groups have been studied extensively in domains related to externalizing and health-risk behavior in adolescents, such as physical and social aggression (Espelage et al., 2003; Shi & Xie, 2012), delinquency and deviant behavior (Allen, Porter, McFarland, Marsh, & McElhaney, 2005; Dishion, McCord, & Poulin, 1999; Ellis & Zarbatany, 2007; Vitaro, Brendgen, & Tremblay, 2000), smoking (Simons-Morton & Farhat, 2010), alcohol and drug use (Allen & Antonishak, 2008; Kiuru, Burk, Laursen, Salmela-Aro, & Nurmi, 2010), and sexual attitudes and behavior (Henry, Schoeny, Deptula, & Slavick, 2007). This can be contrasted with the surprising paucity of research on socialization effects of internalizing behavior in peer groups. As such, the primary aim of this study was to examine clique socialization of depressive symptoms in youth.

In this study, I examined socialization as an effect or phenomenon where youth become more similar to their clique-mates over time. This approach to operationalizing

"socialization" is common practice in research on peer group influence (e.g., Conway, Rancourt, Adelman, Burk, & Prinstein, 2011; Goodwin, Mrug, Borch, & Cillessen, 2012), and is based on the assumption that processes occurring within the clique, such as reinforcement of norm-consistent behavior, punishment of deviations from clique norms, and/or personal strivings of youth to behave consistently with clique norms to promote their acceptance by clique members result in greater behavioral similarity with clique members over time (Bukowski & Sippola, 2001). Although I did not assess clique depression socialization processes in the current study, my predictions are based on depression socialization processes observed in the dyadic friendship literature (e.g., Joiner, Coyne, & Blalock, 1999; Schwartz-Mette & Rose, 2012) as there are currently no studies that have examined clique depression socialization processes.

Depressive Symptoms in Youth

Depressive symptoms, as defined by the *Diagnostic and Statistical Manual for Mental Disorders, Fourth Edition – Text Revision* (*DSM-IV-TR*; American Psychiatric Association, 2000), include depressed mood, anhedonia, sense of worthlessness or guilt, fatigue or lethargy, poor concentration, and recurrent thoughts of death or suicide. Depending on the frequency, severity, and chronicity of these symptoms, differential clinical diagnoses of depressive disorders are made based on *DSM-IV-TR* criteria (Klein, 2008). However, growing evidence highlights the importance of ameliorating sub-clinical depression as well (Gotlib, Lewinsohn, & Seeley, 1995). Specifically, sub-clinical depression is associated with significant psychosocial impairment that is comparable to a level of functioning usually seen in clinical depression (Gotlib et al., 1995). Youth who exhibit numerous depressive symptoms are also at increased risk of developing clinical-

level disorders in future (Kazdin & Marciano, 1998; Lewinsohn, Rohde, & Seeley, 1998). Ample research has demonstrated that the transition into adolescence is associated with increased prevalence of depression (Cohen et al., 1993). Gender differences in prevalence rates of depression have also been found to increase dramatically to rates of approximately 2:1 (female-to-male ratio) by mid-adolescence (Angold, Costello, Erkanli, &Worthman, 1999; Costello, Mustillo, Erkanli, Keeler, & Angold, 2003; Hankin et al., 1998).

Socialization of Depressive Symptoms

Among the internalizing disorders, I chose to study clique socialization of depressive symptoms because the age period associated with increased prevalence of depression is also related to an increased focus on social development and adaptation within the peer context (Brown, 1990; Conway et al., 2011; Hankin et al., 1998). During the transition into adolescence, youth in Western cultures spend a majority of their time with peers, relative to parents and caregivers (Brown, 1990; Hartup, 1993). Within a peer setting, youth have been found to experiment with relationship behavior, such as self-disclosure and intimacy (Berndt, 1982; Buhrmester, 1990). Display of such relationship behavior creates a peer environment where shared interests and alignment of actions and behavior are valued, resulting in increased similarity between youth and their peers (Kandel, 1978). In addition, homophily effects contribute to youths' identity development, as youth explore and are affirmed by peers for adopting norm-consistent attitudes and beliefs (Epstein, 1989). As such, increased emphases on gaining interpersonal competence and adapting well to the social environment have been posited to amplify the contribution of peers' behavior to the prediction of youths' adjustment

outcomes (Brown, Clasen, & Eicher, 1986; Conway et al., 2011).

In comparison with prior work on socialization effects of externalizing behavior among youth, research on peer socialization of depressive symptoms began making strides only in the past decade (Conway et al., 2011; Giletta et al., 2011; Goodwin et al., 2012; Hogue & Steinberg, 1995; Prinstein, 2007; Schwartz-Mette & Rose, 2012; Stevens & Prinstein, 2005; Van Zalk, Kerr, Branje, Stattin, & Meeus, 2010). In many of these studies, socialization effects were explored in single (e.g., Giletta et al., 2011) or multiple friendships (e.g., Conway et al., 2011; Van Zalk et al., 2010). For example, Giletta et al. (2011) studied 487 same-gender best friend dyads (with 389 non-friend dyads serving as comparison) aged 12 to 16 in the Netherlands, and found that a best friend's depressive symptom severity was associated with increases in the youth's own depressive symptoms over a one-year period. Van Zalk et al. (2010) examined multiple friendship ties within youths' social networks[1] in a sample of 847 Swedish youths (aged 10 to 18 years). The authors found that depressive symptom severity of friends within youths' social networks predicted youths' increased depressive symptoms over a four-year period.

Few studies have specifically examined socialization of depressive symptoms among youth in cliques. In one study, Hogue and Steinberg (1995) assessed gender differences in internalized distress (composed of items measuring depression, anxiety, and somatic-related symptoms) among youth (aged 14 through 18) in peer cliques. The authors found that boys' (but not girls') distress levels became more similar to those of

[1] According to Laumann, Marsden, and Prensky (1989), a social network is defined as a cluster of individual nodes (e.g., each youth is represented by a node) that are linked by sets of social ties. A social network includes various types of social ties (e.g., reciprocated or unilateral friendships) that are captured during data collection. Because there are different types of social ties within a network, it is difficult to determine how much time network members spend with each other or how much potential influence members have on one another.

their clique-mates over a one-year period. However, the findings reported by Hogue and Steinberg require replication given the problematic data analytic strategy they employed. Current research in statistical methodology suggests that multi-level modeling (MLM) techniques are more appropriate for data analysis involving individuals nested within groups (Peugh, 2010) than the multiple regression techniques employed by Hogue and Steinberg. Because nested data structures violate the independence assumption that underpins many traditional statistical techniques (e.g., ordinary least-squares multiple regression), traditional statistical techniques present greater risks of biased parameter estimates and making Type I errors (Peugh, 2010; Raudenbush & Bryk, 2002). As such, MLM techniques were used in the present study.

Why might clique members influence each other to become more depressed over time? Although the current study is not set up to answer questions about mediating processes, it would be helpful to discuss the issue in order to understand the reasons for my predictions. This discussion is important when we consider a competing hypothesis in the literature that suggests that interacting with friends and peers may serve as a protective factor against depressive symptoms, as friends and peers provide support, companionship, and emotional validation (e.g., Adams, Santo, & Bukowski, 2011; Berndt, 1989; Helsen, Vollebergh, & Meeus, 2000; Newcomb & Bagwell, 1995).

Although a number of theories have been posited to account for socialization of depressive symptoms among friends or peers in general (e.g., Schwartz-Mette & Rose, 2012), almost all of these theories have yet to be empirically supported. The most promising evidence to date is found in the friendship literature and involves the concept of “co-rumination” (Schwartz-Mette & Rose, 2012). According to Rose (2002), a co-

ruminative conversational style is characterized by mutual encouragement of extensive problem talk, speculating about problems, and excessive focus on negative affect. Persistent exposure to friends' rehashing and speculation about problems, and exposure to friends' depressive symptoms may result in individuals experiencing "empathetic distress" as a "cost of caring," thereby becoming distressed themselves over time (Smith & Rose, 2011). Importantly, Schwartz-Mette and Rose (2012) found that the association between friends' Time 1 depression and youths' Time 2 depression was mediated by co-rumination in a sample of 274 child and adolescent friendship dyads from Midwestern U.S. (aged 9 to 15).

Another theory that attempts to account for how socialization of depressive symptoms occurs among friends or peers is based on the interpersonal theory of depression by Coyne (1976). This approach suggests that youth with depressive symptoms tend to seek reassurance from friends or peers to alleviate doubts and uncertainty about their self-worth, and to determine that friends or peers truly care about them (Coyne, 1976; Joiner et al., 1999). Although peers provide support and reassurance readily, dysphoric youth are likely to generate negative cognitions that question the authenticity of the feedback, and may attribute the provision of reassurance and support instead to peers' sense of obligation or pity (Joiner et al., 1999). Facing a dilemma of both needing and doubting their peers' reassurance, dysphoric youth are likely to seek the feedback of their friends or peers again (Joiner et al., 1999). This repetitive pattern of excessive reassurance seeking may lead friends or peers to become frustrated and irritated (Joiner et al., 1999). This increases the likelihood that friends or peers will reject the dysphoric youth and that friends or peers themselves will become depressed (Joiner et al.,

1999). For dysphoric youth, the deteriorating quality of their peer relationships may exacerbate their depressive symptoms (Coyne, 1976; Prinstein, Borelli, Cheah, Simon, & Aikins, 2005). For friends or peers, negative evaluations of the dysphoric youth may have negative effects on their own self-evaluations (Joiner & Katz, 1999). For example, according to Joiner and Katz (1999), peers may view the dysphoric youth's functioning as reflective of their own self-worth (e.g., "Why are we in a relationship with someone who has problems?") or as personal failure (e.g., "Can't we help our friend enough to address his/her problems?").

Clique Gender as a Moderator of Clique Socialization of Depressive Symptoms

Processes related to co-rumination and the interpersonal theory of depression, as described above, draw attention to the possibility that depressogenic thoughts and behavior can occur within the peer clique and contribute to clique depression socialization. These processes are more pertinent to girls than to boys, in line with theories about gender differences in cognitive vulnerabilities to depression (Hankin & Abramson, 2001). Specifically, girls are more likely than boys to make negative inferences about the causes of events and about their self-worth (Hankin & Abramson, 2002). Girls are also more likely than boys to engage in rumination (Broderick, 1998).

Additionally, in same-gender dyadic friendships that exhibit more depressive symptoms, researchers have found that girls are more susceptible to socialization of depressive symptoms than boys (e.g., Giletta et al., 2011; Schwartz-Mette & Rose, 2012). To explain these results, some researchers suggest that girls have been shown to display greater sensitivity to interpersonal stress as compared to boys, rendering them more vulnerable to depression as a result of interpersonal stress (Rose & Rudolph, 2006). In

line with this finding, Stevens and Prinstein (2005) reported that depressive symptom levels reported by adolescent friends were significantly associated with an increase in girls' depressive symptoms and depressogenic cognitions over time. Other researchers (e.g., Smith & Rose, 2011) suggest that girls are more likely than boys to experience "empathetic distress." Specifically, girls were emotionally involved in discussing problems and personal distress with close friends, to the extent that they exhibited tendencies to take on their friends' emotional distress as their own (Smith & Rose, 2011).

Based on the above findings, it is plausible to posit that in cliques with higher depressive symptom scores, girls in all-female cliques would be most susceptible to clique socialization of depression. This is because all-female cliques that exhibit higher depressive symptom scores are likely to be powerful agents for reinforcing members' depressogenic cognitions and behavior (e.g., engaging in co-rumination as a clique). The contradictory findings of Hogue and Steinberg (1995) notwithstanding (see above), members in depressed cliques with boys may be less susceptible to socialization effects of depressive symptoms because boys in all-male cliques tend to display toughness and self-reliance, often repressing emotionality and instead preferring to engage in competitive activity (Adler & Adler, 1998). The test of clique gender as a moderator of clique socialization of depressive symptoms would inform us of whether cognitive and behavioral characteristics associated with girls, such as depressogenic thoughts and intimacy among peers, may be involved in clique socialization of depressive symptoms.

