

**Social Anxiety and Psychosocial Functioning: Investigating Relations Across
Emerging Adulthood**

by

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Abstract

The social, emotional and academic tasks associated with emerging adulthood are particularly challenging for those with social anxiety, a behavior defined as fear of negative evaluation, distress with social interactions, and/or avoidance of new or all social situations. The goal of this dissertation was to research the longitudinal effects of social anxiety on psychosocial functioning in university students, looking at various behaviors key to this developmental stage of life. In my first study, I examined the relation between social anxiety, social ties, and academic achievement in an autoregressive cross-lagged analysis across three years of university. There were two major findings: the symptoms of social anxiety directly linked to academic achievement, and social ties appeared to play a pivot role through their reciprocal negative and positive relation with social anxiety and academic achievement, respectively. Study two examined social anxiety with respect to alcohol use over three years of university through latent class growth analysis. Five classes were identified, two with social anxiety that differed in levels of alcohol use, and three with low social anxiety and varying levels of alcohol use. The heterogeneity in social anxiety was related to psychosocial functioning. While both social anxiety groups reported similar social anxiety symptomology, only the group linked to higher alcohol use exhibited a greater vulnerability to other at-risk behaviors in year one (e.g., self injury). The third study followed the previously identified five groups through latent growth analysis for a total of seven years, to determine whether there was stability or change in psychosocial functioning over the long term. The results indicated that there was stability within and among groups across time in psychosocial functioning. Notably,

the differences detected between the two social anxiety groups in year one continued over the long term, indicating that the at-risk behaviors associated with the social anxiety group reporting higher alcohol use persisted. Overall, this program of research revealed that those with social anxiety in university struggled more than their peers in a variety of domains. From a developmental perspective, the findings of stability in behavior suggested it might be important for intervention and prevention programs to target younger populations with strategies that are continued in a cohesive manner across university, a time when students are exposed to the pressures of achieving in competing developmental tasks.

Keywords: social anxiety, academic achievement, alcohol use, psychosocial functioning, longitudinal analysis

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Chapter 1: Introduction

The effects of social anxiety on student psychosocial wellbeing may be overlooked in institutions of higher learning because they are easily hidden from the casual observer in what is largely an impersonal setting. Yet the evidence to date suggests there is good reason to examine the impact of social anxiety on student development, given its association with emotional distress and learning difficulties (Russell & Topham, 2012; Strahan, 2003). With symptoms that include fear of negative evaluation, distress, and/or avoidance of new or all social interactions or situations (La Greca & Lopez, 1998), social anxiety has the potential to impair student adjustment to the academic, emotional and social demands encountered in Year 1 of university, as well as across the senior years and post-graduation. During these times, students face many changes and challenges, such as leaving home, achieving academically, establishing new friendships and developing intimate relationships (Mitchell, MacInnes, & Morrison, 2008). Although some researchers have investigated the impact of social anxiety on university students over the short term (e.g., Parade, Leerkes, & Blankson, 2010; Strahan, 2003), very little research has been applied to the examination of its longitudinal effects on psychosocial functioning over emerging adulthood or the time called “coming of age” (Arnett, 2006).

Overall, the goal of my dissertation was to determine whether social anxiety has a long-term effect on psychosocial functioning during the university years and after graduation. In the sections below I will introduce issues important to the purpose of my dissertation and briefly present the reasoning behind each of my studies. To begin, it is important to clarify the concept of social anxiety in relation to the constructs of Social

Anxiety Disorder (SAD) and shyness. The intersection among these closely related research domains remains unclear. Next, theoretical frameworks will be outlined that provide a basis for hypothesis testing, especially in regard to developmental issues associated with social anxiety and its effects in emerging adulthood. The combination of developmental, cognitive and social theoretical perspectives provided a solid foundation for my research questions. And last, I will briefly discuss the reasoning and aims behind each of the three studies that comprise my dissertation: (a) examining the direct relation between social anxiety and academic achievement across three years, as well as indirect relations through social ties; (b) investigating heterogeneity in social anxiety based on alcohol use across three years and whether that heterogeneity was related to differential psychosocial functioning; and (c) continuing to examine the heterogeneity in social anxiety and psychosocial functioning over the senior years of university and post-graduation to determine whether it remained stable or changed over time.

Understanding the Conceptualization of Social Anxiety: From Shyness to Social Anxiety Disorder

The concept of social anxiety is thought to be closely associated with both shyness and SAD (clinically diagnosed social anxiety, also known as Social Phobia) and there is a lack of clarity as to their exact relation (Rapee & Coplan, 2010). Some of this confusion comes from the fact that shyness, social anxiety, and SAD have developed within different historical traditions.

Shyness was identified over a century ago as a “basic human instinct” that was problematic for some individuals (James, 1890). It was recognized as having an inherited component, based in dispositions of fear and anxiety. Over the first half of the 20th

century, shyness was included in multifactorial personality inventories that were developed in a wave of personality research (Cattell, 1946; Eysenck & Eysenck, 1971). After this time, much of the research on shyness was rooted in a social and developmental perspective with a focus on its temperament origins, strong basis in everyday lay language, and assessment through self-attribution. A small but notable extension to this interpretation emanated from the researchers and medical professionals at Stanford Clinic who pathologized shyness (i.e., treated it like a disease) by bringing it into the clinical realm (Henderson, Gilbert, & Zimbardo, 2014; Zimbardo, 1977). Rather than focusing on the construct of shyness as a theoretical construct (e.g., personality), the original purpose of the Stanford research program was geared to helping meet the needs of shy individuals in a clinical setting.

In contrast to shyness, one of the earlier known references to SAD was as a problematic behaviour called “social phobia” (Janet, 1903), involving excessive fears of being observed in public (e.g., blushing). Eventually, research on Social Phobia appeared in the medical domain and focused on refining criteria for diagnosis of Social Phobia and determining the most effective treatment options. Over time, it evolved to become a broader construct designated as SAD within a family of diagnosable anxiety disorders found in the Diagnostic and Statistical Manual of Mental Disorders. Today, SAD is defined by a constellation of symptoms related to the fears and anxieties that emerge in, or are associated with, different social contexts, such as fear of evaluation or scrutiny that is out of proportion to the actual circumstance (Bögels et al., 2010).

Finally, parallel to those working in medical spheres, some researchers approached the psychopathology of social anxiety from a theoretical perspective (i.e., not

clinical but from a developmental point of view). A number of different scales were developed to investigate social anxiety in relation to the personality constructs of anxiety and fear in different social situations (La Greca, Dandes, Wick, Shaw, & Stone, 1988; Leary, 1983; Watson & Friend, 1969). This stimulated a flurry of research in nonclinical populations during the second half of the 20th century that investigated the relation between social anxiety and interpersonal or psychological functioning. Overall, the relation among social anxiety, SAD and shyness was not made clear with the passage of time but a number of different theoretical viewpoints were articulated over the last several decades to shed some light on the issue.

There are three influential hypotheses that theorize about the nature of the relation between the closely related constructs of shyness, social anxiety and SAD. One hypothesis posits that shyness and social anxiety are overlapping constructs because they share many characteristics, but that shyness is the broader, more heterogeneous construct (Heiser, Turner, Beidel, & Roberson-Nay, 2009). Within this framework, shyness and social anxiety are assumed to differ qualitatively with respect to some of their symptomatology. Another closely related hypothesis presents shyness as a vulnerability to later developing social anxiety (Kagan, 2010; Rapee & Coplan, 2010). In other words, an underlying constitutional difference in temperament, one that includes shyness within its dimensions, is thought to be predisposing to social anxiety. Finally, a hypothesis that has carried some favor in the literature is the proposal that shyness and social anxiety exist on a severity continuum across the general population (Chavira, Stein, & Malcarne, 2002; McNeil, 2010). This representation of the relationship between shyness and social anxiety depicts “no fearfulness or anxiety” lying at one end of the spectrum and “extreme

fearfulness or anxiety” at the other end of the spectrum. Thus, shyness and social anxiety only differ by degree such that the symptoms associated with social anxiety are more severe, with SAD at the more extreme end (the more severe symptomatology interferes with daily living, e.g., social, education and occupational impairment), than those associated with shyness.

This brief synopsis indicates that there is a commonality to the defining characteristics of shyness, social anxiety and SAD - fear and anxiety in relation to public self-consciousness – even though each domain is rooted in a historically independent stream of research. Despite the lack of clarity as to the exact nature of the relation between these three constructs, I approached this issue from the point of view that social anxiety was closely related to shyness and SAD from a developmental perspective. Furthermore, that the theories describe above were not mutually exclusive within this framework. Nonetheless, it is important to point out that the findings from this dissertation on social anxiety refer to the symptoms found in nonclinical samples and not to SAD as diagnosed in clinical populations or to shyness as studied in either clinical or nonclinical populations. For the purpose of this dissertation I defined social anxiety to be a fear of negative evaluation, distress, and/or avoidance of new or all social situations or interactions.

A Developmental and Theoretical Framework for Understanding Why Social Anxiety Might Impede Healthy Psychosocial Functioning During and After University

The timing of the university years in the Western world coincides with two developmental phases (of eight) hypothesized in Erikson’s influential *psychosocial*

lifespan theory, namely the stages of “identity versus role confusion” and “intimacy versus isolation” (Erikson, 1966). It is during the first of these two phases that Erikson proposed that individuals are no longer primarily shaped by outside developmental influences. Instead, they take more initiative in directing their own developmental pathways in life by exploring intimate relationships outside the family circle and wrestling with their identity as part of the adult social world. Given that social anxiety is defined by a fear of negative evaluation, distress and avoidance of new and/or all social situations (La Greca & Lopez, 1998), university students with social anxiety face a particularly difficult emotional task. They must integrate into a new social and academic situation, often away from the support of family, in which many social interactions and situations may be perceived as threatening. From this theoretical perspective, social anxiety likely compromises healthy psychosocial development during the university years, including intimacy with others and the reshaping (through social interactions) of attitudes, values, and goals that form an identity separate from family. Thus, Erikson’s psychosocial lifespan theory provides an important context for examining social anxiety in emerging adulthood. Indeed, although some limited longitudinal research has focused on the development of social anxiety across childhood and adolescence (Broeren, Muris, Diamantopoulou, & Baker, 2013; Nelemans et al., 2016), my research fills a gap in the literature by studying social anxiety in relation to psychosocial functioning over the long term in emerging adulthood.

Within the developmental framework provided by Erikson, the *self-presentation theory* provides a platform on which the first study of my dissertation was based (Schlenker & Leary, 1982). Specially, this theory addresses both the proposed direct link

between social anxiety and academic achievement and the indirect link through new social ties in university. Indeed, Schlenker and Leary (1982) hypothesized that people become socially anxious when their desire to make a good impression on others conflicts with their expectation that they will be unsuccessful in this endeavor. Leary (2010) further suggested that individuals with social anxiety automatically anticipate social relationships will be unbalanced by default, simply because the partner in the social interaction will not value the relation as highly as they do (Leary, 2010). According to this perspective, individuals with social anxiety are disadvantaged in pursuing their interpersonal objectives through relationships with others. In the university setting particularly, students with social anxiety are less likely to cultivate the goodwill of friends, peers and faculty to support their academic goals. For instance, asking for help during or after class may be compromised by difficulties (i.e., distress) in socially interacting with others. Thus, poor self-presentation effects may translate into difficulties in developing both new social ties at university and achieving academic objectives (Goguen, Hiester, & Nordstrom, 2010).