Clique Friendship Density as a Moderator of Clique Socialization of Depressive Symptoms

Peer cliques exhibit varying degrees of closeness as reflected in friendship

density, or the extent to which members of a clique nominate each other as friends (Haynie, 2001; Henrich, Kuperminc, Sack, Blatt, & Leadbeater, 2000). In the present study, clique friendship density was defined to be the number of reciprocated friendships as a proportion of the total number of possible reciprocated friendships in the clique.

As discussed above, Van Zalk et al. (2010) studied depression socialization in networks of peers associated with each youth. Notably, the authors used the SIENA technique (Snijders, 2001) in their study to analyze peer relationships. This technique focuses on multiple dyadic friendships involving each adolescent rather than peer cliques. Although dyadic friendships and peer cliques both involve frequent interaction among friends or peers, the configuration of a clique differs from a configuration involving multiple dyadic friendships because not all clique members consider each other as friends (Bagwell et al., 2000). As such, it was important to determine whether the degree of friendship ties (i.e., friendship density) within peer cliques moderated socialization of depressive symptoms. If friendship density was found to moderate socialization of depressive symptoms in cliques, it would suggest that characteristics of friendship involving intimacy and mutual self-disclosure may contribute to socialization of depressive symptoms in peer cliques. Otherwise, results would suggest that clique members' frequent exposure to one another may be sufficient to contribute to socialization of depressive symptoms in cliques, and that friendship characteristics involving intimacy and mutual self-disclosure may not matter.

Although friendships of both genders experience greater emotional closeness and mutual self-disclosure during the transition into adolescence than earlier in childhood (Buhrmester, 1990; Hartup, 1996; Newcomb & Bagwell, 1995), researchers have found

that girls consistently display and report more intimacy and self-disclosure in their friendships than boys (Adler & Adler, 1998; Buhrmester & Furman, 1987). In the clique context, girls' peer cliques have also demonstrated greater intimacy and social connectedness than boys' cliques (Urberg, Değirmencioğlu, Tolson, & Halliday-Scher, 1995). Because self-disclosure has been found to be positively associated with emotional closeness (Camarena, Sarigiani, & Peterson, 1990), all-female cliques that are close-knit are likely to be characterized by significant mutual self-disclosure (Adler & Adler, 1998). In close-knit, all-female cliques that exhibit higher depressive symptoms, it may be possible that mutual self-disclosure increases in intensity and quantity, rendering girls more vulnerable to depressogenic cognitions and behavior that are reinforced by clique members (e.g., co-rumination). Thus girls in close-knit, all-female cliques that exhibit higher depressive symptoms may be most susceptible to socialization effects of depressive symptoms.

The Current Study

Research Questions and Hypotheses

In the present study, I examined the contribution of average clique depressive symptoms to the prediction of later depressive symptoms in youth, controlling for youths' fall depressive symptoms. Peer cliques were identified using the Social-Cognitive Mapping (SCM) procedure (Cairns, Perrin, & Cairns, 1985; Cairns, Cairns, Neckerman, Gest, & Gariépy, 1988). Data collection was conducted in fall and spring over the course of a school year. I hypothesized that average clique depressive symptoms in fall would contribute significantly to the prediction of youths' depressive symptoms in spring, controlling for youths' fall depressive symptoms. Specifically, based on extant research

reviewed above (e.g., Giletta et al., 2011; Hogue & Steinberg, 1995; Van Zalk et al., 2010), I posited that across the sample, higher clique depressive symptoms in fall would be associated with an increase in youths' depressive symptoms in spring.

Building on my first hypothesis, I also examined clique gender and clique friendship density as possible moderators of clique socialization of depressive symptoms. In view of extant research detailed above, I hypothesized that among cliques with higher fall depressive symptom scores, girls in all-female cliques would be most susceptible to clique socialization of depression, as compared to youth in cliques that were not all-female. I also posited that among cliques with higher fall depressive symptom scores, close-knit cliques would be most susceptible to clique socialization of depression, as compared to youth in cliques that were not close-knit. Additionally, because girls are more likely than boys to engage in intimate behavior such as mutual self-disclosure, I posited that clique-level gender differences and variations in clique friendship density would jointly moderate the association between clique fall depressive symptoms and youths' spring depressive symptoms. Specifically, among cliques with higher fall depressive symptom scores, I expected that all-female peer cliques that were closer-knit would be most susceptible to clique socialization effects of depressive symptoms.

Other Variables in This Study

In the present study, all MLM analyses involved controlling for youths' fall depressive symptoms, youths' clique membership stability, and youths' age. Accounting for youths' fall depressive symptoms represented attempts to: (a) partial out youths' fall individual depressive symptom scores from average clique fall depressive symptom scores, (b) partial out a proportion of the total variance due to selection effects, and (c)

control for stability of depressive symptoms over time. To reduce the likelihood of overestimating the contribution of clique-level variables measured in fall to the prediction of youths' spring depressive symptom scores, youths' clique membership stability was included as an additional control variable.

Although this study focused on pre- and early adolescents, age of youth was included as a control variable in the analysis[2] and was not a variable of interest. This is in line with results by Schwartz-Mette and Rose (2012) indicating that no age differences were found in socialization of depressive symptoms among youth and their friends (aged 9, 12, 13, and 15). Based on these findings, the authors suggested that socialization of depressive symptoms may exist in middle childhood as well as in adolescence.

Taken together, increasing our understanding about clique socialization of depressive symptoms and its moderators is important. At an age period where youth increasingly value membership and participation in cliques (Crockett et al., 1984, Urberg et al., 1995), it behooves researchers and clinicians to understand clique contributions to youths' adjustment outcomes. In terms of practical implications, knowledge in this area would enable schools and mental health settings to better identify and assist vulnerable youth in cliques that are at higher risk of socializing depressive symptoms (Conway et al., 2011).

Method

Participants

Data were obtained from the London Peer Groups Project, conducted from 2008 to 2010, which examined peer clique factors contributing to academic, physical, social,

[2] Given that depression prevalence increases dramatically as youth enter adolescence (Costello et al., 2003), youths' age and clique age were included initially (in separate analyses) as possible moderators of the relationship between clique depressive symptoms in fall and youths' depressive symptoms in spring. However, none of the effects involving age was significant.

and psychological functioning in pre- and early adolescent students from eight elementary schools (six public schools and two Catholic schools) in Southwestern Ontario. Ethics approval for the project was obtained from the King's University College Research Ethics Review Committee (see Appendix A). Longitudinal data were collected in two waves. Students from four public schools participated in fall and spring of 2008-2009 (Wave 1), and students from four schools (two public schools and two Catholic schools) participated in fall and spring of 2009-2010 (Wave 2). For Wave 1, three schools were located in small rural towns and one school was located in a mid-sized city. For Wave 2, all four schools were located in a mid-sized city.

All students from grades 4 through 8 in each school were invited to participate in the study, and those who obtained parental consent were included (see Appendix B for parental consent form). The overall sample consisted of 1,033 participants (76.1% participation rate) with a mean age of 11.81 years in the fall (SD = 1.53). Of these participants, (444 boys, 589 girls; 66.6% Caucasian, 8.5% Asian, 20.3% other, 4.5% missing data on ethnicity), 1,023 (99.0%) students participated in data collection in the fall, and 998 (96.6%) students participated in data collection in the spring. Longitudinal data from fall to spring were available for analysis from 990 (95.8%) participants. Based on 2010 census data by Statistics Canada, the majority of students came from families of low or middle socioeconomic status.

Identification of Peer Cliques

The Social-Cognitive Mapping (SCM) procedure (Cairns et al., 1985; Cairns et al., 1988), a computer program (version 4.0), was employed to identify peer cliques within each school. Raw data about youth and their peers were obtained through a free-

recall questionnaire before the data were analyzed using SCM. Each participant was asked about his/her peer clique and its members (e.g., "Do you have a group in your school you hang around with together a lot? If yes, who are they?"). Each participant was also asked to list other peer cliques within his/her school in a similar manner (e.g., "Are there other people in your school who hang around together a lot? List their names."). Participants were not limited in the size of each clique and could nominate as many peers as they wished per clique. They were also permitted to nominate the same individuals to more than one clique. In order to ensure ecological validity, participants were allowed to nominate youth in their school who were not participants of the study.

SCM has been broadly used in the identification of peer cliques since it was introduced by Cairns et al. (1985) to the field of peer relations research (Neal & Neal, 2012). There are three sequential stages of SCM, which are detailed here based on examples provided in the literature (e.g., Neal & Neal, 2012).

The first stage uses respondents' questionnaire data to create a youth-by-clique matrix, also known as a recall matrix (Cairns & Cairns, 1994). A hypothetical example based on Neal and Neal (2012) is presented in Figure 1. In Figure 1, questionnaire data are obtained from six youths in School X. Bernie, for example, lists two cliques and reports that she, Adam, and Chandra spend time together frequently, and separately, that Adam, Chandra, and Delia spend time together frequently. In another example, Faith states that Adam, Bernie, and Delia spend time together frequently. In these examples, two significant characteristics of the SCM procedure are brought into relief. First, SCM can obtain information on all peer cliques in a setting based on responses from a subset of participants, which helps to compensate for subject attrition and low response rates

School X

Questionnaire item: "Are there people in your school who hang around together a lot? List their names."

Respondents: Adam, Bernie, Chandra, Delia, Eric, and Faith

Adam	**Bernie**
Adam, Bernie, and Chandra Adam, Bernie, and Delia Bernie, Chandra, and Delia	Adam, Chandra, and Delia Adam, Bernie, and Chandra
Chandra	**Delia**
Missing data	Adam, Bernie, and Delia Bernie, Chandra, and Delia
Eli	**Faith**
Adam, Bernie, and Chandra Adam, Chandra, and Delia	Adam, Bernie, and Delia Bernie, Chandra, and Delia Adam, Chandra, and Delia

Figure 1. Hypothetical example of raw questionnaire data from six respondents as a precursor to the first stage of Social-Cognitive Mapping (SCM). Adapted from "The Multiple Meanings of Peer Groups in Social Cognitive Mapping," by J. W. Neal and Z. P. Neal, 2012, *Social Development*, *22*, p. 583.

(Cairns & Cairns, 1994). As such, even though Chandra did not participate in the study, it is still possible to learn about the peer cliques that she belongs to. Second, SCM takes advantage of the fact that youth possess expertise in identifying relationships within their social settings that are beyond their own relationships (Neal & Neal, 2012). Using the example, Faith indicates that Adam, Bernie, and Delia spend time together frequently even though she is not part of their clique.

Based on the raw data collected in the first stage, a youth-by-clique or recall matrix was generated. Figure 2, a hypothetical example, presents a recall matrix based on questionnaire data from Figure 1 (Neal & Neal, 2012). The rows in the matrix represent each youth in the school, and the columns represent each clique as reported by a participant. A "1" was assigned to a cell when the youth in the row was nominated to the clique in the column, and a "0" was assigned otherwise. For instance, because the first clique that Adam listed in Figure 1 consisted of himself, Bernie, and Chandra, the column in the recall matrix in Figure 2 representing Adam's first listed clique would contain "1"s in rows corresponding to Adam, Bernie, and Chandra, and would contain "0"s in rows corresponding to Delia, Eli, and Faith.

The second stage of the SCM procedure assists in aggregating data across multiple peer respondents, which minimizes the likelihood of self-enhancement biases and shared method variance that are often associated with the sole reliance on self-report methods (Neal & Neal, 2012). In this stage, a transformation is applied to the recall matrix to generate a co-nomination matrix (see Figure 3; Neal & Neal, 2012). Values in the off-diagonal cells represent the number of times that two children were identified as members of the same interaction clique, and values in the diagonal cells represent the

School X

	Participants' reports											
	Adam: Clique 1	Adam: Clique 2	Adam: Clique 3	Bernie: Clique 1	Bernie: Clique 2	Delia: Clique 1	Delia: Clique 2	Eli: Clique 1	Eli: Clique 2	Faith: Clique 1	Faith: Clique 2	Faith: Clique 3
Adam	1	1	0	1	1	1	0	1	1	1	0	1
Bernie	1	1	1	0	1	1	1	1	0	1	1	0
Chandra	1	0	1	1	1	0	1	1	1	0	1	1
Delia	0	1	1	1	0	1	1	0	1	1	1	1
Eli	0	0	0	0	0	0	0	0	0	0	0	0
Faith	0	0	0	0	0	0	0	0	0	0	0	0

Figure 2. Recall matrix generated in the first stage of Social-Cognitive Mapping (SCM). Rows in the matrix represent each youth in School X. Columns represent each clique as reported by a participant. A "1" was assigned to a cell when the youth in the row was nominated to the clique in the column, and a "0" was assigned otherwise. Adapted from "The Multiple Meanings of Peer Groups in Social Cognitive Mapping," by J. W. Neal and Z. P. Neal, 2012, *Social Development*, *22*, p. 584.