In the second study of my dissertation, heterogeneity in social anxiety was investigated in relation to alcohol use across three years of university, and whether that heterogeneity in social anxiety was associated with differential psychosocial functioning in Year 1 of university. Furthermore, my third study continued to study heterogeneity in social anxiety with respect to alcohol use and psychosocial functioning over the long term (7 years). The theoretical perspective of the *self-medication hypothesis* (SMH) informed both of these studies (Khantzian, 1985). Indeed, the SMH is based on earlier research that demonstrated alcohol significantly reduces stress and avoidance tendencies in animals

confronted with fearful stimuli (Conger, 1956). Khantzian (1985) extrapolated this finding to postulate that individuals were motivated to use drugs (e.g., alcohol) to escape painful emotions or alleviate their psychological distress. In the university setting, there are likely varied motivations for using alcohol, including to regulate positive and/or negative affect (Cooper, Frone, Russell, & Mudar, 1995). In the case of social anxiety, alcohol is posited to help individuals cope with their symptoms in stressful and threatening social situations over the short-term (Carrigan & Randall, 2003) - an effect that is likely bidirectional such that drinking alcohol likely lowers inhibitions and reduces avoidance of social interactions. Thus, the SMH underscores the likelihood that individuals with social anxiety will drink to cope with their negative affect (distress) and negative cognition (fear of negative evaluation).

Dissertation Studies

Having discussed the developmental and theoretical framework for my dissertation, the following paragraphs will describe my dissertation studies in more detail. Overall, these investigations examined whether social anxiety had an impact on psychosocial functioning during the university years and after graduation. I was particularly interested in assessing the developmental tasks of academic achievement and socialization, both a central part of the university experience. This included examining the relations between social anxiety and academic achievement, new social ties formed in university, and alcohol use, all activities involving social interactions closely aligned with this developmental stage in university.

In my *first study* I was primarily interested in the developmental task of academic achievement. Although previous longitudinal research by two different groups had not

found a link between social anxiety and grade point average (Strahan, 2003; Topham & Moller, 2011), the studies were limited by a lack of control for previous scores on social anxiety at Time 1 and for not controlling for general anxiety and depression; it is well known that general anxiety and depression co-occur with social anxiety (Epkins & Heckler, 2011; Starr, Davila, La Greca, & Landoll, 2011). A stronger interpretation would have been achieved with the adoption of a longitudinal design that accounted for temporal order and reciprocal associations among the variables. I also considered the explanation given by Strahan on the lack of evidence for a direct relation between social anxiety and academic achievement (Strahan, 2003). Although she did not find a direct link between social anxiety and grade point average in her research, she speculated that the effect might be indirect, through the formation of new social relationships in university. Indeed, limited evidence from the literature indicated there was a link between social anxiety and difficulty forming new friendships in university (Parade et al., 2010). Other researchers indicated there was a link between forming new friendships in university and favorable academic outcomes (Antonio, 2004). Thus, these previous research investigations informed my decision to fill a gap in the literature by addressing the two issues simultaneously: whether there was a relation between social anxiety and academic achievement, and whether there was an indirect relation through new social ties formed in university. These questions were examined by assessing the reciprocal relations between social anxiety, new social ties and academic achievement (i.e., year-end average marks) in a longitudinal design controlling for general anxiety and depression.

My *second study* centered on the social activity of alcohol use commonly embraced in the university setting (Labrie, Lamb, & Pedersen, 2008). Until recently,

studies examining the relation between social anxiety and alcohol use in university revealed mixed findings – social anxiety was both positively and negatively related to drinking (Buckner, Schmidt, & Eggleston, 2006; Ham & Hope, 2006; LaBrie, Pedersen, Neighbors, & Hummer, 2008). However, a recent meta-analysis clarified the issue by reporting that although social anxiety was negatively related to alcohol use, it also was positively associated with alcohol-related problems (Schry & White, 2013). The inference was that most students with social anxiety did not drink, but that those who did were at risk for adverse outcomes. Thus, the question arose as to whether there might be meaningful heterogeneity in alcohol use in the population with social anxiety; did one group with social anxiety drink significantly more than a second group with social anxiety? Using a person-centered design with social anxiety and alcohol use as indicators of class membership between Year 1 to Year 3, I hypothesized that there might be more than one group of students with social anxiety and that these groups might differ in alcohol use (frequency and quantity). I also expected to identify other groups in my university sample with low social anxiety whose memberships might have been defined by differing levels of alcohol use.

Moreover, I was interested in assessing whether psychosocial functioning (e.g., at-risk behaviors) in Year 1 of university was associated with heterogeneity in social anxiety. Indeed, there is considerable evidence in the literature to suggest that higher levels of alcohol use are concurrently associated with missing class, getting injured, or even problems with the authorities (Ham & Hope, 2003, 2005). Furthermore, alcohol use is also linked to impulsive behaviors (Leamy, Connor, Voisey, Young, & Gullo, 2016), self-medicating to cope with negative affect (Strahan, Panayiotou, Clements, & Scott,

2011), and poorer academic achievement (Alcoholism, 2015). Thus, my second hypothesis addressed another gap in the literature by investigating if there was heterogeneity in social anxiety based on alcohol use in the first three years of university, and whether that heterogeneity was differentially associated with psychosocial functioning (e.g., other at-risk behaviors) in Year 1 of university.

As a follow up, in my *third study* I continued to track the five groups identified in study two across the senior years of university and post-graduation for a total of seven years. There were two social anxiety groups, one linked with low and the other with high alcohol use, and three low social anxiety groups that were associated with high, moderate and low alcohol use, respectively – based on their co-occurrence over the first three years of university. The atypical social anxiety group, as compared to a typical social anxiety group, was linked to more at-risk behaviors (BAS-fun seeking, poorer academic achievement, self injury and marijuana use) in Year 1 of university. In the literature, only one research group looked at the co-occurrence of SAD and Alcohol Use Disorders (AUD) in the clinical range, following participants across adolescence and into emerging adulthood (Black et al., 2015). The authors concluded that a history of SAD co-occurred with severe AUD over time (i.e., those on a trajectory of persistent SAD symptoms were more likely to follow a trajectory of severe AUD than those on a trajectory of adolescent-limited SAD). I was interested in studying the co-occurrence of social anxiety and alcohol use in a nonclinical population – where social anxiety scores did not distinguish between my groups with social anxiety - in which an investigation into the salience of alcohol use coincided with the peak period of drinking in emerging adulthood (Johnston, O'Malley, Bachman, Schulenberg, & Miech, 2015). Indeed, I hoped to examine whether

the psychosocial functioning reported in Year 1 (study two) still differentiated among the groups over time. By using both a person-centered analysis and growth curve analysis, I was able to investigate change and stability in behavioral trajectories. Thus, my third study filled a gap in the literature by examining heterogeneity in social anxiety based on alcohol use and its association with psychosocial functioning before and after university in a nonclinical sample.

Summary

The three studies that comprise this dissertation examined the effects of social anxiety from a strong developmental perspective during emerging adulthood. While social anxiety is recognized as potentially problematic, it is often hidden from the casual observer and its consequences are not easily recognized in nonclinical samples. This dissertation addresses a gap in the literature with respect to the longitudinal effects of social anxiety at a transitional phase – namely, the transition through university and into the adult world. This period coincides with the important developmental tasks of gaining independence, re-evaluating identity, establishing new relationships, developing intimacy and achieving academically, tasks that are likely challenging for those with social anxiety. Without successfully completing these tasks, healthy psychosocial functioning is likely compromised and, in turn, happiness and well-being into the future (Erikson, 1966; McMahon & Oketch, 2013).

References

- Alcoholism, N. I. o. A. A. a. (2015). College Drinking. Retrieved from <https://www.niaaa.nih.gov/alcohol-health/special-populations-co-occurring-disorders/college-drinking>
- Antonio, A. L. (2004). Influence of friendship groups in college. *The Journal of Higher Education, 75*(4), 446-471. doi:none
- Arnett, J. J. (2006). Emerging adulthood: Understanding the new way of coming of age. In J. J. Arnett & J. L. Tanner (Eds.), *Emerging adults in America: Coming of age in the 21st century* (pp. 3-19). Washington, DC, US: American Psychological Association.
- Black, J. J., Clark, D. B., Martin, C. S., Kim, K. H., Blaze, T. J., Creswell, K. G., & Chung, T. (2015). Course of alcohol symptoms and social anxiety disorder from adolescence to young adulthood. *Alcoholism: Clinical and Experimental Research, 39*(6), 1008-1015. doi:10.1111/acer.12711
- Bögels, S. M., Alden, L., Beidel, D. C., Clark, L. A., Pine, D. S., Stein, M. B., & Voncken, M. (2010). Social anxiety disorder: Questions and answers for the DSM-V. *Depression and Anxiety, 27*(2), 168-189. doi:10.1002/da.20670
- Broeren, S., Muris, P., Diamantopoulou, S., & Baker, J. R. (2013). The course of childhood anxiety symptoms: developmental trajectories and child-related factors in normal children. *Journal of Abnormal Child Psychology, 41*, 81-95.

- Buckner, J. D., Schmidt, N., B., & Eggleston, A. M. (2006). Social anxiety and problematic alcohol consumption: The mediating role of drinking motives and situations. *Behavior Therapy, 37*, 381-391. doi:10.1016/j.beth.2006.02.007
- Carrigan, M. H., & Randall, C. L. (2003). Self-medication in social phobia: A review of the alcohol literature. *Addictive Behaviors, 28*, 269-284. doi:10.1016/S0306-4603(01)00235-0
- Cattell, R. B. (1946). *Description and measurement of personality*. Oxford, England: World Book Company.
- Chavira, D. A., Stein, M. B., & Malcarne, V. L. (2002). Scrutinizing the relationship between shyness and social phobia. *Journal of Anxiety Disorders, 16*(6), 585-598. doi:10.1016/S0887-6185(02)00124-X
- Conger, J. (1956). Reinforcement theory and the dynamics of alcoholism. *Quarterly Journal of Studies on Alcohol, 17*, 296-305.
- Cooper, M. L., Frone, M. R., Russell, M., & Mudar, P. (1995). Drinking to regulate positive and negative emotions: A motivational model of alcohol use. *Journal of Personality and Social Psychology, 69*(5), 990-1005. doi:10.1037/0022-3514.69.5.990
- Epkins, C. C., & Heckler, D. R. (2011). Integrating etiological models of social anxiety and depression in youth: Evidence for a cumulative interpersonal risk model. *Clinical Child and Family Psychology Review, 14*(4), 329-376. doi:10.1007/s10567-011-0101-8

- Erikson, E. H. (1966). Eight ages of man. *International Journal of Psychiatry*, 2(3), 281-300. doi:none
- Eysenck, H. J., & Eysenck, S. B. (1971). The orthogonality of psychoticism and neuroticism: A factorial study. *Perceptual and Motor Skills*, 33(2), 461-462. doi:10.2466/pms.1971.33.2.461
- Goguen, L. M. S., Hiester, M. A., & Nordstrom, A. H. (2010). Associations among peer relationships, academic achievement, and persistence in college. *Journal of College Student Retention*, 12(3), 319-337. doi:10.2190/CS.12.3.d
- Ham, L. S., & Hope, D. A. (2003). College students and problematic drinking: A review of the literature. *Clinical Psychology Review*, 23(5), 719-759. doi:10.1016/S0272-7358(03)00071-0
- Ham, L. S., & Hope, D. A. (2005). Incorporating social anxiety into a model of college student problematic drinking. *Addictive Behaviors*, 30(1), 127-150. doi:10.1016/j.addbeh.2004.04.018
- Ham, L. S., & Hope, D. A. (2006). Incorporating social anxiety into a model of college problem drinking: Replication and extension. *Psychology of Addictive Behaviors*, 20(3), 348-355. doi:10.1037/0893-164X.20.3.348
- Heiser, N. A., Turner, S. M., Beidel, D. C., & Roberson-Nay, R. (2009). Differentiating social phobia from shyness. *Journal of Anxiety Disorders*, 23(4), 469-476. doi:10.1016/j.janxdis.2008.10.002
- Henderson, L., Gilbert, P., & Zimbardo, P. (2014). Shyness, social anxiety, and social phobia. In S. G. Hofmann & P. M. DiBartolo (Eds.), *Social anxiety: Clinical,*

developmental, and social perspectives (3rd ed., pp. 95-115). San Diego, CA, US: Elsevier Academic Press.