School X

	Adam	Bernie	Chandra	Delia	Eli	Faith
Adam	9	6	6	6	0	0
Bernie	6	9	6	6	0	0
Chandra	6	6	9	6	0	0
Delia	6	6	6	9	0	0
Eli	0	0	0	0	0	0
Faith	0	0	0	0	0	0

Figure 3. Co-nomination matrix generated in the second stage of Social-Cognitive Mapping (SCM). Values in off-diagonal cells represent the number of times that two children were identified as members of the same interaction clique, and values in diagonal cells represent the number of times the child was identified as a member of any interaction clique (Cairns & Cairns, 1994). Adapted from "The Multiple Meanings of Peer Groups in Social Cognitive Mapping," by J. W. Neal and Z. P. Neal, 2012, *Social Development*, *22*, p. 585.

number of times the child was identified as a member of any interaction clique (Cairns & Cairns, 1994). In the hypothetical example illustrated in Figure 3, the cell corresponding to Bernie's row and Adam's column contains a value of "6" because these two youths were identified by their peers to be members of the same interaction clique six times (i.e., twice by Adam, once by Bernie, once by Delia, once by Eli, and once by Faith, as seen in Figure 1). In this sense, a co-nomination matrix contains information about the frequency with which each youth is identified to be in the same clique as other youths in the school, thus generating affiliation profiles for each youth (Ellis & Zarbatany, 2007).

In the third stage of the SCM procedure, correlations between affiliation profiles of each pair of youths were computed based on information from the co-nomination matrices (Cairns & Cairns, 1994). Youths were then clustered based on the similarity of their profiles using a standard cut-off value for similarity ($r > .40$) (Cairns et al., 1985; Cairns et al., 1988). In order to create non-overlapping cliques (i.e., such that each youth would not be a member of more than one clique), a decision rule was applied to youths who were affiliated with more than one clique in earlier stages of SCM analyses (Cairns et al., 1985; Cairns et al., 1988). Specifically, each youth was designated as a member of a clique when his/her affiliation profile was significantly correlated ($r > .50$) with the affiliation profiles of at least 50% of clique members (Cairns et al., 1985).

Because peer cliques consist of at least three youths (Urberg et al., 1995), youth who belonged only to friendship dyads or did not belong to a peer clique were excluded from the analysis ($n = 34$). As such, for the purposes of this study, the SCM procedure identified 999 youths (425 boys and 574 girls; M age = 11.84, SD = 1.52) in 162 peer cliques. The distribution of youth across grades was as follows: 188 were in Grade 4 (84

boys and 104 girls; *M* age = 9.82, *SD* = .62), 212 were in Grade 5 (97 boys and 115 girls; *M* age = 10.76, *SD* = .54), 220 were in Grade 6 (81 boys and 139 girls; *M* age = 11.88, *SD* = .48), 192 were in Grade 7 (86 boys and 106 girls; *M* age = 12.95, *SD* = .45), and 187 were in Grade 8 (77 boys and 110 girls; *M* age = 13.90, *SD* = .42). Out of the 999 youths, 722 (72.3%) youths remained in the same clique in fall and in spring (indicating stability of membership), and the other 277 youths, in the spring, were no longer in the clique to which they belonged in the fall.

The SCM procedure has been found to identify youths' naturalistic groupings accurately (Cairns, Leung, Buchanan, & Cairns, 1995). For instance, Cairns et al. (1995) noted that SCM aggregate reports about peer cliques overlapped significantly with self-nominated peer cliques. This finding also led the researchers to suggest that even youth with few (or only single) nominations are placed into cliques with considerable accuracy. In addition, classroom observational data from Gest, Farmer, Cairns, and Xie (2003) indicated that peer cliques identified using the SCM procedure reflect actual interaction patterns in class. Specifically, Gest et al. (2003) found that youth were four times more likely to interact with members of their SCM clique than with other same-gender classmates. These results were robust regardless of variation in gender or grade (Gest et al., 2003). As such, the SCM procedure has been adopted by numerous researchers interested in the study of social clusters (e.g., Cairns & Cairns, 1994; Ellis & Zarbatany, 2007; Xie & Shi, 2009).

Measures

Depressive symptoms. Participants completed a short version of the Children's Depression Inventory (CDI; Kovacs, 2001) consisting of 13 items that assess depression

symptoms. For each item, youth were asked to select one out of three statements (ranging from least to most severe) that best described their feelings for the past two weeks. Examples of items include "I like myself; I do not like myself; I hate myself" and "I am sad once in a while; I am sad many times; I am sad all the time." Youths' responses were then converted into numerical scores (1 – least severe; 2 – moderately severe; 3 – most severe). A mean depressive symptom score for each youth was computed based on youths' responses to the 13 items. Thereafter, mean depressive symptom scores of youths in each peer clique were averaged to obtain a depressive symptom score for each peer clique, which is similar to approaches adopted by other studies (e.g., Hogue & Steinberg, 1995). Higher scores indicate more severe depressive symptoms. Individual depressive symptom scores from this scale demonstrated good internal consistency (Time 1: $\alpha = .82$; Time 2: $\alpha = .87$).

Clique friendship density. Participants were asked to nominate up to 10 schoolmates, whom they considered as best friends (e.g., "Please tell us about your best friends below, and circle whether they are a boy or girl"). Information from these friendship nominations was then used to examine friendship ties within each peer clique. For each clique, a friendship nomination matrix was created. Every clique member's nomination of a fellow clique member as a best friend was indicated by a "1" in the matrix. Non-nomination of a fellow clique member as a best friend by the nominating clique member was indicated by a "0" in the matrix. A reciprocated friendship was defined if clique members nominated each other as best friends. Based on each friendship nomination matrix, a clique friendship density score was calculated based on the number of reciprocated friendships as a proportion of the total number of possible reciprocated

friendships in the clique. It follows that clique friendship density ranges from 0 to 1, with a higher score indicating greater friendship density within the clique. This study focused on reciprocated friendships, as friendship choice is expressed by both parties, and reciprocated friendships are generally of higher friendship quality than non-reciprocated friendships (Newcomb & Bagwell, 1995). Other studies have used similar approaches to examine peer friendship density (e.g., Gest, Davidson, Rulison, Moody, & Welsh, 2007).

Gender and age of youth. Participants were asked to complete a questionnaire package which included demographic questions. For purposes of this study, information about youths' gender and age was used. Information about gender was used to determine the gender composition of peer cliques, which is presented in the Results section.

Procedure

Each school was invited to participate in the study, and relevant school authorities (i.e., principals, teachers, school administration) were provided information about the nature of the study before being given the option of accepting or declining the invitation. After receiving permission from school authorities to conduct the study, parental consent and child assent were sought and obtained for all participants. Participants then completed the questionnaire package, including the peer clique identification measure, friendship nominations, CDI, and other measures not included in the present study between mid-October and mid-December (in the fall), and again between late-May and early-June (in the spring) of the same academic year. Questionnaires were administered in home classrooms, and each questionnaire package took approximately two hours to complete. Research assistants read general instructions aloud to all participants to ensure adequate comprehension, and they also read all questionnaire items and instructions

aloud to students in Grades 4 and 5. At least one research assistant was available during questionnaire administration to answer questions from students or to assist with reading. At the end of the study, participating youths were each given a $10 gift certificate, and participating schools were each given a $500 honorarium.

Results

Descriptive Characteristics of Peer Cliques

As mentioned above, the final sample consisted of 162 non-overlapping peer cliques, of which 69 were all-female, 51 were all-male, and 42 were mixed-gender. Gender of cliques was coded as "1" for all-female cliques, "0" for all-male cliques, and "0" for mixed-gender cliques. Cliques ranged between 3 and 17 members in size (*M* members = 6.16, *SD* = 2.78), with a mode of 3 members per clique. Table 1 presents information on the distribution of cliques as a function of grade, gender, and clique size. The distribution of cliques across grades was as follows: 31 fourth-grade cliques, 30 fifth-grade cliques, 32 sixth-grade cliques, 23 seventh-grade cliques, 29 eighth-grade cliques, 3 combined fourth- and fifth-grade cliques, 5 combined fifth- and sixth-grade cliques, 4 combined sixth-and seventh-grade cliques, and 5 combined seventh- and eighth-grade cliques. Combined-grade cliques were from split-grade classes in participating schools.

Missing Data

Prior to statistical analysis, data screening was conducted using SPSS Statistics (version 21) software. As the 'depressive symptoms' variable was key to the present study, analysis of missing data on individual depressive symptoms in fall and in spring was conducted. Table 2 presents the distribution of missing data for the 13-item CDI. Missing data were addressed using multiple imputation, enabling the 'depressive

Table 1

Distribution of cliques as a function of grade, gender, and clique size

	Grade																				
	4			5			6			7			8			4/5 and 5/6			6/7 and 7/8		
Clique Size	M	F	Mixed	M	F	Mixed	M	F	Mixed	M	F	Mixed	M	F	Mixed	M	F	Mixed	M	F	Mixed
3 (*n* = 29)	7	4	1	2	1	0	1	5	2	1	1	0	1	2	0	1	0	0	0	0	0
4 (*n* = 27)	1	1	3	2	4	4	1	1	1	2	1	0	2	2	2	0	0	0	0	0	0
5 (*n* = 26)	1	2	0	0	3	2	2	2	1	0	1	1	0	5	0	1	1	2	1	0	1
6 (*n* = 16)	0	1	0	1	2	0	2	1	1	2	1	0	1	3	0	0	1	0	0	0	0
7 (*n* = 19)	0	2	0	2	0	0	1	2	1	2	2	1	0	2	0	0	0	0	0	1	3
8 (*n* = 15)	0	0	0	1	1	1	0	2	0	0	1	1	0	1	3	1	0	0	1	1	1
9 (*n* = 12)	1	1	1	0	0	0	0	0	2	0	2	0	4	1	0	0	0	0	0	0	0
≥ 10 (*n* = 18)	2	1	2	1	1	2	0	2	2	2	2	0	0	0	0	0	0	1	0	0	0
Total (*N*= 162)	12	12	7	9	12	9	7	15	10	9	11	3	8	16	5	3	2	3	2	2	5

Note. M = All-male cliques. F = All-female cliques. Mixed = Mixed-gender cliques. Combined-grade cliques were from split-grade classes in participating schools.

Table 2

Breakdown of missing data for the depressive symptom measure

Items Missing	Youth with missing items at T1	Youth with missing items at T2
0	790 (79.1%)	888 (88.9%)
1	148 (14.8%)	46 (4.6%)
2	34 (3.4%)	14 (1.4%)
3	11 (1.1%)	5 (0.5%)
4	3 (0.3%)	6 (0.6%)
5	0 (0.0%)	3 (0.3%)
6	2 (0.2%)	1 (0.1%)
7	3 (0.3%)	0 (0.0%)
8	0 (0.0%)	1 (0.1%)
9	0 (0.0%)	0 (0.0%)
10	0 (0.0%)	0 (0.0%)
11	0 (0.0%)	0 (0.0%)
12	0 (0.0%)	0 (0.0%)
13	8 (0.8%)	35 (3.5%)
Total	999 (100.0%)	999 (100.0%)

Note. T1 = Time 1 or fall. T2 = Time 2 or spring. Values in parentheses represent percentages of the study sample.

symptoms' variable to be defined for every youth in each of five imputed datasets. The use of five imputations is in line with research suggesting that even with three to five imputations, the relative efficiency of estimation is very high when compared with an infinite number of imputations (Rubin, 1987; Schafer & Olsen, 1998). The five imputed datasets were combined during statistical analysis to obtain results for the present study.