James, W. (1890). Instinct. In *The principles of psychology* (pp. 383-441). NY, US: Henry Holt and Company.

Janet, P. (1903). *Les obsessions et la psychasthénie*. Paris: F. Alcan.

Johnston, L. D., O'Malley, P. M., Bachman, J. G., Schulenberg, J. E., & Miech, R. A. (2015). Monitoring the future national survey results on drug use, 1975-2015: Volume 2, College students and adults ages 19-55. In (Vol. II: College students and adults ages 19-55). Ann Arbor, Michigan: University of Michigan. Retrieved from http://www.monitoringthefuture.org//pubs/monographs/mtf-vol2_2015.pdf.

Kagan, J. (2010). Temperamental contributions to the development of psychological profiles. In S. G. H. P. M. DiBartolo (Ed.), *Social anxiety: Clinical, developmental, and social perspectives* (2nd ed.) (pp. 323-345). San Diego, CA, US: Elsevier Academic Press.

Khantzian, E. J. (1985). The self-medication hypothesis of addictive disorders: Focus on heroin and cocaine dependence. *The American Journal of Psychiatry*, *142*(11), 1259-1264.

La Greca, A. M., Dandes, S. K., Wick, P., Shaw, K., & Stone, W. L. (1988). Development of the Social Anxiety Scale for Children: Reliability and Concurrent Validity. *Journal of Clinical Child Psychology*, *17*(1), 84-91.
doi:10.1207/s15374424jccp1701_11

- La Greca, A. M., & Lopez, N. (1998). Social anxiety among adolescents: Linkages with peer relations and friendships. *Journal of Abnormal Child Psychology*, *26*(2), 83-94. doi:10.1023/A:1022684520514
- Labrie, J., Lamb, T., & Pedersen, E. (2008). Changes in drinking patterns across the transition to college among first-year college males. *Journal of Child & Adolescent Substance Abuse*, *18*(1), 1-15. doi:10.1080/15470650802526500
- LaBrie, J., Pedersen, E. R., Neighbors, C., & Hummer, J. F. (2008). The role of self-consciousness in the experience of alcohol-related consequences among college students. *Addictive Behaviors*, *33*(6), 812-820. doi:10.1016/j.addbeh.2008.01.002
- Leamy, T. E., Connor, J. P., Voisey, J., Young, R. M., & Gullo, M. J. (2016). Alcohol misuse in emerging adulthood: Association of dopamine and serotonin receptor genes with impulsivity-related cognition. *Addictive Behaviors*, *63*, 29-36. doi:10.1016/j.addbeh.2016.05.008
- Leary, M. R. (1983). Social anxiousness: The construct and its measurement. *Journal of Personality Assessment*, *47*(1), 66-75. doi:10.1207/s15327752jpa4701_8
- Leary, M. R. (2010). Social anxiety as an early warning system: A refinement and extension of the self-presentation theory of social anxiety. In S. G. Hofmann & P. M. DiBartolo (Eds.), *Social anxiety: Clinical, developmental, and social perspectives* (2nd ed., pp. 471-486). New York: Elsevier: Academic Press.
- McMahon, W. W., & Oketch, M. (2013). Educations's effects on individual life chances and on development: An overview. *British Journal of Educational Studies*, *61*(1), 79-107. doi:10.1080/00071005.2012.756170

- McNeil, D. W. (2010). Evolution of terminology and constructs in social anxiety and its disorders. In S. G. Hofmann & P. M. DiBartolo (Eds.), *Social anxiety: Clinical, developmental, and social perspectives* (2nd ed., pp. 3-21). New York: Academic Press.
- Mitchell, M., MacInnes, D., & Morrison, I. (2008). *Student Wellbeing Study*. Retrieved from Christ Church, New Zealand:
- Nelemans, S. A., Hale Iii, W. W., Raaijmakers, Q. A. W., Branje, S. J. T., van Lier, P. A. C., & Meeus, W. H. J. (2016). Longitudinal associations between social anxiety symptoms and cannabis use throughout adolescence: The role of peer involvement. *European Child & Adolescent Psychiatry, 25*(5), 483-492. doi:10.1007/s00787-015-0747-8
- Parade, S. H., Leerkes, E. M., & Blankson, A. N. (2010). Attachment to parents, social anxiety, and close relationships of female students over the transition to college. *Journal of Youth and Adolescence, 39*(2), 127-137. doi:10.1007/s10964-009-9396-x
- Rapee, R. M., & Coplan, R. J. (2010). Conceptual relations between anxiety disorder and fearful temperament. In H. Gazelle & K. H. Rubin (Eds.), *Social anxiety in childhood: Bridging developmental and clinical perspectives. New Directions for Child and Adolescent Development* (Vol. 127, pp. 17-31). San Francisco: Jossey-Bass.

- Russell, D., & Topham, P. (2012). The impact of social anxiety on student learning and well-being in higher education. *Journal of Mental Health, 21*(4), 375-385.
doi:10.3109/09638237.2012.694505
- Schlenker, B. R., & Leary, M. R. (1982). Social anxiety and self-presentation: A conceptualization model. *Psychological Bulletin, 92*(3), 641-669.
doi:10.1037/0033-2909.92.3.641
- Schry, A. R., & White, S. W. (2013). Understanding the relationship between social anxiety and alcohol use in college students: A meta-analysis. *Addictive Behaviors, 38*(11), 2690-2706. doi:10.1016/j.addbeh.2013.06.014
- Starr, L. R., Davila, J., La Greca, A., & Landoll, R. R. (2011). Social anxiety and depression: The teenage and early adult years. In C. Alfano & D. C. Beidel (Eds.), *Social anxiety in adolescents and young adults: Translating developmental science into practice* (pp. 75-91). Washington, DC, US: Psychological Association
- Strahan, E. Y. (2003). The effects of social anxiety and social skills on academic performance. *Personality and Individual Differences, 34*(347-366).
- Strahan, E. Y., Panayiotou, G., Clements, R., & Scott, J. (2011). Beer, wine, and social anxiety: Testing the “self-medication hypothesis” in the US and Cyprus. *Addiction Research & Theory, 19*(4), 302-311.
doi:10.3109/16066359.2010.545152

- Topham, P., & Moller, N. (2011). New students' psychological well-being and its relation to first year academic performance in a UK university. *Counselling and Psychotherapy Research, 11*(3), 196-203. doi:10.1080/14733145.2010.519043
- Watson, D., & Friend, R. (1969). Measurement of social-evaluative anxiety. *Journal of Consulting and Clinical Psychology, 33*(4), 448-457. doi:10.1037/h0027806
- Zimbardo, P. G. (1977). *Shyness: What it is, what to do about it*. Don Mills, Ontario: Addison-Wesley Publishing company.

Chapter 2: The Social Ties that Bind: Social Anxiety and Academic Achievement across the University Yearsⁱ

Introduction

The ethos today in Western cultures is that success in university is one important gateway to future prosperity and wellbeing. Higher education is known to be associated with health and happiness, as well as reduced crime rates and lower welfare costs, to name a few (McMahon & Oketch, 2013). Yet students often face many changes (e.g., moving away from the nuclear family, creating new social networks) and challenges (e.g., achieving academically) as they make their way through university (e.g., Mitchell, MacInnes, & Morrison, 2008). While many students navigate this transitional time successfully, others are confronted by difficulties in both achievement and psychosocial adjustment. One psychosocial factor that may hinder success in university is social anxiety, an emotional problem that often is overlooked or hidden from the casual observer.

Social anxiety is not inconsequential in institutions of higher learning. Depending on the threshold of diagnosis, prevalence rates of social anxiety in university students range from 10 to 33% as compared to 7 to 13% in the general population (e.g., see Parade, Leerkes, & Blankson, 2010; Russell & Shaw, 2009). Given that engagement and integration (i.e., involvement in the various social and academic activities of university

ⁱ A version of this chapter has been published. Brook, C. A., & Willoughby, T. (2015). The social ties that bind: Social anxiety and academic achievement across the university years. *Journal of Youth and Adolescence*, 44(5), 1139-1152. doi:10.1007/s10964-015-0262-8

life) are considered key to successful academic achievement (see Tinto, 2006), the identifying features of social anxiety, including fear of negative evaluation, distress and/or avoidance of new or all social situations (Ginsburg, La Greca, & Silverman 1998), may be especially disadvantageous in the social and evaluative contexts that are integral to the university setting. In fact, Russell and Topham (2012) proposed that social anxiety might have a negative impact on university students' academic achievement.

The goal of the present study was to test whether social anxiety is directly associated with academic achievement over time among university students, and second, to investigate a proposed indirect mechanism through which social anxiety might be linked to lower academic achievement – that is, through the restricted formation of new social ties in university (Goguen, Hiester, & Nordstrom, 2010), a task that is particularly challenging for socially anxious individuals. It is important to note that in this paper we refer to social anxiety symptoms found within the general population and not to clinically diagnosed Social Anxiety Disorder (also known as Social Phobia; with more severe symptomatology that significantly interferes with daily living, e.g., social, education and occupational impairment), diagnosed in clinical populations. Further, our definition of academic achievement refers to overall academic achievement in university (i.e., overall year-end academic grades) as compared to more specific circumstances of achievement, such as test taking or performance in an examination.

Theoretical Perspectives: Social Anxiety, Social Ties, and Academic Achievement

Many theories postulate factors that best predict successful academic achievement in university, with some focused on the social interactions occurring within the university setting (i.e., college impact or interindividual theories; see Pascarella & Terenzini, 2005),

and others focused more on the individual (i.e., developmental, self-presentation, or intraindividual theories; see Pascarella & Terenzini, 2005). For example, the college impact theories of Tinto's Theory of Student Departure (2006) or Astin's Theory of Involvement (1999) suggest that engagement and integration in the social systems of university life (i.e., experiencing rewarding encounters within the university community that lead to the sharing of normative values and attitudes with both peers and faculty) are critical predictors of successful academic achievement (also see Chickering & Reisser, 1993). However, thoughts of engaging or interacting with others might foster the social fears that are central to social anxiety, hindering any attempt to participate in the classroom, join in conversations, or ask for help in order to successfully maneuver through the university system. Thus, from this viewpoint, socially anxious or withdrawn individuals might be at a disadvantage academically if they tend to avoid the social and academic communities of an institution.

Developmental theories also are relevant to understanding why engagement is important to academic success in university, most particularly Erikson's (1966) stage theory of psychosocial development. In the sixth stage, labeled intimacy versus isolation, Erikson hypothesized that a successful transition through early adulthood should involve the development of a healthy sense of intimacy as opposed to isolation. Individuals entering into institutions of higher education face the challenge of integrating into a new social and academic context, where their interactions with the social environment are likely to reshape their identity through changing attitudes, values, and goals. From this perspective, individuals who are socially anxious might perceive the university social environment as somewhat threatening, which, in turn, would restrict their openness to

change (e.g., identity re-evaluation and gaining independence from the nuclear family) and inhibit their interactions with others (e.g., developing intimacy within new friendships, and engaging professors and teaching assistants in discussion). As a consequence, feelings of social distress and avoidance in the university context might prevent socially anxious individuals from taking advantage of the learning opportunities that are designed to bolster academic success in school.

Finally, the self-presentation theory of Schlenker and Leary (1982) focuses on the individual and specifically addresses a proposed indirect link between social anxiety and academic achievement. Schlenker and Leary hypothesized that individuals likely become socially anxious when they wish to make a good impression on others but anticipate that they will be unsuccessful. Leary (2010) further proposed that socially anxious individuals perceive most relationships to be unbalanced by default, through a predisposing fear that others will not value the relationship as highly as they do. The consequence of this “relationship devaluation” is an inability for socially anxious individuals to obtain their own particular interpersonal objectives through their relationships with others. From this standpoint (i.e., a predisposing fear of social failure), socially anxious students likely have difficulty engaging friends, peers or faculty in any goodwill to support their present or future interpersonal goals, including achieving favorable academic outcomes through group study or discussions. Thus, poor self-presentation may translate into difficulties in developing new social ties at university and trouble in obtaining the support of others to achieve academic objectives (e.g., Goguen et al., 2010). Overall, these theoretical perspectives on the importance of engagement, psychosocial development, and self-

presentation in the university context suggest that social anxiety may interfere with achieving academic success, perhaps through difficulties in establishing social ties.

Social Anxiety and Academic Achievement

To the best of our knowledge, only two research groups have tested the hypothesis that social anxiety is directly and inversely associated with academic achievement in university. In a study of 253 university students, Strahan (2003) found that social anxiety was not a significant predictor of college persistence or grade point average over time. Topham and Moller (2011) replicated this result in a smaller sample of 117 university students, although neither study took advantage of their longitudinal design to control for previous scores on academic achievement or to control for comorbidity with general anxiety and depressive symptoms. In contrast, research on other populations found that Social Phobia in older adults was linked with poorer educational achievement (Van Ameringen, Mancini, & Farvolden, 2003), and trajectories of general anxiety throughout elementary school were associated with later high school non-completion (Duchesne, Vitaro, Larose, & Tremblay, 2008). Given the limited research assessing the longitudinal relationship between social anxiety and academic achievement specifically, a direct test of this hypothesis over time with a larger sample size of university students is needed.

Although Strahan (2003) did not find a direct link between social anxiety and grade point average in her research, she speculated that an effect between social anxiety and academic achievement might be indirect; that is, social anxiety might impact on academic achievement through difficulties in the formation of new social connections. Indeed, Strahan found that social anxiety was significantly correlated with overall

university adjustment (e.g., social integration), and university adjustment was significantly correlated with academic persistence and grade point average, although the indirect effect from social anxiety to academic persistence and grade point average through university adjustment was not formally tested in the study. We also proposed that there might be an indirect effect of social anxiety on academic achievement specifically through socially anxious individuals' difficulties in forming new social ties, as social ties are theorized to be an important determinant in social adjustment (Leary & Kowalski, 1995) and critical to integration and successful academic achievement in university (Tinto, 2006). We next outline research that provides support for this hypothesis, albeit through separate lines of research – one line that assesses the association between social anxiety and social ties, and another line that examines the link between social ties and academic achievement.

Social Anxiety and Social Ties

Given the key deficits associated with social anxiety (i.e., fear of negative evaluation, distress and/or avoidance of new or all social situations), it is not surprising that researchers have investigated its maladaptive effects on social relationships. Overall, this research indicates that social anxiety is contemporaneously associated with fewer close and intimate friendships in adolescence (Festa & Ginsburg, 2011; La Greca & Harrison, 2005; La Greca & Lopez, 1998). Two prospective studies also reported that social anxiety was negatively associated with the emergence of companionship and intimacy in newly formed adolescent friendships (Biggs, Vernberg, Abwender, Ewell, & Beery, 1992), although only one of these studies took advantage of the prospective design and controlled for previous scores on companionship and intimacy (Vernberg et al.,

1992). Finally, longitudinal research examining the bidirectional associations between social anxiety and adolescent friendship found that social anxiety predicted lower friendship support among males but, in turn, friendship support did not predict lower social anxiety in either sex (Tillfors, Persson, Willén, & Burk, 2012).

Despite both concurrent and longitudinal support for a link between social anxiety and social ties, the evidence seems to rest almost exclusively on younger adolescent populations, except for one study by Parade et al. (2010) that focused on female university students. Parade and colleagues found that socially anxious students had significantly more difficulty forming friendships than students who were not socially anxious, although the direction of effects between social anxiety and ease of forming friendships was unclear as they were measured concurrently. Nevertheless, Parade and colleagues (2010) suggested that their evidence supported the view that socially anxious female students are less confident in engaging others and may evaluate any relationship more negatively than students who are less socially anxious.

Notwithstanding the work of Parade and colleagues (2010), there appears to be a scarcity of literature on university students with respect to investigating both longitudinal and reciprocal relationships between social anxiety and social ties, most specifically new friendships formed in university. Based on evidence from the adolescent literature, however, it is expected that socially anxious students in university may be more withdrawn and have greater difficulty forming new friendships (Biggs et al., 2012) than their peers at a time when engagement and involvement are important to successful university outcomes (Tinto, 2006). As well, students who do not have the emotional support of newly formed close friends may have difficulty overcoming their fear of being

negatively evaluated or participating in the numerous social events that occur as a normal part of post-secondary educational pursuits. In fact, evidence from the work of Vernberg et al. (1992) on early adolescence suggests that there may be reciprocal effects between social anxiety and friendship; that is, their study indicated that social anxiety predicted the formation of fewer social ties in early adolescence and, in turn, less intimacy and companionship was associated with either stable or greater levels of social anxiety over time. In summary, data from a number of studies support the suggestion that there may be a direct relationship between social anxiety and social ties, while much less research hints at an opposing direction of effects.

Social Ties and Academic Achievement

Previous research indicates that social ties are related to academic achievement in university. For instance, Fass and Tubman (2002) reported that peer attachment and friendship quality were concurrently associated with scholastic engagement and competence (i.e., self-perceived scholastic functioning), and in turn, scholastic engagement and competence were concurrently associated with grade point average. In the same vein, longitudinal investigations have revealed that friendship quality or having new best friends in university predicated better social and academic outcomes (i.e., adjustment, aspirations, grade point average; Antonio, 2004; Buote et al., 2007; Goguen et al., 2010; Swenson, Nordstrom, & Hiester, 2008). Thus, the findings so far indicate that close social ties are important to favorable academic outcomes in the university environment.

Although empirical studies to date link close social ties with better academic adjustment or achievement in post-secondary institutions, much of the work assessed

these associations concurrently (e.g., Fass & Tubman, 2002; Swenson et al., 2008) or only over the first year of university (e.g., Antonio, 2004). A stronger examination of these relationships is necessary, specifically through the adoption of a longitudinal design that accounts for temporal order and reciprocal associations among the variables. Indeed, Mackinnon (2012) studied the direction of effects between perceived social support (note that this measure did not specifically assess the formation of new friendships in university) and academic achievement (i.e., grades) in a population of students transitioning between high school and university, and found that higher levels of perceived social support did *not* predict higher levels of academic achievement over time, but higher academic achievement did predict higher levels of perceived social support. Overall, the evidence from the literature quite strongly supports a connection between friendships or social ties in university and academic outcomes, and to a much lesser extent, an opposing direction of effects.

Sex Considerations

Some prior research on social anxiety points to sex differences in prevalence, with girls typically reporting more symptoms than boys (e.g., La Greca & Lopez, 1998; La Greca & Harrison, 2005). Yet, other studies report no sex differences (e.g., Biggs et al., 2012). These mixed findings suggest that sex should be included as a covariate in any model testing. Likewise, sex differences in the pattern of results have been revealed with respect to the association between social anxiety and social ties. For example, socially anxious girls have reported more support, companionship, and intimacy in their close friendships than socially anxious boys, and both socially anxious boys and girls displayed poorer social functioning than those who were less socially anxious, but the relationships

were stronger for girls (La Greca & Lopez; Vernberg et al., 1992). Biggs and colleagues (2012) showed similar findings. They found that an indirect effect of social anxiety on friendship quality through social withdrawal was significant only for girls. Although the weight of the evidence indicates that social anxiety is more likely to have a stronger effect on female as opposed to male social ties, there also is research that supports an opposing view. Tillfors and colleagues (2012) found that social anxiety predicted decreases in friendship support for males, but not for females. Collectively, these results indicate that sex should be examined as a potential moderator of the relationship between social anxiety and social ties.

Consequently, sex also may emerge as an important moderator of the association between social ties and academic achievement in university contexts as there are key differences in the quality of friendship between males and females, with females reporting significantly closer and more intimate friendships than males (e.g., Sharabany, Gershoni, & Hofman, 1981). As a consequence, these sex differences may translate into divergent effects on the pattern of associations among social anxiety, social ties, and academic achievement, although the direction of effects is uncertain.

Current Study

Several empirical questions arose from the review of the literature on relationships among social anxiety, social ties, and academic achievement. Specifically, the purpose of this three-wave longitudinal study was to test in a large sample of university students the pattern of associations among social anxiety, social ties, and academic achievement. First, given past research, we hypothesized that there may be a

negative direct relationship between social anxiety and academic achievement over time (Duchesne et al., 2008; Van Ameringen et al., 2003). Second, we hypothesized that there may be a negative indirect relationship between social anxiety and academic achievement through social ties. We also investigated the opposing direction of effects (e.g., academic achievement to social anxiety), although this analysis was exploratory given the lack of research examining these reciprocal effects. Third, we hypothesized that sex may be a significant moderator of the results, given that socially anxious females, for example, often report more intimacy in their friendships than socially anxious males, and the link between social anxiety and social functioning often is stronger for females than males (e.g., La Greca & Lopez, 1998; Vernberg et al., 1992). Finally, we tested for reciprocal effects over time between social anxiety and social ties, and academic achievement and social ties, although these analyses also were exploratory since there was a scarcity of research investigating these reciprocal relationships. A measure of general anxiety was controlled for in all analyses in order to assess the unique effect of social anxiety (over and above any general anxiety) on social ties and academic achievement (e.g., Epkins & Heckler, 2011). As well, depressive symptoms were included as a covariate to control for the known co-morbidity between social anxiety and depressive symptoms (e.g., Starr, Davila, La Greca, & Landoll, 2011). We also included age, sex, and parental education as covariates in the analyses given that these variables often are associated with academic achievement, social anxiety, social ties (e.g., La Greca & Lopez, 1998; McAndrew & Jeong, 2012; Tavernier & Willoughby, 2013, 2015; Tynkkynen, Tolvanen, & Salmela-Aro, 2012).