Multiple imputation was performed under the assumption that data were 'missing at random' (MAR), or more specifically, that the probability of having missing data in the dataset was assumed to be random and unrelated to unobserved variables, after taking into account all observed variables (Graham, 2009; Schafer & Graham, 2002). Operating under the assumption of MAR, the probability of having missing data in depressive symptom mean scores at one time point may be predicted from data on similar constructs measured at another time point, or from data on other related constructs at either time point (Little & Rubin, 2002). Little and Rubin (2002) noted that, even if there was a slight departure from this assumption, results would be still less biased than if statistical analysis was solely based on cases with complete data.

To impute data for the 'depressive symptoms' variable, other variables in the dataset that are commonly associated with adolescent depression symptoms in the literature and are significantly correlated with depressive symptoms in the dataset were used as auxiliary variables. Based on Graham (2009), including auxiliary variables that are correlated $r = .50$ or above with depressive symptom mean scale scores would reduce bias and increase power in statistical analysis. As these correlations become weaker, the incremental benefit of including auxiliary variables in statistical analysis decreases (Graham, 2009). Data (for fall and spring) from the following variables were included:

depressive symptoms, loneliness, self-esteem, and peer victimization (Paul & Cillessen, 2003; Peterson et al., 1993). Correlations among auxiliary variables and depressive symptoms are presented in Table 3. Variables of depressive symptoms, loneliness, and self-esteem were included in the imputation process because mean scale scores of these measures in fall or spring were significantly correlated with depressive symptoms in fall or spring, at $r > .50$. Peer victimization in fall and in spring, which emerged as being correlated at $r = .48$ with depressive symptoms in fall and $r = .46$ with depressive symptoms in spring, were also included because correlations emerged significant and because the construct has demonstrated a significant association with depressive symptoms in the peer relations literature (e.g., Paul & Cillessen, 2003).

Non-normality in the distribution of data was assessed by generating skewness and kurtosis indices for study variables. In line with numerous researchers (e.g., Kline, 2011; Tabachnick & Fidell, 2007), Finney and DiStefano (2006) noted that there are currently no clear guidelines regarding an acceptable degree of departure from non-normality, but suggested that non-normality might be a cause for concern when absolute values of univariate skewness and univariate kurtosis exceed 2.00 and 7.00, respectively. Skewness and kurtosis of continuous predictor and outcome variables were assessed to be within acceptable range (see Table 4).

Descriptive Statistics

Descriptive statistics (i.e., means and standard deviations) involving the main study variables are presented in Table 4, and zero-order correlations among the variables are presented in Table 5. Notably, a correlation of .67 emerged between youths' depressive symptoms in fall and in spring, suggesting that there was considerable

Table 3

Correlations among auxiliary variables and the depressive symptom measure

	1	2	3	4	5	6	7	8
1. Depression T1	1.00							
2. Depression T2	.66**	1.00						
3. Loneliness T1	.62**	.46**	1.00					
4. Loneliness T2	.49**	.66**	.60**	1.00				
5. Self-esteem T1	-.55**	-.46**	-.55**	-.43**	1.00			
6. Self-esteem T2	-.45**	-.63**	-.35**	-.56**	.56**	1.00		
7. Victimization T1	.48**	.38**	.41**	.33**	-.24**	-.22**	1.00	
8. Victimization T2	.36**	.46**	.34**	.47**	-.26**	-.33**	.57**	1.00

Note. T1 = Time 1 or fall. T2 = Time 2 or spring.

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

Table 4

Descriptive statistics of continuous variables of interest

	Mean	*SD*	Skewness	Kurtosis
1. Depression T1	1.24	.28	1.77 (.08)	3.79 (.16)
2. Depression T2	1.25	.31	2.03 (.08)	4.87 (.16)
3. Clique Depression T1	1.26	.17	1.52 (.19)	3.17 (.38)
4. Clique Friendship Density	.51	.25	.16 (.19)	-.53 (.38)

Note. T1 = Time 1 or fall. T2 = Time 2 or spring. Values in parentheses are standard error values.

Table 5

Zero-order correlations among study variables

	1	2	3	4	5	6	7
1. Depression T1	1.00						
2. Depression T2	.67**	1.00					
3. Age at T1	-.05	-.05	1.00				
4. Membership Stability	-.06	-.06	.05	1.00			
5. Clique Depression	.53**	.40**	-.11**	-.04	1.00		
6. Clique Gender	.02	.01	.12**	-.06	.03	1.00	
7. Clique Friendship Density	-.10**	-.08*	.19**	.19**	-.18**	.18**	1.00

Note. T1 = Time 1 or fall. T2 = Time 2 or spring. Clique Depression = Average clique fall depressive symptoms. For clique depression, a higher score indicates greater depressive symptoms. Clique gender was coded "1" for all-female cliques and "0" for all other cliques; a positive correlation represents a variable's association with all-female cliques and a negative correlation represents a variable's association with all-male or mixed gender cliques. For clique friendship density, a higher score indicates higher clique friendship density.

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

stability of depression but also that there was unique variance associated with the latter that was not accounted for by the former. There were small but significant negative correlations between clique friendship density and clique fall depressive symptoms (r = -.18), and between clique friendship density and youths' depressive symptoms in fall (r = -.10) and in spring (r = -.08). These negative correlations were opposite in direction to my predictions. There were small but significant positive correlations between clique friendship density and youths' age (r = .19) and membership stability (r = .19), and between clique friendship density and clique gender (r = .18). As mentioned above, gender of cliques was coded as "1" for all-female cliques and "0" for all-male and mixed-gender cliques.

To examine gender and grade differences in depressive symptoms, a two-way multivariate analysis of variance (MANOVA) was performed with youths' gender (boys and girls) and grade (Grades 4, 5, 6, 7, and 8) as independent variables and youths' fall and spring depressive symptoms as dependent variables. To test whether the assumption of homogeneity of covariance matrices was violated, Box's test of equality of covariance matrices was performed and results were found to be significant (Box's M = 125.64, p < .001). This suggested that the homogeneity assumption was violated and that covariance matrices of the outcome variables were significantly different across levels of gender and grade. When the homogeneity assumption is violated, Tabachnick and Fidell (2007) suggest that Pillai's criterion be used to test significance of main effects and interactions as it is more robust under violations of assumptions than the more commonly used Wilk's lambda.

The MANOVA revealed a significant multivariate main effect for gender (Pillai's

Trace = .007, $F(2, 946) = 3.20$, $p = .04$, partial $\eta^2 = .007$) but not for grade (Pillai's Trace = .01, $F(8, 1894) = 1.17$, $p = .31$). This suggests that boys' and girls' depression symptom scores varied more than could be reasonably attributed to chance, and the power to detect this main effect for gender was .61. A significant interaction effect between gender and grade also emerged as significant (Pillai's Trace = .04, $F(8, 1894) = 4.39$, $p < .001$, partial $\eta^2 = .02$), suggesting that boys' and girls' depression symptom scores in fall and spring differed depending on grade. Power to detect the interaction effect was 1.00.

Figures 4 and 5 present graphical plots of gender differences in youths' fall and spring depressive symptoms respectively, relative to variations in grade. Post-hoc comparisons using the Bonferroni adjustment were made to assess simple main effects of gender at each grade level. For fall depressive symptoms, boys were found to report significantly higher depressive symptom scores than girls in Grade 4 ($M_{boys} = 1.29$, $M_{girls} = 1.21$; $t(947) = 2.00$, $p = .05$). Girls reported significantly higher depressive symptom scores than boys in Grade 6 ($M_{boys} = 1.17$, $M_{girls} = 1.25$; $t(947) = 2.34$, $p = .02$), Grade 7 ($M_{boys} = 1.18$, $M_{girls} = 1.26$; $t(947) = 2.00$, $p = .05$), and Grade 8 ($M_{boys} = 1.18$, $M_{girls} = 1.31$; $t(947) = 3.32$, $p = .001$). There were no significant gender differences in depressive symptom scores in Grade 5 ($M_{boys} = 1.29$, $M_{girls} = 1.24$; $t(947) = 1.31$, $p = .19$). For spring depressive symptoms, boys were found to report significantly higher depressive symptom scores than girls in Grade 4 ($M_{boys} = 1.32$, $M_{girls} = 1.21$; $t(947) = 2.33$, $p = .02$). Girls reported significantly higher depressive symptom scores than boys in Grade 6 ($M_{boys} = 1.15$, $M_{girls} = 1.25$; $t(947) = 2.35$, $p = .02$), and Grade 8 ($M_{boys} = 1.16$, $M_{girls} = 1.38$; $t(947) = 4.93$, $p < .001$). There were no significant gender differences in depressive symptom scores in Grade 5 ($M_{boys} = 1.28$, $M_{girls} = 1.25$; $t(947) = .68$, $p = .49$) and in Grade 7 (M_{boys}

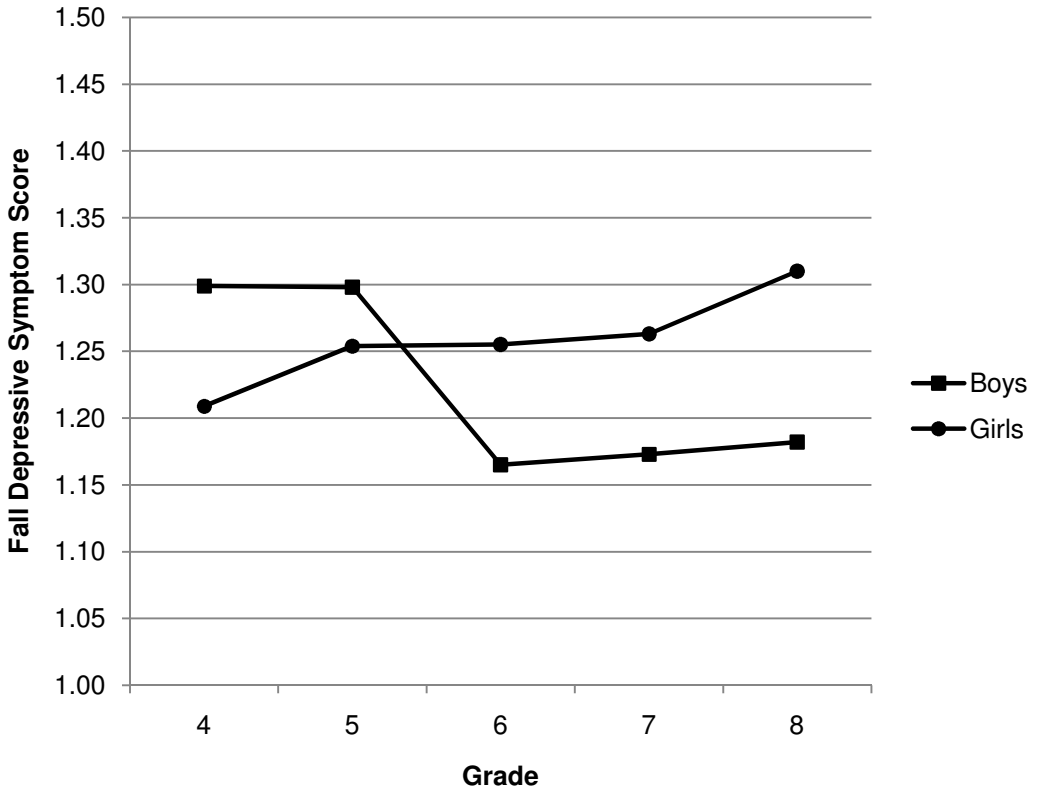

Figure 4. Graphical plot of gender differences in youths' depressive symptoms in the fall, relative to variations in grade.