Method

Participants

The participants were 1,132 students who were part of a cohort enrolled in a mid-sized university in southern Ontario, Canada, who were surveyed for three consecutive years. First and second year surveys were administered by trained research assistants, while surveys in the third year were completed online. As academic grades were an important component of the present study, we excluded from our analyses the students who dropped out or transferred out of the university ($N = 190$), as grades were not applicable or available. Therefore, our analyses were based on 942 students (71.7 % female participants - note that the overall university male/female student ratio at Time 1 was 42%/58%) who remained registered at the university during the three waves of the study (note that we reran the analyses with the full sample and the pattern of findings did not differ). At the first assessment, all participants were in their first year of university ($M = 19.01$ years, $SD = 0.90$, range = 17–25 years). Data on socioeconomic status indicated that mean levels of education for mothers and fathers fell between “some college, university, or apprenticeship program” and “completed a college/apprenticeship and/or technical diploma.” Our sample was composed predominantly of domestic-Canadian students (88%), and common ethnic backgrounds of these students other than Canadian were British (19%), Italian (16.8%), French (9.5%), and German (9%), consistent with the broader demographics for the region (Statistics Canada, 2006). Of the international students, the majority was from Asia (36.1%), the European Union (15.7%), the Caribbean (10.2%), and Africa (10.2%).

Procedure

First-year university students from a broad variety of academic disciplines (e.g., biology, business, history, kinesiology, linguistics, nursing, psychology) were invited to complete a survey examining factors related to stress, coping, and adjustment to university by way of posters, classroom announcements, website posting, and visits to on-campus student residences. The participants were given course credit or monetary compensation for their participation at Time 1 (\$10), and monetary compensation for their participation at Time 2 (\$20) and Time 3 (\$30). At Time 2 and 3, all students who participated in the first assessment were invited to participate again by way of e-mails, posters, and classroom announcements. At all three assessments, surveys were completed during the winter term (end of January to March). Trained research assistants administered the survey in person to groups of students for Times 1 and 2, and online for Time 3. The study was approved by the university ethics board prior to survey administration at all three assessments and all participants provided informed active consent prior to participation.

Missing Data

Missing data occurred within each assessment time point because some students did not finish the entire questionnaire (average missing data = 2.2% across the three time points), and because some students did not complete all three waves of the survey. In our sample ($N = 942$), 72.2% completed all three assessments, 18.4% completed two of the three assessments, and 9.4% completed only one of the three assessments; therefore, retention was high. The participants who completed the survey at all three time periods were not significantly different from participants missing one or two waves on any of the

study measures, with one exception. The participants who completed the survey at all three waves had significantly higher academic achievement than their peers who completed only one ($ps < .001$, mean difference of 4.20, 4.54, and 5.72 for Time 1, Time 2, and Time 3, respectively) or two waves ($ps < .001$, mean difference of 3.49, 4.18, and 5.58 for Time 1, Time 2, and Time 3, respectively). Thus, we assumed data was missing at random. Missing values were imputed using the EM (expectation-maximum) algorithm with all demographic and study measures in the imputation process, including academic achievement (Little, Jorgensen, Lang, & Moore, 2014). EM is an iterative maximum-likelihood (ML) procedure in which a cycle of calculating means and covariances followed by data imputation is repeated until a stable set of estimated missing values is reached. Methodological research has demonstrated that ML estimation is preferable to pair-wise deletion, list-wise deletion, or means substitution (Schafer & Graham, 2002).

Measures

All measures were assessed at each time period with the exception of the five covariates, namely, age, sex, parental education, anxiety and depressive symptoms, which were measured at Time 1.

Demographics. Age, sex, and parental education (one item per parent, using a scale from 1 = *did not finish high school* to 6 = *professional degree*, which was averaged for participants reporting on both parents, $r = .40$ between mother and father education) were assessed and used as covariates in the analyses.

General anxiety. The Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990) was used to assess trait anxiety and general anxiety disorders (see Davey, 1993; Meyer et al., 1990). We used a shortened 7-item version of

the original 16-item scale (due to time constraints we could not include the full scale – we used the highest loaded items from a factor analysis when scales were reduced in size). An example item was, “I know I should not worry about things, but I just cannot help it”. Items were measured on a 5-point Likert scale ranging from 1 = *not at all like me* to 5 = *completely like me*. The internal consistency for this scale was .80 at Time 1, similar to Davey (1993) who used the full PSWQ with 136 university students.

Depressive symptoms. The Center for Epidemiologic Studies Depression Scale (CES-D Scale; Radloff, 1977) measures depressive symptoms in the general population. There are 20 items in this scale (e.g. “I thought my life had been a failure”), which are measured on a 5-point Likert scale ranging from 1 = *none of the time* to 5 = *most of the time*. At Time 1 the internal consistency for this scale was .91, consistent with other studies, such as Oppong, Asante, and Andoh-Arthur (2015) and Willoughby and Fortner (2014).

Social anxiety symptoms. Social anxiety was assessed using the Social Anxiety Scale for Adolescents (SAS-A; La Greca & Lopez, 1998). An adolescent measure was used as our sample involved late adolescence, consistent with the age range recommended for the SAS-A measure. The self-report instrument was comprised of three subscales including fear of negative evaluation (5 items, e.g., “I worry about what other people my age think of me”), social avoidance and distress of new situations (4 items, e.g., “I only talk to other people my age that I know really well”), and social avoidance and distress generally (5 items, e.g., “I feel shy even with other people my age I know well”). The responses were based on a 4-point Likert scale ranging from 1 = *almost never or never* to 4 = *almost always or always*. Consistent with past research, the 14 items were

combined into a composite measure of social anxiety (La Greca & Lopez, 1998; due to survey length constraints we could not use all 18 items from the original scale). A reliability analysis of the SAS-A scale at Time 1, 2, and 3 gave Cronbach's alphas of .89, .90, and .91, respectively, consistent with other studies on older adolescents (e.g., La Greca & Harrison, 2005). In the present study, individuals who have an average score of 2.22 or higher might be considered at-risk for more severe distress and impairment (Tulbure, Szentagotai, Dobrea, & David, 2012).

Social ties. The social ties construct was compiled from three questions on the Student Adaptation to College Questionnaire (SACQ, Baker & Siryk, 1989). We operationalized this construct through a principal components analysis of the SACQ that grouped together the three items focusing on the formation of new social ties in university (factor loadings were between .73 to .78). Given the length of the SACQ and that we were investigating many variables over time, we were not able to include the entire SACQ in the survey. The questions included: "I have several close social ties at university", "I am satisfied with how much I am participating in social activities at university", and "I am meeting people and making friends at university". Students rated the relevance of each statement on a 5-point Likert scale ranging from 1 = *not at all like me* to 5 = *completely like me*. Cronbach's alphas at Time 1, 2, and 3 were .69, .73, and .76, respectively.

Academic achievement. Overall year-end academic grades across all courses were accessed from the university's Registrar's Office with permission granted from the participants (only $n = 19$ or 2% of students did not consent to having their grades accessed).

Analytic Approach

An autoregressive cross-lag path analysis was employed in the present study to allow for the testing of direct, indirect, and reciprocal pathways, while controlling for previous scores on the study variables (Selig & Little, 2012). Model fit was determined using the comparative fit index (CFI) and the root mean square error of approximation (RMSEA) indicators of goodness-of-fit (Hu & Bentler, 1995). The cut-off criteria recommended by Hu and Bentler for a well-specified or close-fitting model are a CFI > .95 and a RMSEA < .06, simultaneously. The analyses were carried out using AMOS 22.

The model. The autoregressive model was comprised of three variables measured over three waves: social anxiety, social ties, and academic achievement (Figure 2-1). Across the three time periods, we included the following paths: lag-1 (i.e., from Time 1 to Time 2, and Time 2 to Time 3) cross-lag paths between social anxiety and social ties and between social ties and academic achievement, lag-1 (i.e., from Time 1 to Time 2, and Time 2 to Time 3) and lag-2 (i.e., from Time 1 to Time 3) autoregressive paths (i.e., within variable) for social anxiety, social ties, and academic achievement, and lag-2 (i.e., from Time 1 to Time 3) cross-lag paths between social anxiety and academic achievement. Concurrent associations among social anxiety, social ties, academic achievement, and all covariates (age, sex, parental education, anxiety, and depressive symptoms) were included at each time point in order to control for common method variance. Paths were estimated from the covariates at Time 1 to the study variables at Time 2 and 3. Any significant paths, therefore, accounted for the correlations among the variables within a wave, and controlled for previous scores on the outcome variables,

covariates, and other predictors in the model (i.e., to allow estimation of the unique relationship between study variables).

Invariance testing. We first assessed whether the pattern of results was invariant across time (e.g., we determined if the relationship between Time 1 social anxiety and Time 2 social ties was the same as between Time 2 social anxiety and Time 3 social ties). Each cross-lag path was constrained to be equal across time and compared to an unconstrained model where the paths were left free to vary. A chi-square difference test of relative fit was used to ascertain whether there was a difference in model fit between the constrained and unconstrained models. Non-significance would indicate no difference in fit between the two models and the more parsimonious constrained model would be kept for further hypothesis testing (i.e., simplest model with fewest parameters being estimated).

To test whether sex was a significant moderator of the results, we constrained each cross-lag path to be equal across sex and compared that model to an unconstrained model where the paths were left free to vary. A non-significant chi-square difference test would indicate no difference in fit between the constrained and unconstrained models and that sex was not a significant moderator of the pattern of effects.

Results

Descriptive Statistics

The descriptives for all study variables were analyzed using SPSS 22 and the means and standard errors are listed in Table 2-1 and the correlations are found in Table 2-2. Although the social anxiety measure used in this study is not necessarily

comparable to measures used to clinically diagnose Social Anxiety Disorder, 16.3% of our sample in year one had social anxiety scores that would be considered significantly at risk for more severe distress and impairment (Tulbure et al., 2012). To test whether there were any sex differences in the three study variables, three MANOVAs were conducted separately for social anxiety, social ties, and academic achievement at each time point, with sex as the independent variable. Only the MANOVAs at Time 2 and 3 revealed a significant main effect ($ps < .001$). Female students reported significantly higher grades and higher levels of social ties than males at Time 2 ($p < .001$ and $p < .05$, respectively), and higher grades than males at Time 3 ($p < .001$).

Primary Analyses

Time invariance. The chi-square difference test of relative fit indicated that the unconstrained model was not a significantly better fit than the constrained model, $\chi^2_{\text{diff}}(4) = 6.995, p > .05$, suggesting that the pattern of associations among the variables was consistent across the three years. Therefore, we used the constrained model for all further analyses, as it was the most parsimonious. The constrained model fit was good, $\chi^2(12) = 24.700, p = .016$, CFI = .997 and RMSEA = .034, 90% CI [.014 .052], $p = .922$.

Social anxiety and academic achievement. We tested our first hypothesis by analyzing whether there was a direct effect of social anxiety on academic achievement and found that social anxiety at Time 1 was a negative and significant predictor of academic achievement at Time 3, while academic achievement at Time 1 *was not* a significant predictor of social anxiety at Time 3 – see Figure 2-1. Thus, our findings showed a negative direct effect of social anxiety on academic achievement.

Social anxiety, academic achievement, and social ties. With the same constrained model, we used bias-corrected bootstrapping (to calculate confidence intervals and significance levels for the indirect coefficients; bootstrap samples = 1000; see Zhao, Lynch, & Chen, 2010) to test whether there was an indirect effect of social anxiety at Time 1 on academic achievement at Time 3 through social ties at Time 2 and found a significant negative relationship – see Figure 2-2. The negative indirect effect of academic achievement at Time 1 on social anxiety at Time 3 through social ties at Time 2 also was significant. Thus, we found reciprocal negative indirect effects between social anxiety and academic achievement through social ties.

Secondary reciprocal associations. Our model also revealed that social anxiety at Time 1 negatively predicted social ties at Time 2, and, in turn, social ties at Time 1 negatively predicted social anxiety at Time 2. Furthermore, social ties at Time 1 positively predicted academic achievement at Time 2, and academic achievement at Time 1 positively predicted social ties at Time 2 (note that as the lag-1 cross-lag pathways were constrained to be the same over time, the pattern of results for Time 2 to Time 3 was identical to those for Time 1 to Time 2). Thus, our results indicated significant negative reciprocal relationships between anxiety and social ties, and positive reciprocal associations between social ties and academic achievement (Figure 2-1).

Sex as a moderator. We examined whether the pattern of effects was divergent across sex as proposed by the third hypothesis. There was no significant difference in model fit between males and females, $\chi^2_{\text{diff}}(5) = 2.107, p > .05$, indicating that the pattern of associations across time was not different across sex. Therefore, sex did not moderate the pattern of effects among social anxiety, social ties, and academic achievement.

Discussion

In this study, we analyzed the longitudinal relationships among social anxiety, social ties, and academic achievement in university students. Overall, 16.3% of our sample in year one reported levels of social anxiety that have been associated with clinically significant distress or impairment (Tulbure et al., 2012). Explicitly, we investigated whether there was a significant direct effect between social anxiety and academic achievement, as well as reciprocal indirect effects through social ties, and found evidence to support both these hypotheses. Significant reciprocal relationships over time also were found between social anxiety and social ties, as well as between social ties and academic achievement.

The finding that higher levels of social anxiety were significantly and directly linked to lower levels of academic achievement over time is congruent with the self-presentation theory of Schlenker and Leary (1982). Socially anxious individuals may have difficulty engaging with the academic environment as a consequence of their fear that others will not value them equally within a relationship or social interaction. This fear may further inhibit their willingness to participate in class and ask for help or information from teaching assistants, professors, and other university staff. It also may indicate that socially anxious students have greater difficulty within the academic structure of the university as a whole, where approaching and interacting with, and being evaluated by others is a normal part of the learning process.

We also found that social anxiety was associated indirectly with academic achievement through social ties. This finding is in line with our hypothesis of an indirect effect, which pulls together two areas of research, namely, one that focuses on the

associations between social anxiety and fewer or poorer quality social ties or friendships, and the other that links friendship or peer relationships with better academic outcomes. More specifically, in the last couple of decades, social anxiety has been associated with disengagement from peer interactions, fewer best friends, less companionship and emotional support from friends (e.g., La Greca & Lopez, 1998), withdrawal and poorer friendship quality (e.g., Biggs et al., 2012), and interference with the development of close supportive ties (e.g., Vernberg et al., 1992). Overall, social anxiety appears to disrupt the formation of close social ties and our results support this contention. Moreover, our evidence underscores the importance of engaging in social tasks during the developmental transition through university, as it appears that social and academic goals are linked.

Indeed, our findings on the positive relationships between social ties and academic achievement are consistent with another part of the extant literature, in which connections have been established between friendship and positive outcomes in university (i.e., higher grade point average or better academic adjustment; e.g., Goguen et al., 2010; Swenson et al., 2008; Woolf, Potts, Patel, & McManus, 2012). Moreover, we extend the literature by introducing a factor that might inhibit the formation of social ties, specifically social anxiety. Given social anxiety's defining symptoms of fear of negative evaluation, distress, and/or avoidance of social interactions, it may be that socially anxious individuals partially or entirely forgo the advantages that accrue with making new social ties in university, a situation that is particularly detrimental since friendships have been noted as primary sources of guidance, support, security, and a means by which academic resources and information are directly shared, to name just a few friendship

features that are relevant to academic success (e.g., Buote et al., 2007; Tokuno, 1986). Despite the evidence critically linking social engagement to academic success (see review by Pascarella & Terenzi, 2005), concern also has been expressed that achieving engagement across the entire student population at the practical (rather than theoretical) level is not easily accomplished (Tinto, 2006). To this end, our results suggest specifically targeting some engagement strategies toward socially anxious students, particularly in helping them overcome their reticence in forming new social ties in university, which, in turn, might have a beneficial impact on their academic accomplishments.

In terms of our hypothesized reciprocal direction of effects, we also found that academic achievement predicted social anxiety over time, through social ties. Although there is minimal evidence in the literature to support this pathway, our results are in line with a three-wave cross-lag path analysis in which Mackinnon (2012) found a significant association between grades and social support (but surprisingly no evidence for the opposing direction of effects). He proposed that the finding was consistent with research showing that hard work in academia leads to better self-concept or self-esteem that, in turn, may lead to richer more satisfying social ties or friendships (Baumeister, Campbell, Krueger, & Vohs, 2003). While we concur with the idea that students who likely gain confidence in themselves through their academic accomplishments will be more comfortable in reaching out to their peers and accessing the support that comes with friendship, our research suggests that there also may be additional benefits for those who are vulnerable to the symptoms of social anxiety.

In consideration of the second component of this indirect path (i.e., social ties to social anxiety), our finding was consistent with Vernberg and colleagues' (1992) proposal that there are reciprocal associations between social anxiety and certain aspects of friendship. Other research also has demonstrated that best friendships with positive qualities are related to less social anxiety, indicating that friendships may serve in a protective capacity by reducing social anxiety (La Greca & Harrison, 2005). Our study is consistent with this view that social relationships confer a protective factor on those who are at risk to the effects of social evaluative fears and withdrawal behavior. Indeed, problematic relationships with peers probably contribute to the emergence of social awkwardness and avoidance of social situations, all symptoms of social anxiety. In turn, social withdrawal likely elicits negative feedback from peers and exacerbates feelings of social rejection (e.g., Biggs et al., 2012; Rubin, Bowker, & Gazelle, 2010). Thus, our results support the idea that successful academic achievement in university alongside the formation of social ties may be helpful in alleviating the effects of social anxiety. More generally, our findings indicate that an implementation of strategies that encourage the development of new social relationships at university would be advantageous on several fronts, both in achieving successful academic outcomes and in relieving some of the detrimental effects of social anxiety.

In summary, our findings support past research that outlines the many benefits of friendship, including intimacy and companionship (Berndt, 1982), emotional or social support (Furman & Buhrmester, 1992), favorable short and long term adjustment (Rubin et al., 2010), positive self-esteem and better psychosocial adjustment (Buhrmester, 1990), as well as its capacity to provide an overall "protective function", particularly in reducing

social anxiety (La Greca & Harrison; 2005; La Greca & Lopez, 1998; Vernberg et al. 1992). Not only do social ties appear to help the socially anxious individual become socially engaged and more comfortable in social contexts but they also may diminish the effects of social anxiety by facilitating academic adjustment and success in the university environment.

Finally, there were no sex differences in mean levels of social anxiety and the pattern of results found among social anxiety, social ties, and academic achievement was not different across students. Both of these findings were somewhat unanticipated as adolescent girls have reported higher levels of social anxiety than boys (e.g., La Greca & Lopez, 1998; La Greca & Harrison, 2005), and they have described their friendships differently; socially anxious girls have reported their friendships as more supportive and intimate than do socially anxious boys (La Greca & Lopez, 1998; Vernberg et al., 1992). However, these findings on sex differences are mostly limited to younger adolescent populations and may not be applicable to our older sample.

The strength of the present study was in investigating the associations among social anxiety, social ties, and academic achievement using a long-term longitudinal research design with a large sample size. We used an autoregressive cross-lag analysis to control for previous scores on study measures (i.e., controlling for temporal order), to incorporate major covariates (particularly those known to be comorbid with social anxiety, such as general anxiety and depressive symptoms), and to control for shared method variance among variables within the same wave.

At the same time, our study is not without limitations. First, these findings may not apply to the general population as they were based on a single university sample. An

advantage of using one university sample, however, is that we were able to develop a strong relationship with the participants and, thus, retention has been high over time (see missing data section for values). In addition, the pattern of findings from this study is unlikely to be unique to students at our university, although these results may unfold differently within younger age groups or different cultures. Second, our collection of data was yearly and it might be beneficial in future to assess these relationships more frequently. Third, on average, those who completed all three waves of the survey had higher grades than those who completed only one or two waves. It may be that students who completed all three waves are more conscientious than students completing only one or two waves, and thus more likely to respond each year to invitations to complete the survey. To avoid any potential bias, however, we included academic achievement in all missing data estimation analyses. Fourth, the alpha level for social ties at Time 1 was just below the conventional value of .7 for “adequate” acceptance, however, this might be due partly to the scale consisting of only three items, as reliability values decrease with fewer items in the scale. Fifth, although we focused on new social ties as relevant to the central feature of “social fears” associated with social anxiety, investigation of other interpersonal processes (e.g., friendship quality) also might inform the relationship between social anxiety and academic achievement. Interest also has been expressed in studying individual differences in emotionality as relevant to understanding predictors of academic achievement (Valiente, Swanson, & Eisenberg, 2012). It may be that emotional dysregulation moderates the relationship between social anxiety and academic outcomes. Alternatively, a person-centered approach might tease apart subgroups of individuals with differing levels of social anxiety symptoms that diverge with respect to their pattern of

relations with social ties, friendship qualities, or emotional regulation. Finally, some of the coefficients in this study were small compared to conventional sizes. However, small effect sizes are common in cross-lag models when accounting for the correlations among the variables within wave, and controlling for previous scores on the outcome variables, covariates, and other predictors in the model (Adachi & Willoughby, 2014). Thus, small effects would be expected.

Conclusions

The findings of this study impact two traditional areas of research: social anxiety and academic achievement. We found that social anxiety had a direct effect on academic achievement over the university years. A fear of negative evaluation alongside a greater tendency of feeling distressed and/or avoiding social situations seemed to interfere with academic achievement. Furthermore, newly formed university social ties appeared to play a pivotal role through their reciprocal relationships with both social anxiety and academic achievement, allowing us to bridge two areas of research. Those students with higher levels of social anxiety may be more successful in their academic pursuits when they embrace new social connections in the university environment, and those who achieve more favorable academic outcomes seem to engage in the formation of new social ties that seem to alleviate social anxiety symptoms. Broadly, we interpret the evidence to suggest that social ties have an overall protective function in these transitional years between adolescence and adulthood, particularly with respect to the link between social anxiety and academic achievement.

Over the last several decades, welcome programs, frosh week, and one-on-one mentorships have been implemented with some success to engage students in university life with the goal of leading students to successful integration and academic outcomes (e.g., Robinson et al., 1996). Our findings suggest that perhaps welcome program coordinators might consider specifically targeting individuals who are socially anxious or who are at risk for displaying withdrawn behavior. Given the prevalence of social anxiety in our sample, our findings may be of practical interest to socially anxious individuals and university administrators whose common goals are ultimately focused on promoting a smooth and successful transition through university.