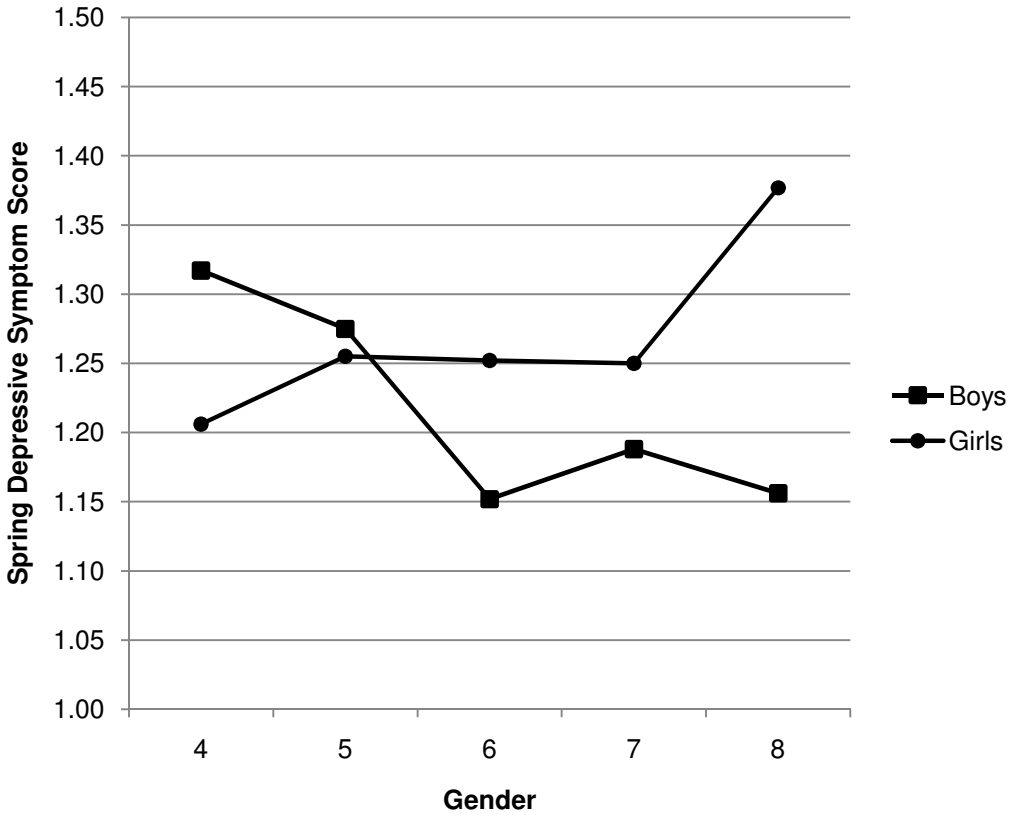

Figure 5. Graphical plot of gender differences in youths' depressive symptoms in the spring, relative to variations in grade.

= 1.19, M_{girls} = 1.25; $t(947) = 1.38$, $p = .17$).

Overview of Hypothesis Testing

Given that this study examined youths nested in peer cliques, multi-level modeling (MLM) techniques were employed to address the nested nature of the data. In nested data, individual-level (level-1) observations are not independent, as youths are likely to share characteristics with fellow clique members because they share the same social environment (Nezlek, 2008). It is important to use MLM techniques in order to ensure that variance is attributed more accurately to either clique-level (level-2) or individual-level effects (Nezlek, 2008). Otherwise, researchers who employ statistical techniques that only analyze one level of data and ignore the hierarchical nature of the data are likely to make erroneous inferences about the data (Nezlek, 2008). For example, we may commit the fallacy of Simpson's paradox (Lindley & Novick, 1981), which is defined as the problem of making wrong conclusions when data from youths embedded in heterogeneous cliques are collapsed and analyzed in a way that assumes the data were from a homogeneous population (Hox, 2010).

Multi-level models were constructed using the Hierarchical Linear and Nonlinear Modeling (HLM version 7.01) software (Raudenbush, Bryk, & Congdon, 2010), with the level-1 unit being the youth and the level-2 unit being the peer clique. A bottom-up model building strategy was adopted: Starting with a simple model, parameters were gradually added step-by-step to create more complex models (Hox, 2010).

Restricted maximum likelihood (RML) was employed as the method of estimation. In maximum likelihood estimation, we estimate population parameters that maximize the probability (through a likelihood function) of obtaining predicted data that

match the actual data, given the model (Hox, 2010). When we estimate population parameters using the full maximum likelihood (FML) approach, we maximize the probability that predicted and actual data will match by estimating both the regression coefficients and the variance components simultaneously (Hox, 2010). As regression coefficients need to take on fixed but unknown values while the FML approach estimates variance components, degrees of freedom are lost when these fixed effects of unknown quantity are included in the likelihood function (Hox, 2010). However, in the RML approach, we maximize the probability that predicted and actual data will match by estimating fixed effects in a separate step, and then estimating variance components after we remove the fixed effects from the model (Hox, 2010). The above information suggests that the FML approach may underestimate the variance components because of the degrees of freedom lost during estimation of population parameters, but RML estimates are likely to be less biased (Hox, 2010; Longford, 1993).

Hypothesis Testing: Unconditional Model

An intercept-only model[3] was first created, with youths' spring depressive symptoms [$(YDep_{Sp})_{ij}$] as the outcome variable:

(1) $Level\ 1\text{: } (YDep_{Sp})_{ij} = \beta_{0j} + r_{ij}$

(2) $Level\ 2\text{: } \beta_{0j} = \gamma_{00} + u_{0j}$

Table 6 presents results for the unconditional model. The mean intercept representing youths' spring depressive symptom scores significantly differed from zero

[3] An explanation of the intercept-only model is provided here. In equation 1, the spring depressive symptom score of youth *i* in clique *j* [$(YDep_{Sp})_{ij}$] was expressed as a function of clique *j*'s mean spring depressive symptom score [β_{0j}], plus an error term representing youth *i*'s deviation around the mean of clique *j* [r_{ij}]. In equation 2, clique *j*'s mean spring depressive symptom score [β_{0j}] was expressed as a function of the grand mean spring depressive symptom score [γ_{00}], plus a clique's deviation from the average slope coefficient [u_{0j}].

Table 6

Level-1 model summaries: "Youths' Spring Depressive Symptoms" as criterion variable

Parameters	Effect	*SE*	*t*-test	*p*-value
Unconditional Model				
Regression coefficients (fixed effects)				
Intercept (γ_{00})	1.26	.01	90.31***	< .001
Variance components (random effects)				
Residual (σ^2)	.08	.29		
Intercept (u_{0j})	.02	.13		
Level-1 Model with Covariates				
Regression coefficients (fixed effects)				
Intercept (γ_{00})	1.25	.01	133.04***	< .001
Depression T1 (γ_{10})	.74	.04	18.97***	< .001
Age (γ_{20})	-.002	.005	-.40	.69
Membership stability (γ_{30})	-.007	.02	-.37	.71
Variance components (random effects)				
Residual (σ^2)	.04	.21		
Intercept (u_{0j})	.005	.07		
Slope (u_{1j})	.08	.28		
Slope (u_{2j})	.00003	.005		
Slope (u_{3j})	.008	.09		

Note. T1 = Time 1 or fall.

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

(β = 1.26, *SE* = .01, $t(161) = 90.31$, $p < .001$), suggesting that youth across the study sample were experiencing some depressive symptoms in spring.

An intra-class correlation (ICC) was generated to determine if there were differences in youths' spring depressive symptom scores across peer cliques (Peugh, 2010; Raudenbush & Bryk, 2002). Differences across peer cliques may exist because youths in each peer clique share similar experiences and environments, which could contribute to depressive symptom scores being more correlated for youth in the same peer clique than for youth in different peer cliques (Peugh, 2010). The mathematical formula expressing the ICC, as presented below, is the proportion of clique-level variance [τ_{00}] as a proportion of the total (i.e., individual- and clique-level) variance [$\tau_{00} + \sigma^2$]. In the current study, an ICC value of .16 ($p < .001$) was found:

$$ICC = \frac{\tau_{00}}{\tau_{00} + \sigma^2} = \frac{.01564}{.01564 + .0836} = .16$$

This ICC value was significantly greater than zero, which suggests that a portion of variance in youths' spring depressive symptom scores may be attributed to differences in means of youths' spring depressive symptom scores across peer cliques (Peugh, 2010). Multi-level modeling was therefore required to analyze variance components that are uniquely associated with the youth at level-1 and with the peer clique at level-2.

Hypothesis Testing: Inclusion of Level-1 Covariates

Level-1 covariates including youths' fall depressive symptoms, youths' age, and youths' clique membership stability were added as control variables to the unconditional model. These level-1 covariates were grand-mean centered in all multi-level analyses in the current study. Enders and Tofighi (2007) noted that level-1 control variables are composites of individual-level and clique-level variation, and are thus correlated with

Level-2 predictors. When these level-1 control variables are grand-mean centered, we partial out individual-level variation so that level-2 effects influencing the intercept β_{0j} reflect clique-level associations among predictors and the criterion variable. Also, as the associations between control variables and the criterion variable may vary from clique to clique, a random-coefficients regression model was generated to allow level-1 coefficients to vary randomly – in other words, I introduced the error terms u_{1j}, u_{2j}, and u_{3j} into the model (Raudenbush & Bryk, 2002; Peugh, 2010). The level-1 model[4] is presented below:

(3) $Level\ 1:\ (YDep_{Sp})_{ij} = \beta_{0j} + \beta_{1j}\left(FDep_{ij} - \overline{FDep}\right) + \beta_{2j}\left(Age_{ij} - \overline{Age}\right) + \beta_{3j}\left(Memb_{ij} - \overline{Memb}\right) + r_{ij}$

(4) $Level\ 2:\ \beta_{0j} = \gamma_{00} + u_{0j}$

(5) $\beta_{1j} = \gamma_{10} + u_{1j}$

(6) $\beta_{2j} = \gamma_{20} + u_{2j}$

(7) $\beta_{3j} = \gamma_{30} + u_{3j}$

Results for the level-1 covariate model are presented in Table 6. The mean intercept was found to be significant (β= 1.25, *SE* = .01, $t(161) = 133.04$, $p < .001$), suggesting that youths' spring depressive symptom scores still significantly differed from zero even

[4] An explanation of this model is provided here. In equation 3, the spring depressive symptom score of youth *i* in clique *j* [$(YDep_{Sp})_{ij}$] was expressed as a function of clique *j*'s mean spring depressive symptom score [β_{0j}], plus effects of youths' fall depressive symptom scores [$\beta_{1j}\left(FDep_{ij} - \overline{FDep}\right)$], age [$\beta_{2j}\left(Age_{ij} - \overline{Age}\right)$], and membership stability [$\beta_{3j}\left(Memb_{ij} - \overline{Memb}\right)$] on youths' spring depressive symptom scores across the sample, plus an error term representing youth *i*'s deviation around the mean of clique *j* [r_{ij}]. Equations 4 and 2 are identical in interpretation. In equation 5, the impact of youths' fall depressive symptom scores [β_{1j}] on their spring depressive symptom scores was expressed as a function of the average slope representing the effect of youths' fall depressive symptom scores on their spring depressive symptom scores averaged across all cliques [γ_{10}], plus a clique's deviation from the average slope coefficient [u_{1j}]. Equations 6 and 7 are similar in interpretation to equation 5, but involve youths' age [γ_{20}; u_{2j}] and membership stability [γ_{30}; u_{3j}] respectively.

after accounting for the three control variables. Youths' fall depressive symptom scores (β = .74, *SE* = .04, *t*(161) = 18.97, *p* < .001) contributed significantly to the prediction of their spring depressive symptom scores, but age (β = -.002, *SE* = .005, *t*(161) = -.40, *p* = .69) and membership stability (β = -.007, *SE* = .02, *t*(161) = -.37, *p* = .71) did not.

As marginally significant variation remained in youths' spring depressive symptom scores across cliques (τ = .005, χ^2 (81) = 101.96, *p* = .058), further analyses were conducted to examine clique-level differences that might explain variation in youths' spring depressive symptom scores. Because regression slopes for youths' fall depressive symptoms (τ = .08, χ^2 (81) = 96.34, *p* = .12), age (τ = .00003, χ^2 (81) = 90.18, *p* = .23), and membership stability (τ = .008, χ^2 (81) = 99.75, *p* = .08) did not appear to vary significantly across cliques, residual variance terms associated with these variables [u_{1j}, u_{2j}, and u_{3j}] were removed from the model in subsequent analyses. According to Hox (2010), removal of non-significant residual variance terms creates a more parsimonious model by reducing the number of estimated parameters, thereby increasing the degrees of freedom and decreasing the risk of problems with convergence on a solution.

Hypothesis Testing: Socialization of Depressive Symptoms

The level-2 predictor, clique fall depressive symptom scores ($GDep_j$), was grand-mean-centered and added to the level-1 covariate model. According to Enders and Tofighi (2007), decisions about centering at Level 2 can be based on recommendations for ordinary least-squares (OLS) multiple regression (i.e., choosing between grand-mean centering and not centering). In line with recommendations for OLS multiple regression, I chose to grand-mean center clique fall depressive symptom scores because I planned to

add higher-order interaction terms involving this continuous predictor in subsequent models (Aiken & West, 1991). The level-2 model[5] is presented below:

(8) $$Level\ 1:\ (YDep_{Sp})_{ij} = \beta_{0j} + \beta_{1j}\left(FDep_{ij} - \overline{FDep}\right) + \beta_{2j}\left(Age_{ij} - \overline{Age}\right) + \beta_{3j}\left(Memb_{ij} - \overline{Memb}\right) + r_{ij}$$

(9) $$Level\ 2:\ \beta_{0j} = \gamma_{00} + \gamma_{01}\left(GDep_j - \overline{GDep}\right) + u_{0j}$$

(10) $$\beta_{1j} = \gamma_{10}$$

(11) $$\beta_{2j} = \gamma_{20}$$

(12) $$\beta_{3j} = \gamma_{30}$$

Equations 8 to 12 examined whether socialization of depressive symptoms were present in peer cliques. Specifically, this multi-level model investigated whether there was a greater likelihood that youth in cliques with higher mean depressive symptom scores in fall (level-2) would have higher spring depressive symptom scores than youth in cliques with lower mean depressive symptom scores in fall.

Results for the model are presented in Table 7. Clique fall depressive symptom scores contributed significantly and positively to the prediction of youths' spring depressive symptom scores (β = .15, *SE* = .07, $t(160) = 2.20$, $p = .029$), indicating that socialization effects of depressive symptoms could be present in cliques. This accounted for 40.3% of the individual-level variance. The mean intercept was found to be significant (β = 1.25, *SE* = .009, $t(160) = 135.77$, $p < .001$), suggesting that youths'

[5] An explanation of this model is provided here. Equations 8 and 3 are identical in interpretation. In equation 9, clique *j*'s mean spring depressive symptom score [β_{0j}] was expressed as a function of the grand mean spring depressive symptom score [γ_{00}], plus variation across cliques explained by clique fall depressive symptom scores [$\gamma_{01}(GDep_j - \overline{GDep})$], plus a clique's deviation from the average slope coefficient [u_{0j}] accounting for clique-level variance not explained by level-2 predictors in the model. Equations 10 through 12 are similar in interpretation to equation 5, with u_{1j}, u_{2j} and u_{3j} removed.

Table 7

Level-2 model summary: Clique socialization of depressive symptoms

Parameters	Effect	*SE*	*t*-test	*p*-value
Regression coefficients (fixed effects)				
Intercept (γ_{00})	1.25	.009	135.77***	<.001
Depression T1 (γ_{10})	.70	.03	23.00***	<.001
Age (γ_{20})	-.002	.006	-.26	.80
Membership stability (γ_{30})	-.009	.02	-.54	.59
Clique Depression T1 (γ_{01})	.15	.07	2.20*	.029
Variance components (random effects)				
Residual (σ^2)	.05	.22		
Intercept (u_{0j})	.004	.07		

Note. "Youths' spring depressive symptoms" was the criterion variable. T1 = Time 1 or fall.

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

spring depressive symptom scores still significantly differed from zero, even after accounting for all predictors and control variables. Because significant variation remained in youths' spring depressive symptom scores across cliques ($\tau = .004$, $\chi^2(160) = 257.31$, $p < .001$), additional analyses were performed to explore clique-level differences that may explain variation in youths' spring depressive symptom scores.

Hypothesis Testing: Clique Gender as a Moderator

To test whether the association between clique fall depressive symptoms and youths' spring depressive symptoms was moderated by clique gender, clique gender and an interaction term representing the cross-product of clique fall depressive symptoms and clique gender were added to the previous multi-level model (i.e., equations 8 through 12). Clique gender was not centered, which means that the coefficients γ_{02} and γ_{03} reflect the difference between all-female cliques and cliques that are not all-female. This level-2 model[6] is presented below:

(13) $$Level\ 1: (YDep_{Sp})_{ij} = \beta_{0j} + \beta_{1j}\left(FDep_{ij} - \overline{FDep}\right) + \beta_{2j}\left(Age_{ij} - \overline{Age}\right) + \beta_{3j}\left(Memb_{ij} - \overline{Memb}\right) + r_{ij}$$

(14) $$Level\ 2: \beta_{0j} = \gamma_{00} + \gamma_{01}\left(GDep_j - \overline{GDep}\right) + \gamma_{02}\left(GSex_j\right) + \gamma_{03}\left(GDep_j - \overline{GDep}\right)\left(GSex_j\right) + u_{0j}$$

(15) $$\beta_{1j} = \gamma_{10}$$

[6] An explanation of this model is provided here. Equations 13 and 3 are identical in interpretation. In equation 14, clique *j*'s mean spring depressive symptom score [β_{0j}] was expressed as a function of the grand mean spring depressive symptom score [γ_{00}], plus variation across cliques explained by clique fall depressive symptom scores [$\gamma_{01}(GDep_j - \overline{GDep})$], clique gender [$\gamma_{02}\left(GSex_j\right)$], and a two-way interaction between clique fall depressive symptoms and clique gender [$\gamma_{03}\left(GDep_j - \overline{GDep}\right)\left(GSex_j\right)$], plus a clique's deviation from the average slope coefficient [u_{0j}] accounting for clique-level variance not explained by level-2 predictors in the model. Equations 15 through 17 are identical in interpretation to equations 10 through 12.

(16) $\beta_{2j} = \gamma_{20}$

(17) $\beta_{3j} = \gamma_{30}$

Table 8 presents the results for this model. The interaction term did not emerge as significant (β = .02, *SE* = .13, *t*(158) = .18, *p* = .86), suggesting that the association between clique fall depressive symptoms and youths' spring depressive symptoms was not moderated by clique gender. After accounting for all predictors and control variables, youths' spring depressive symptom scores still significantly differed from zero (β = 1.25, *SE* = .01, *t*(158) = 101.57, *p* < .001). Significant variation remained in youths' spring depressive symptom scores across cliques (τ = .005, χ^2 (158) = 257.51, *p* < .001). As such, although clique gender did not emerge as a significant moderator, additional analyses were conducted to explore clique-level differences that may explain variation in youths' spring depressive symptom scores.

Hypothesis Testing: Clique Friendship Density as a Moderator

To test whether the association between clique fall depressive symptoms and youths' spring depressive symptoms was moderated by clique friendship density, clique friendship density and an interaction term representing the cross-product of clique fall depressive symptoms and clique friendship density were added to the previous multi-level model (i.e., equations 8 through 12). My rationale for grand-mean centering clique friendship density was similar to my reason for grand-mean centering clique fall depressive symptoms. This level-2 model is presented below:

(18) $$Level\ 1: (YDep_{Sp})_{ij} = \beta_{0j} + \beta_{1j}\left(FDep_{ij} - \overline{FDep}\right) + \beta_{2j}\left(Age_{ij} - \overline{Age}\right) + \beta_{3j}\left(Memb_{ij} - \overline{Memb}\right) + r_{ij}$$

Table 8

Level-2 model summary: Clique gender as a moderator

Parameters	Effect	*SE*	*t*-test	*p*-value
Regression coefficients (fixed effects)				
Intercept (γ_{00})	1.25	.01	101.57***	<.001
Depression T1 (γ_{10})	.70	.03	23.01***	<.001
Age (γ_{20})	-.002	.006	-.30	.77
Membership stability (γ_{30})	-.009	.02	-.53	.60
Clique Depression T1	.14	.08	1.75	.08
Clique Gender	.0003	.02	.02	.99
Clique Depression T1 x Clique Gender	.02	.13	.18	.86
Variance components (random effects)				
Residual (σ^2)	.05	.22		
Intercept (u_{0j})	.005	.07		

Note. "Youths' spring depressive symptoms" was the outcome variable. T1 = Time 1 or fall.

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

(19) $$Level\ 2:\ \beta_{0j} = \gamma_{00} + \gamma_{01}\left(GDep_j - \overline{GDep}\right) + \gamma_{02}\left(GDense_j - \overline{GDense}\right) + \gamma_{03}\left(GDep_j - \overline{GDep}\right)\left(GDense_j - \overline{GDense}\right) + u_{0j}$$

(20) $$\beta_{1j} = \gamma_{10}$$

(21) $$\beta_{2j} = \gamma_{20}$$

(22) $$\beta_{3j} = \gamma_{30}$$

Table 9 presents the results for this model[7]. The interaction term did not emerge as significant (β = -.19, *SE* = .23, *t*(158) = -.83, *p* = .41), suggesting that the association between clique fall depressive symptoms and youths' spring depressive symptoms was not moderated by clique friendship density. After accounting for all predictors and control variables, youths' spring depressive symptom scores still significantly differed from zero (β = 1.25, *SE* = .01, *t*(158) = 101.57, *p* < .001). Significant variation remained in youths' spring depressive symptom scores across cliques (τ = .005, χ^2 (158) = 257.51, *p* < .001). As such, although clique friendship density did not emerge as a significant moderator, additional analyses were conducted to explore clique-level differences that may explain variation in youths' spring depressive symptom scores.

Hypothesis Testing: Clique Gender and Clique Friendship Density as Joint Moderators of Clique Socialization of Depressive Symptoms

To investigate whether variations in clique friendship density and clique gender jointly moderate the association between clique fall depressive symptoms and youths'

[7] An explanation of this model is provided here. Equations 18 and 3 are identical in interpretation. In equation 19, clique *j*'s mean spring depressive symptom score [β_{0j}] was expressed as a function of the grand mean spring depressive symptom score [γ_{00}], plus variation across cliques explained by clique fall depressive symptom scores [$\gamma_{01}(GDep_j - \overline{GDep})$], clique friendship density [$\gamma_{02}\left(GDense_j - \overline{GDense}\right)$], and a two-way interaction between clique fall depressive symptoms and clique friendship density [$\gamma_{03}\left(GDep_j - \overline{GDep}\right)\left(GDense_j - \overline{GDense}\right)$], plus a clique's deviation from the average slope coefficient [u_{0j}] accounting for clique-level variance not explained by level-2 predictors in the model. Equations 20 through 22 are identical in interpretation to equations 10 through 12.

Table 9

Level-2 model summary: Clique friendship density as a moderator

Parameters	Effect	*SE*	*t*-test	*p*-value
Regression coefficients (fixed effects)				
Intercept (γ_{00})	1.25	.01	133.40***	<.001
Depression T1 (γ_{10})	.70	.03	23.02***	<.001
Age (γ_{20})	-.001	.006	-.14	.89
Membership stability (γ_{30})	-.008	.02	-.47	.64
Clique Depression T1	.13	.07	1.88	.06
Clique Friendship Density	-.01	.04	-.27	.79
Clique Depression T1 x Clique FD	-.19	.23	-.83	.41
Variance components (random effects)				
Residual (σ^2)	.05	.22		
Intercept (u_{0j})	.005	.07		

Note. Clique FD = Clique friendship density. "Youths' spring depressive symptoms" was the outcome variable. T1 = Time 1 or fall.