Table 2-1

Means and Standard Deviations for all Variables (N = 942)

Variable	M (SD)	Range	α
Sex	71.7% female	-	-
Age 1	19.01 (0.89)	17-25	-
Parental Education	3.68 (1.27)	1-6	-
General Anxiety 1	3.14 (0.83)	1-5	0.80
Depressive Symptoms 1	2.09 (0.64)	1-5	0.91
Social Anxiety 1	1.74 (0.51)	1-4	0.89
Social Anxiety 2	1.73 (0.49)	1-4	0.90
Social Anxiety 3	1.73 (0.50)	1-4	0.90
Social Ties 1	3.24 (0.90)	1-5	0.69
Social Ties 2	3.22 (0.87)	1-5	0.73
Social Ties 3	3.21 (0.91)	1-5	0.76
Academic Achievement 1	68.85 (9.55)	-	-
Academic Achievement 2	69.34 (9.35)	-	-
Academic Achievement 3	72.67 (10.25)	-	-

Note. Higher scores equal higher levels of the construct. Numbers 1, 2, and 3, represent Time 1, Time 2, and Time 3, respectively.

Table 2-2

Correlations of Study Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Age T1	-	-.069*	-.109**	-.013	-.023	-.051	-.021	.008	-.155**	-.166**	-.035	-.039	-.059	-.092**
2. Sex		-	-.119**	.326**	.206**	.049	.007	-.014	-.024	.069*	.044	.048	.130**	.164**
3. Par Edu T1			-	-.109**	-.116**	.002	-.015	.009	.115**	.031	.081*	.107**	.076*	.105**
4. Gen Anx T1				-	.476**	.363**	.295**	.255**	-.166**	-.088**	-.102**	.119**	.130**	.178**
5. Depress T1					-	.392**	.314**	.227**	-.239**	-.229**	-.246**	-.111**	-.097**	-.062
6. Soc Anx T1						-	.716**	.608**	-.243**	-.231**	-.220**	.112**	.071*	.038
7. Soc Anx T2							-	.704**	-.260**	-.347**	-.266**	.106**	.060	.061
8. Soc Anx T3								-	-.228**	-.279**	-.331**	.082*	-.001	-.005
9. Soc Ties T1									-	.579**	.547**	-.099**	-.004	-.020
10. Soc Ties T2										-	.618**	-.026	.052	.066*
11. Soc Ties T3											-	.042	.115**	.130**
12. Aca Ach T1												-	.728**	.663**
13. Aca Ach T2													-	.744**
14. Aca Ach T3														-

Note. Par Edu = parent education, Gen Anx = general anxiety, Depress = depressive symptoms, Soc Anx = social anxiety, Soc Ties = social ties, Aca Ach = academic achievement, T1 = time 1, T2 = time 2, T3 = time 3. * $p < .05$. ** $p < .01$.

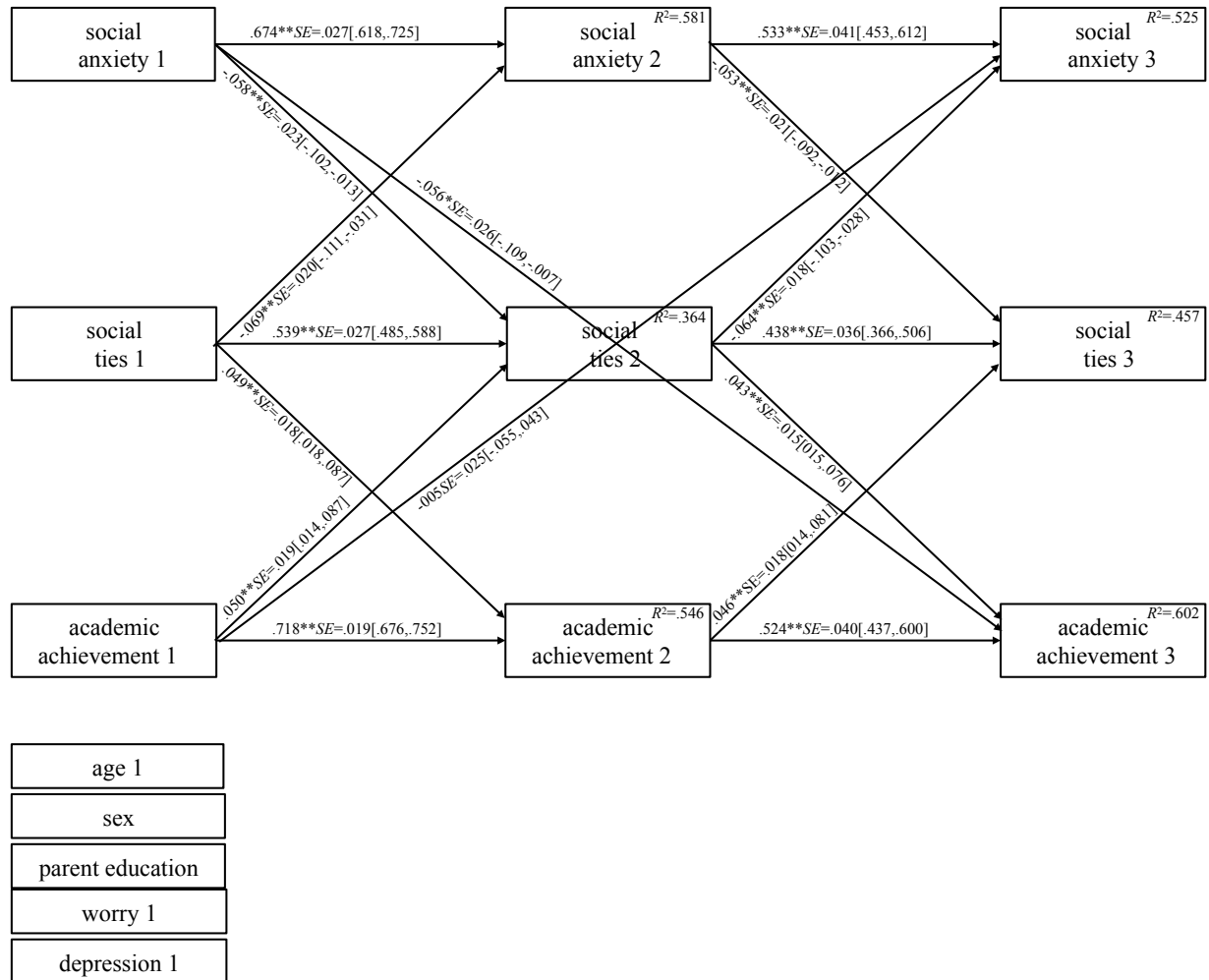


Figure 2-1. Lag-1 and lag-2 direct paths among social anxiety, social ties, and academic achievement, and lag-1 autoregressive paths are shown. Numbers 1 = Time 1, 2 = Time 2, and 3 = Time 3. Standardized coefficients are reported with their standard errors and 95% confidence intervals in brackets (from bias-corrected bootstrapping samples of 1000). R^2 is also given. In order to facilitate interpretation of the results the following paths are not drawn: lag-2 autoregressive pathways, the direct pathways between the covariates at Time 1 and the study variables at Time 2 and Time 3, the correlations at Time 1 among the study variables and covariates, and the contemporaneous correlations between study variables at Time 2 and Time 3 (results can be obtained from the first author). * $p < .05$. ** $p < .01$.

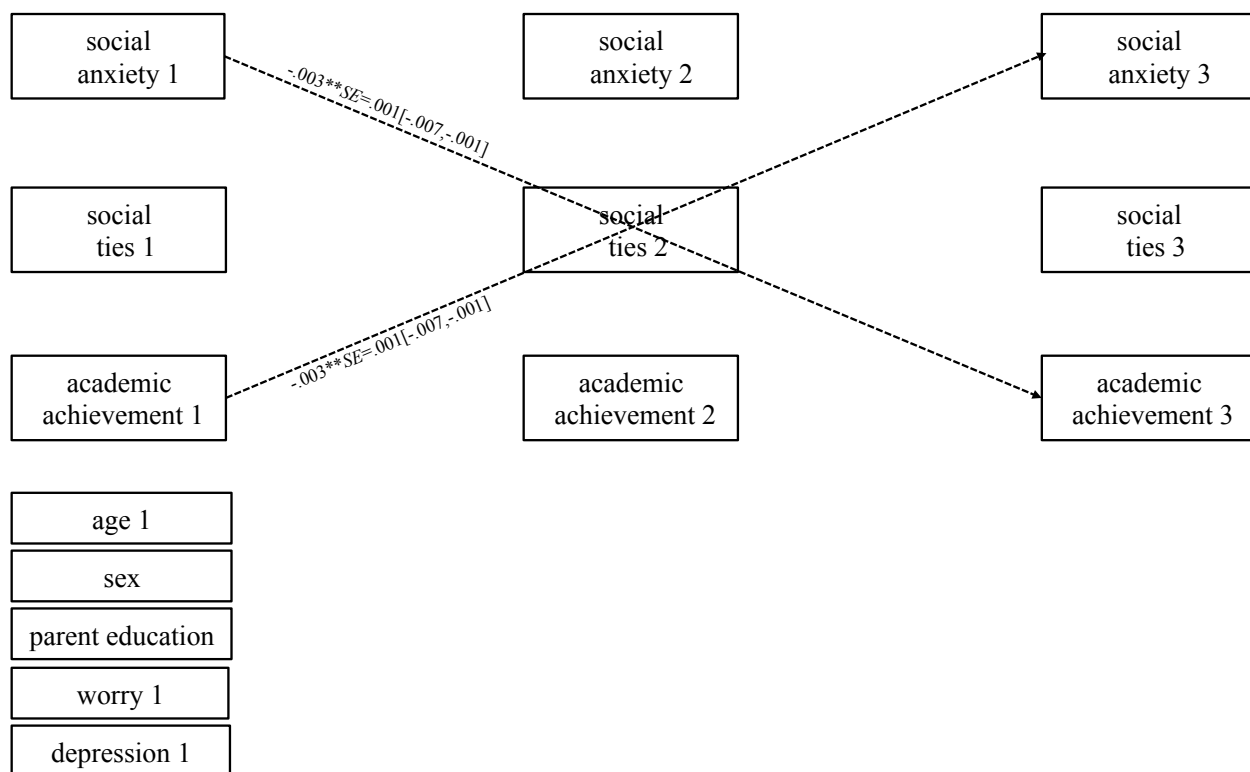


Figure 2-2. The significant *indirect* pathways between social anxiety and academic achievement through social ties are shown. Numbers 1 = Time 1, 2 = Time 2, and 3 = Time 3. Standardized coefficients are reported with their standard errors and 95% confidence intervals in brackets (from bias-corrected bootstrapping samples of 1000). In order to facilitate interpretation of the results the following paths are not drawn: lag -1 and lag-2 autoregressive pathways, the cross-lag pathways between social anxiety and social ties, and between social ties and academic achievement, all of which can be found in *Figure 2-1*. Also not shown are the direct pathways between the covariates at Time 1 and the study variables at Time 2 and Time 3, the correlations at Time 1 among the study variables and covariates, and the contemporaneous correlations between study variables at Time 2 and Time 3 (results can be obtained from the first author). $**p < .01$.