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

spring depressive symptoms, a three-way interaction was modeled. Equations 8 through 12 were expanded to include clique friendship density, clique gender, relevant interaction terms at Level-2, and a three-way interaction between clique fall depressive symptoms, clique friendship density, and clique gender. As in previous models, I decided not to center clique gender, but I centered clique friendship density and clique fall depressive symptoms. The model[8] is presented as follows:

(23) $$Level\ 1:\ (YDep_{Sp})_{ij} = \beta_{0j} + \beta_{1j}\left(FDep_{ij} - \overline{FDep}\right) + \beta_{2j}\left(Age_{ij} - \overline{Age}\right) + \beta_{3j}\left(Memb_{ij} - \overline{Memb}\right) + r_{ij}$$

(24) $$Level\ 2:\ \beta_{0j} = \gamma_{00} + \gamma_{01}\left(GDep_j - \overline{GDep}\right) + \gamma_{02}\left(GSex_j\right) + \gamma_{03}\left(GDense_j - \overline{GDense}\right) + \gamma_{04}\left(GDep_j - \overline{GDep}\right)\left(GSex_j\right) + \gamma_{05}\left(GDep_j - \overline{GDep}\right)\left(GDense_j - \overline{GDense}\right) + \gamma_{06}\left(GDense_j - \overline{GDense}\right)\left(GSex_j\right) + \gamma_{07}\left(GDep_j - \overline{GDep}\right)\left(GDense_j - \overline{GDense}\right)\left(GSex_j\right) + u_{0j}$$

(25) $$\beta_{1j} = \gamma_{10}$$

(26) $$\beta_{2j} = \gamma_{20}$$

(27) $$\beta_{3j} = \gamma_{30}$$

Results for this model are presented in Table 10. The three-way interaction term

[8] An explanation of this model is provided here. Equations 23 and 3 are identical in interpretation. In equation 24, clique *j*'s mean spring depressive symptom score [β_{0j}] was expressed as a function of the grand mean spring depressive symptom score [γ_{00}], plus variation across cliques explained by clique fall depressive symptom scores, clique gender, clique friendship density, all relevant two-way interactions, and a three-way interaction between clique fall depressive symptoms, clique gender, and clique friendship density [$\gamma_{07}\left(GDep_j - \overline{GDep}\right)\left(GClose_j - \overline{GClose}\right)\left(GSex_j\right)$], plus a clique's deviation from the average slope coefficient [u_{0j}] accounting for clique-level variance not explained by level-2 predictors in the model. Equations 25 through 27 are identical in interpretation to equations 10 through 12.

Table 10

Level-2 model summary: Three-way interaction

Parameters	Effect	*SE*	*t*-test	*p*-value
Regression coefficients (fixed effects)				
Intercept (γ_{00})	1.25	.01	98.95***	<.001
Depression T1 (γ_{10})	.70	.03	23.00***	<.001
Age (γ_{20})	-.002	.006	-.38	.70
Membership stability (γ_{30})	-.010	.02	-.55	.58
Clique Depression T1	.06	.09	.68	.50
Clique Gender	-.00006	.02	-.003	.99
Clique Friendship Density	-.09	.06	-1.58	.12
Clique Depression T1 x Clique Gender	.12	.14	.88	.38
Clique Depression T1 x Clique FD	-.34	.29	-1.14	.26
Clique Friendship Density x Clique Gender	.17	.08	2.09	.04
Clique Depression T1 x FD x Gender	.27	.49	.55	.59
Variance components (random effects)				
Residual (σ^2)	.05	.22		
Intercept (u_{0j})	.004	.07		

Note. "Youths' spring depressive symptoms" was the outcome variable. FD = Friendship density. T1 = Time 1 or fall.

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

did not emerge as significant ($\beta = .27$, $SE = .49$, $t(154) = .55$, $p = .59$), indicating that clique friendship density and clique gender did not jointly moderate the depression socialization effect. After accounting for all predictors and control variables, youths' spring depressive symptom scores still significantly differed from zero ($\beta = 1.25$, $SE = .01$, $t(154) = 98.95$, $p < .001$). Significant variation remained in youths' spring depressive symptom scores across cliques ($\tau = .004$, $\chi^2(154) = 247.51$, $p < .001$).[9]

Discussion

In this study, I investigated peer clique socialization of depressive symptoms from fall to spring of a single school year. I also explored whether differences in clique gender and friendship density moderated youths' susceptibility to clique socialization of depressive symptoms. As detailed below, results provide partial support for my hypotheses, and pave the way for future research to address gaps in the literature.

Clique Socialization of Depressive Symptoms

Findings from the present study support my first hypothesis – that is, higher clique depressive symptoms in fall was indeed associated with an increase in youths' depressive symptoms in spring, controlling for youths' fall depressive symptoms. Results demonstrate that socialization effects of depressive symptoms may exist in pre- and early adolescent peer cliques in this sample. Although Hogue and Steinberg (1995) also

[9] Additional statistical analyses related to the hypotheses were subsequently conducted. These included: a) similar analyses on a subset of the data ($n = 712$) consisting of only all-female and all-male cliques, and excluding mixed-gender cliques; b) exploring whether having at least one girl in a clique would moderate depression socialization; c) performing similar analyses on data from all-female, all-male, and mixed-gender cliques separately; d) investigating (in all-female, all-male, and mixed gender cliques separately) whether youths' age was a moderator of depression socialization and whether clique friendship density further qualified that relationship; e) exploring density of clique ties that comprise unilateral friendships instead of examining reciprocated friendship density in cliques; f) using full maximum likelihood as the method of estimation instead of restricted maximum likelihood; g) leaving residual variance terms (i.e., u_{1j}, u_{2j}, and u_{3j}) in the multi-level models tested in the present study. These additional analyses did not yield any new significant effects.

examined internalized distress in cliques, they used multiple regression techniques to arrive at their results. Using MLM techniques in the present study, I confirm Hogue and Steinberg's findings through a less biased approach. Thus, peer influence on depression is not confined to dyadic (friend) peer contexts (e.g., Giletta et al., 2011; Schwartz-Mette & Rose, 2012), but extends to larger groupings of frequent associates.

Although depression scores in this sample were low, which was to be expected in a community-based school sample, clique socialization of depressive symptoms was still evident over a period as short as eight months. This suggests the importance of recognizing that peer cliques may play a role in contributing to youths' adjustment outcomes in pre- and early adolescence. As such, it would be worthwhile for depression researchers to consider the contribution of peer clique influence to the onset and maintenance of depressive symptoms in youth, especially during the transition into adolescence. During this age period, where youth tend to focus more on membership in larger peer configurations (e.g., cliques) than on dyadic friendships (Crockett et al., 1984; Urberg et al., 1995), peer clique influence may interact with other important factors (e.g., biological, genetic, familial, or cognitive vulnerabilities) to contribute to the onset and maintenance of depressive symptoms in youth.

In terms of practical implications, findings from this study indicate to researchers and clinicians that one approach to ameliorating youths' depressive symptoms is to identify and work with depressed cliques in schools. As a hypothetical example, a group intervention could involve teaching depressed cliques better coping and supportive strategies that would help in alleviating clique-mates' depressive symptoms rather than exacerbating them. Currently, there are no known school-based interventions targeting

depressed peer cliques in particular. However, more generally, clinical researchers have demonstrated effectiveness of some group intervention approaches in ameliorating depression in adolescence (e.g., Chu, Colognori, Weissman, & Bannon, 2009; Clarke, Rohde, Lewinsohn, Hops, & Seeley, 1999). For instance, Clarke et al. (1999) examined the effectiveness of a group cognitive-behavioral therapy (CBT) program – the *Adolescent Coping With Depression Course* (CWD-A; Clarke, Lewinsohn, & Hops, 1990) – in decreasing depressive symptoms in a sample of 123 clinically depressed adolescents aged 14 to 18 years old in the United States. Clarke et al. (1999) found that participants in the group CBT condition were more than twice as likely as those in the waitlist condition to experience a reduction in depressive symptoms after 16 group CBT sessions. Lewinsohn and Clarke (1999) noted that group interventions provide youth with opportunities to engage in role-play and to receive peer feedback on their behavior and functioning. The interactive nature of these group interventions may be helpful in teaching cliques important social and interaction skills, as well as various coping and supportive strategies to mitigate depressive symptoms among clique-mates.

Data from the current study do not explain the process by which clique depression socialization occurs, and the extant literature is largely silent on this topic. I attempted an indirect approach to identifying potential depression socialization processes based on current knowledge about interactional styles of friendships that vary in gender and closeness. This includes knowledge about characteristics associated with each gender and with friendship density (e.g., co-rumination, empathetic distress, and the interpersonal theory of depression) that have bearing on processes underlying depression socialization in friendships (Joiner et al., 1999; Schwartz-Mette & Rose, 2012; Smith & Rose, 2011).

In this study, the fact that clique depression socialization effects were unqualified by clique gender and friendship density suggests that processes that explain depression socialization in friendship dyads may not apply to the clique context and that other processes may be involved. I discuss these possibilities below.

Null Findings Regarding Clique Gender and Friendship Density as Moderators

Results of the study did not support my second hypothesis that depression socialization is most intense in all-female, depressed cliques. My third hypothesis that members of depressed, close-knit (especially female) cliques would be most susceptible to depression socialization also was not supported. Based on the pattern of gender and age differences I observed involving depression (through the MANOVA), it is unlikely that the null findings regarding gender are due to atypical patterns with respect to depressive symptoms in relation to gender and age. Consistent with past research (e.g., Costello et al., 2003), older girls reported more depressive symptoms than younger girls in both fall and spring, whereas this trend was not seen in boys.

The null findings regarding gender and friendship density as moderators of clique depression socialization suggest that friendship characteristics involving intimacy and mutual self-disclosure, and cognitive and behavioral characteristics associated with girls (such as depressogenic thoughts, co-rumination, and empathetic distress) may not be essential to depression socialization in depressed cliques (Schwartz-Mette & Rose, 2012; Smith & Rose, 2011). There are some possibilities, yet to be empirically tested, that could account for the above findings. For example, friendship reciprocity and intimacy may operate differently in peer cliques as compared to dyadic friendships. Although cliques may exhibit close affective ties and reciprocated friendships, a clique setting may not

provide sufficient privacy to facilitate mutual self-disclosure among clique-mates. In a similar vein, clique settings may facilitate selective disclosure about personal issues that have no significant bearing on clique socialization of depressive symptoms. As such, intimacy-related processes that characterize close friendships may be less relevant to depressed cliques, even when these cliques exhibit close affective ties and reciprocated friendships.

Future research should test intimacy-related processes directly to determine whether they mediate the association between clique depression and youths' subsequent depressive symptoms. If intimacy-related processes fail to mediate this association, the next step for researchers would be to explore other possible processes that could account for socialization of depressive symptoms in peer cliques. For example, depressed cliques may be characterized by low energy and infrequent engagement in pleasurable activities, which are typical features of depressed individuals as described in the *DSM-IV* (American Psychiatric Association, 2000). Such a clique atmosphere may exist across cliques of different gender or varying levels of friendship density, and may exacerbate depressive symptoms.

Null findings regarding gender and friendship density as moderators of depression socialization in depressed cliques also raise the possibility that members of depressed cliques become more depressed not due to interactional processes occurring *within* the group, but rather to factors impinging on them from *outside* the peer clique. For example, depressed boys and girls often suffer from relationship problems involving the larger peer group, including peer rejection and victimization (Huitsing, Veenstra, Sainio, & Salmivalli, 2012). These victimized youth seldom have significant social connections

(Juvonen, 2013), and the only friends they typically have are other ostracized and socially insecure youth (Rubin, Wojslawowicz, Rose-Krasnor, Booth-LaForce, & Burgess, 2006). In support of this latter point, Bagwell et al. (2000) found that rejected preadolescents in their study were usually members of small cliques that comprised similarly marginalized peers. Even though victims often cluster together and support each other (Huitsing et al., 2012), continued maltreatment by the larger peer group may contribute to members of depressed cliques becoming more depressed over time. As such, an important next step for researchers is to assess the possibility that members of depressed cliques become more depressed due to external factors impinging on these cliques.

Limitations

Two limitations of this study's research design warrant comment. First, strong conclusions regarding the causal role played by depressed cliques in socializing depression are not possible given the correlational research design employed in this study. Although a time-order relationship was implied when I examined the association between clique depression in fall and youths' depressive symptoms in spring, variables not assessed in this study (e.g., amount of academic-related stress) may account for both the predictor (i.e., clique depressive symptoms) and the outcome variable (i.e., youths' later depressive symptoms). Additionally, it was not possible to determine the causal direction of the relationship between clique depression and youths' depressive symptoms. Just as clique depression may cause a change in youths' depressive symptoms over time, it is also plausible that the direction of causality operates in the opposite direction – that is, that youths' depressive symptoms may cause a change in clique depression over time.

The second limitation of the research design is that possible selection effects were

not fully accounted for in the analysis. Thus, strictly speaking, I was not able to conclude that results were solely due to socialization effects of depressive symptoms. However, controlling for youths' fall depressive symptoms represented an attempt on my part to partially account for selection effects. As such, a tentative conclusion that clique depression socialization contributed to youth becoming more depressed over an eight-month period seems warranted.

To identify causal mechanisms accounting for clique socialization effects, researchers could employ experimental paradigms. For instance, we could conduct an experiment that involves randomly assigning depressed cliques to different levels of a particular type of therapeutic intervention. One randomly-chosen clique member from each depressed clique would not participate in the intervention. Pre-intervention (baseline) levels of clique and individual depressive symptoms would be measured. Post-intervention, we would observe the effects of the intervention on depressive symptom levels of non-participating clique members. If non-participating clique members experience changes in depressive symptom levels post-intervention, it would suggest that the manipulation of depression levels in cliques (through the intervention) prospectively impacts youths' depressive symptom levels.

Future Directions

As mentioned above, researchers of peer group influence have largely operationalized "socialization" as an effect rather than as a process thus far (e.g., Conway et al., 2011; Goodwin et al., 2012). As such, important areas for future research include identifying social processes through which clique socialization of depressive symptoms occurs, and determining whether these processes take place within the clique or are

external to the clique. Without adequate understanding of such processes, the inferences we can make about clique socialization effects and associated moderators are limited.

It would also be important for future studies to consider another body of research indicating that friends and peers serve as a protective factor for youth against depression (e.g., Adams et al., 2011; Helsen et al., 2000). For example, Helsen et al. (2000) found that perceived quality of social support from friends – when accompanied by high perceived parental support – was directly related to decreases in depression and psychological stress in Dutch adolescents and young adults (aged 12 through 24). The notion of friends and peers buffering youth from depression is in opposition to the depression socialization hypothesis tested in the current study. Future research can attempt to reconcile these two competing hypotheses. Building on the study by Helsen et al. (2000), one research question that could be explored is: To what extent does youths' perceived social support from clique-mates ameliorate or exacerbate youths' depressive symptoms over time? On the one hand, youth who perceive strong and positive social support from their clique-mates may experience reduced depressive symptoms over time. On the other hand, strong and positive social support from clique-mates may also serve to validate youths' reasons for being depressed, which may inadvertently exacerbate their depressive symptoms over time. Moreover, it may be possible that non-depressed cliques-mates provide a different kind of social support from depressed clique-mates. One example, albeit speculative, is that non-depressed peers may be less likely than depressed peers to validate youths' internal attributions of self-blame or worthlessness when negative events occur. While depressed peers may provide social support through the lens of "depressive realism" by acknowledging the negativity associated with

negative events (Lewinsohn, Mischel, Chaplin, & Barton, 1980), non-depressed peers may adopt a more positive perspective when providing social support.

Conclusion

Taken together, results from this study add to our knowledge base of clique socialization of depressive symptoms. Based on a very large sample of preadolescents and early adolescents, I have demonstrated that socialization effects of depressive symptoms do exist in a peer clique context – that is, cliques' fall depressive symptom scores are prospectively associated with youths' spring depressive symptom scores. The results did not support my hypotheses that depression socialization effects would be stronger for all-female cliques, closely-knit cliques, and all-female cliques that are closely-knit. Future investigations into potential moderators of clique socialization of depressive symptoms are likely to benefit from much-needed process-oriented research in this domain. In terms of practical implications, findings from this study indicate to researchers and clinicians that one approach to ameliorating youths' depressive symptoms is to identify and work with depressed cliques in schools.

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Appendix A

Ethics approval certificate

KING'S UNIVERSITY COLLEGE | Department of Psychology
www.uwo.ca/kings
266 Epworth Avenue, London, ON, Canada N6A 2M3
t. 519.433.3491 f. 519.433.0353 toll free 1.800.265.4406

June 26, 2008

Dr. Wendy E. Ellis
Department of Psychology (FB203)
King's University College
266 Epworth Avenue
London, ON
N6A 2M3

Dear Dr. Ellis,

The Research Ethics Review Committee of King's University College approves your project, *Children's Peer Group Interactions: Implications for Social, Psychological and Academic Adjustment* (to be conducted along with Lynne Zarbatany and Xinyin Chen). Good luck with this interesting research.

Sincerely,

Donald R. Gorassini Ph. D.
Professor and Chair
King's University College Research Ethics Review Committee

cc: Dr. C. Desmond Dutrizac
Academic Dean

Appendix B

Parental consent form

Information letter and consent form for your child to participate in a research study titled:
Implications of Children's Peer Group Interaction for Social, Psychological and Academic Adjustment

Dear Parent or Guardian,

My colleagues and I, at *The University of Western Ontario* and *King's University College,* are writing to request permission for your child's participation in a research study that we are conducting on the influence of children peer groups on adjustment in childhood. We are inviting students in Grades 4 to 8 from several schools within the Thames Valley District Board of Education to participate. As you know, friends and friendship groups become increasingly important to children as they move from childhood to early adolescence, and friends can have both positive and negative effects. In our study we hope to identify the ways in which peer groups influence children's behavior and adjustment. We are interested in studying how aggressive groups and prosocial/kind peer groups are able to influence the behavior and adjustment of other group members. We believe that this research will help us to identify the ways in which peer groups may help children who are experiencing problems, as well as situations in which children might require assistance dealing with the more negative influence of friends involving peer bullying and aggression.

Our study will begin in the Fall of 2009 and will continue until the end of the academic year. We will ask students to complete a series of questionnaire as a group in their classrooms on two occasions (e.g., once in the fall and again in the spring). We will also ask students to participate in a 45-minute video-taped observational study with their group of friends. All parts of the study will take place at your child's school. To show our appreciation, each child who participates in this research study will receive a $10 gift card for Chapters *or* a local movie theater.

Each questionnaire session will be conducted at times your child's teacher decides are convenient and will take approximately 60-90 minutes to complete. We will read the questions out loud, if necessary, so that all students can follow along. The students will be asked to identify their school friends and friendship groups, and report their satisfaction with their current friendships. They also will report on their adjustment in several different areas, including self esteem, loneliness, depression, attitudes toward school, problem behavior at school and physical health. We also will ask them to identify

students in their grade who have certain behavioral characteristics such as those who are leaders, are helpful to others, start fights, and are picked on by other children. Similarly, your child will be rated by his or her classmates. To obtain additional information about children's adjustment in school, we will ask your child's teacher to report on your child's behavior at school.

At some point after the first questionnaire session, we will ask students to participate in a video-taped interaction with their peer group. These sessions will take place at your child's school during the school day at a times your child's teachers decides are most convenient and will take approximately 45 minutes. Children will be asked to work on several projects with their peer group in 5-10 minute increments. For example, they will be given age-appropriate toys to share for 10 minutes, asked to work on a model-building problem together for 10 minutes and asked to discuss describe their group for 5 minutes.

All information will be kept confidential to the extent permitted by law. Your son or daughter never will be mentioned by name in our reports of our results. All of the questionnaire information and video tapes will be kept confidential and access will be restricted to those researchers directly involved in the project. All information will be destroyed five years after the study is completed.

There are no known risks associated with participation in this study. Participation in this study is completely voluntary and had nothing to do with school performance. Your child may refuse to participate, refuse to answer any questions, or withdraw from the study at any time. You also may withdraw your consent at any time. If you would like to see a summary of the results of this study, please include your address on the attached form and we will send one to you as soon as it is available.

Thank you very much for your consideration. Please fill out the attached form and have your son or daughter return it to his or her teacher. We will be awarding a pizza party to the first class to return all of their forms, *whether or not they agree to participate in the study*. If you have any questions or comments about the study, you are more than welcome to contact me at number listed below. This letter is yours to keep.

Sincerely,

Wendy Ellis, Ph.D
Assistant Professor, King's University College

Xinyin Chen, Ph.D
Professor, The University of Western Ontario

Lynne Zarbatany, Ph.D
Associate Professor, The University Of Western Ontario

PLEASE HAVE YOUR CHILD RETURN THIS FORM TO HIS or HER TEACHER

I HAVE READ THE INFORMATION PROVIDED ABOUT THIS PROJECT AND HAD MY QUESTIONS ANSWERED TO MY SATISFACTION. I VOLUNTARILY AGREE TO ALLOW MY CHILD TO PARTICIPATE IN THIS STUDY.

_____ _____

Your Name (please print) Name of child (please print)

_____ _____

Signature of parent or guardian Date

_____

Signature of child

If you would like a summary of the results of the study, please PRINT your name and address below. Please provide a permanent address if you anticipate a move within the next year or two.

_____

_____

_____

_____

*OR **I do not wish** to have my child _____ participate* ☐

(Name of child)

Curriculum Vitae

Name and Contact Information:

Suzanne Li-Hwa Seah
Department of Psychology
Westminster Hall, University of Western Ontario
361 Windermere Road
London, Ontario, N6A 3K7, Canada

Post-secondary Education and Degrees:

Nanyang Technological University
Singapore, Singapore
Bachelor of Arts (Honours) in Psychology
2005 - 2009

Honours and Awards:

Western Graduate Research Scholarship
University of Western Ontario, Canada
2011 - 2012, 2012 - 2013

Nominee for Graduate Student Teaching Award
Society of Graduate Students
University of Western Ontario, Canada
2012 - 2013

Tan Sri Dr. Tan Chin Tuan Scholarship
Nanyang Technological University, Singapore
2008

Tan Sri Dr. Runme Shaw Scholarship
Nanyang Technological University, Singapore
2006, 2007

Dean's List
Nanyang Technological University, Singapore
2006, 2008, 2009

Professional Memberships:

Canadian Psychological Association
London Regional Psychological Association
Singapore Psychological Society

Related Work Experience:

Graduate Teaching Assistant
Department of Psychology
University of Western Ontario, Canada
2011 - Present

Project Officer (Research)
Division of Psychology
Nanyang Technological University, Singapore
2009 - 2011

Research Assistant (Locum)
Child Guidance Clinic
Institute of Mental Health, Singapore
2008 - 2010

Publications:

Seah, S. L., & Ang, R. P. (2008). Differential correlates of reactive and proactive aggression in Asian adolescents: Relations to narcissism, anxiety, schizotypal traits, and peer relations. *Aggressive Behavior*, *34*, 553-562.

Conferences:

Seah, S. L., Schraeder, K., & Otchet, F. (2013, June). The interdisciplinary training model at the Wait List Clinic. In K. Schraeder (Chair), *Why wait? An innovative service delivery and training model for supporting wait-listed adults with severe mental illness at the Canadian Mental Health Association – London Middlesex.* Symposium conducted at the 74th annual convention of the Canadian Psychological Association, Québec City, Québec, Canada.

Seah, S. L. (2012, July). *Materialism and social collectivism at the crossroads: Personal meaning in Asian societies.* Paper presented at the International Network on Personal Meaning: 7th Biennial International Meaning Conference, Toronto, Ontario, Canada.

Seah, S. L., Ang, R. P., Fung, D. S. S., & Ooi, Y. P. (2010, July). *Diagnostic accuracy of the Child Behavior Checklist for externalizing and internalizing disorders in Asian children and adolescents*. Paper presented at the 27th International Congress of Applied Psychology, Melbourne, Australia.

Seah, S. L., & Ang, R. P. (2008, September). *The reactive-proactive aggression typology and its differential correlates in Asian adolescents*. Paper presented at the 43rd annual conference of the Australian Psychological Society, Hobart, Tasmania, Australia.