References

- Adachi, P.J.C., & Willoughby, T. (2014). Interpreting effect sizes when controlling for stability effects in longitudinal autoregressive models: Implications for psychological science. *European Journal of Developmental Psychology, 12*(1), 116-128. doi: 10.1080/17405629.2014.963549.
- Antonio, A. L. (2004). Influence of friendship groups in college. *The Journal of Higher Education, 75*(4), 446-471.
- Astin, A. W. (1999). Student involvement: A developmental theory for higher education. *Journal of College Student Development, 40*(5), 518-529.
- Baker, R. W., & Siryk, B. (1989). *Student adaptation to college questionnaire manual*. Los Angeles, CA: Western Psychological Services.
- Baumeister, R. F., Campbell, J. D., Krueger, J. I., & Vohs, K. D. (2003). Does high self-esteem cause better performance, interpersonal success, happiness, or healthier lifestyles? *Psychological Science in the Public Interest, 4*(1), 1-44.
- Berndt, T. J. (1982). The features and effects of friendship in early adolescence. *Child Development, 53*(6), 1447-1460.
- Biggs, B. K., Vernberg, E. M., & Wu, Y. P. (2012). Social anxiety and adolescents' friendships: The role of social withdrawal. *The Journal of Early Adolescence, 32*(6), 802-823. doi: 10.1177/0272431611426145
- Buhrmester, D. (1990). Intimacy of friendship, interpersonal competence, and adjustment during preadolescence and adolescence. *Child Development, 61*(4), 1101-1111.

- Buote, V. M., Pancer, S. M., Pratt, M. W., Adams, G., Birnie-Lefcovitch, S., Polivy, J., et al. (2007). The importance of friends: Friendship and adjustment among 1st-year university students. *Journal of Adolescent Research, 22*(6), 665-689. doi: 10.1177/0743558407306344
- Chickering, Arthur W., & Reisser, Linda. (1993). *Education and Identity* (2nd edition ed.). San Francisco: Jossey-Bass.
- Davey, G. C. L. (1993). A comparison of three worry questionnaires. *Behaviour Research and Therapy, 31*(1), 51-56. doi: [http://dx.doi.org/10.1016/0005-7967\(93\)90042-S](http://dx.doi.org/10.1016/0005-7967(93)90042-S)
- Duchesne, S., Vitaro, F., Larose, S., & Tremblay, R. E. (2008). Trajectories of anxiety during elementary-school years and the prediction of high school noncompletion. *Journal of Youth and Adolescence, 37*(9), 1134-1146. doi: 10.1007/s10964-007-9224-0
- Epkins, C., & Heckler, D. (2011). Integrating etiological models of social anxiety and depression in youth: Evidence for a cumulative interpersonal risk model. *Clinical Child and Family Psychology Review, 14*(4), 329-376. doi: 10.1007/s10567-011-0101-8
- Erikson, E. H. (1966). Eight ages of man. *International Journal of Psychiatry, 2*(3), 281-300.
- Fass, M. E., & Tubman, J. G. (2002). The influence of parental and peer attachment on college students' academic achievement. *Psychology in the Schools, 39*(5), 561-574. doi: 10.1002/pits.10050

- Festa, C. C., & Ginsburg, G. S. (2011). Parental and peer predictors of social anxiety in youth. *Child Psychiatry and Human Development, 42*(3), 291-306. doi: 10.1007/s10578-011-0215-8
- Furman, W., & Buhrmester, D. (1992). Age and sex differences in perceptions of networks of personal relationships. *Child Development, 63*(1), 103-115.
- Ginsburg, G. S., La Greca, A. M., & Silverman, W. K. (1998). Social anxiety in children with anxiety disorders: Relation with social and emotional functioning. *Journal of Abnormal Child Psychology, 26*(3), 175-185.
- Goguen, L. M. S., Hiester, M. A., & Nordstrom, A. H. (2010). Associations among peer relationships, academic achievement, and persistence in college. *Journal of College Student Retention, 12*(3), 319-337. doi: 10.2190/CS.12.3.d
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*(1), 1-55.
- La Greca, A. M., & Harrison, H. M. (2005). Adolescent peer relations, friendships, and romantic relationships: Do they predict social anxiety and depression? *Journal of Clinical Child and Adolescent Psychology, 34*(1), 49-61.
- La Greca, A. M., & Lopez, N. (1998). Social anxiety among adolescents: Linkages with peer relations and friendships. *Journal of Abnormal Child Psychology, 26*(2), 83-94.
- Leary, M. R. (2010). Social anxiety as an early warning system: A refinement and extension of the self-presentation theory of social anxiety. In S. G. Hofmann & P.

- M. DiBartolo (Eds.), *Social anxiety: Clinical, developmental, and social perspectives* (2nd ed., pp. 471-486). New York: Elsevier.
- Leary, M. R., & Kowalski, R. M. (1995). The self-presentation model of social phobia. In R. G. Heimberg, M. R. Liebowitz, D. A. Hope & F. R. Schneier (Eds.), *Social Phobia: Diagnosis, assessment, and treatment*. New York: Guilford Press.
- Little, T. D., Jorgensen, T. D., Lang, K. M., & Moore, E. W. G. (2014). On the joys of missing data. *Journal of Pediatric Psychology, 39*(2), 151-162.
- Mackinnon, S. P. (2012). Perceived social support and academic achievement: Cross-lagged panel and bivariate growth curve analyses. *Journal of Youth and Adolescence, 41*(4), 474-485. doi: 10.1007/s10964-011-9691-1
- McAndrew, Francis T., & Jeong, Hye Sun. (2012). Who does what on Facebook? Age, sex, and relationship status as predictors of Facebook use. *Computers in Human Behavior, 28*(6), 2359-2365. doi:
<http://dx.doi.org.proxy.library.brocku.ca/10.1016/j.chb.2012.07.007>
- McMahon, Walter W., & Oketch, Moses. (2013). Educations' effects on individual life chances and on development: An overview. *British Journal of Educational Studies, 61*(1), 79-107. doi: 10.1080/00071005.2012.756170
- Meyer, T.J, Miller, M.L., Metzger, R.L., & Borkovec, T.D. (1990). Development and validation of the Penn State Worry Questionnaire. *Behaviour Research and Therapy, 28*, 487-495. doi: 10.1016/0005-7967(90)90135-6
- Mitchell, M., MacInnes, D., & Morrison, I. (2008). *Student Wellbeing Study*. Christ Church, New Zealand: The Department for Innovation, Canterbury Christ Church

University.

- Oppong Asante, Kwaku, & Andoh-Arthur, Johnny. (2015). Prevalence and determinants of depressive symptoms among university students in Ghana. *Journal of Affective Disorders, 171*(0), 161-166. doi: <http://dx.doi.org/10.1016/j.jad.2014.09.025>
- Parade, S. H., Leerkes, E. M., & Blankson, A. N. (2010). Attachment to parents, social anxiety, and close relationships of female students over the transition to college. *Journal of Youth and Adolescence, 39*(2), 127-137. doi: 10.1007/s10964-009-9396-x
- Pascarella, E. T., & Terenzini, P. T. (2005). *How college affects students: A third decade of research* (Vol. 2). San Francisco: Jossey-Bass.
- Radloff, L. S. (1977). The CES-D Scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1*, 385-401. doi: 10.1177/014662167700100306
- Robinson, Debra A.G., Burns, Carl F., & Gaw, Kevin F. (1996). Orientation programs: A foundation of student learning and success. *New Directions for Student Services*(75), 55-68.
- Rubin, K. H., Bowker, J. C., & Gazelle, H. (2010). Social withdrawal in childhood and adolescence. In K. H. Rubin & R. J. Coplan (Eds.), *The development of shyness and social withdrawal* (pp. 131-156). New York: Guilford Press.
- Russell, G., & Shaw, S. (2009). A study to investigate the prevalence of social anxiety in a sample of higher education students in the United Kingdom. *Journal of Mental Health, 18*(3), 198-206. doi: 10.1080/09638230802522494

- Russell, G., & Topham, P. (2012). The impact of social anxiety on student learning and well-being in higher education. *Journal of Mental Health, 21*(4), 375-385. doi: 10.3109/09638237.2012.694505
- Schafer, J. L., & Graham, J. W. (2002). Missing data: Our view of the state of the art. *Psychological Methods, 7*, 147-177. doi: 10.1037/1082-989X
- Schlenker, B. R., & Leary, M. R. (1982). Social anxiety and self-presentation: A conceptualization model. *Psychological Bulletin, 92*(3), 641-669. doi: 10.1037/0033-2909.92.3.641
- Selig, James P., & Little, Todd D. (2012). Autoregressive and cross-lagged panel analysis for longitudinal data. In B. Laursen, T. D. Little & N. A. Card (Eds.), *Handbook of Developmental research Methods* (pp. 265-278). New York: The Guilford Press.
- Sharabany, R., Gershoni, R., & Hofman, J. E. (1981). Girlfriend, boyfriend: Age and sex differences in intimate friendship. *Developmental Psychology, 17*(6), 800-808.
- Statistics Canada. (2006). *Population by ethnic origin*. Retrieved from [http://www41.statcan.gc.ca/2009/30000/tbl/cybac30000_2009_000_t05-eng .htm](http://www41.statcan.gc.ca/2009/30000/tbl/cybac30000_2009_000_t05-eng.htm)
- Strahan, E. Y. (2003). The effects of social anxiety and social skills on academic performance. *Personality and Individual Differences, 34*, 347-366.
- Swenson, L. M., Nordstrom, A., & Hiester, M. (2008). The role of peer relationships in adjustment to college. *Journal of College Student Development, 49*(6), 551-567. doi: 10.1353/csd.0.0038
- Tavernier, Royette, & Willoughby, Teena. (2013). Bidirectional associations between

- sleep (quality and duration) and psychosocial functioning across the university years. *Developmental Psychology*, 50(3), 674-682. doi: 10.1037/a0034258
- Tavernier, Royette, & Willoughby, Teena. (2015). A longitudinal examination of the bidirectional association between sleep problems and social ties at university: the mediating role of emotion regulation. *Journal of Youth and Adolescence*, 44, 317-330. doi: 10.1007/s10964-014-0107-x
- Tillfors, M., Persson, S., Willén, M., & Burk, W. J. (2012). Prospective links between social anxiety and adolescent peer relations. *Journal of Adolescence*, 35(5), 1255-1263. doi: 10.1016/j.adolescence.2012.04.008
- Tinto, V. (2006). Research and practice of student retention: What next? *Journal of College Student Retention: Research, Theory and Practice*, 8(1), 1-19.
- Tokuno, K. A. (1986). The early adult transition and friendships: Mechanisms of support. *Adolescence*, 21(83), 593.
- Topham, P., & Moller, N. (2011). New students' psychological well-being and its relation to first year academic performance in a UK university. *Counselling and Psychotherapy Research*, 11(3), 196-203. doi: 10.1080/14733145.2010.519043
- Tulbure, B. T., Szentagotai, A., Dobrean, A., & David, D. (2012). Evidence based clinical assessment of child and adolescent social phobia: A critical review of rating scales. *Child Psychiatry and Human Development*, 43(5), 795-820. doi: 10.1007/s10578-012-0297-y
- Tynkkynen, L., Tolvanen, A., & Salmela-Aro, K. (2012). Trajectories of educational expectations from adolescence to young adulthood in Finland. *Developmental*

Psychology, 48(6), 1674-1685. doi: 10.1037/a0027245

- Valiente, C., Swanson, J., & Eisenberg, N. (2012). Linking students' emotions and academic achievement: When and why emotions matter. *Child Development Perspectives*, 6(2), 129-135. doi: 10.1111/j.1750-8606.2011.00192.x
- Van Ameringen, M., Mancini, C., & Farvolden, P. (2003). The impact of anxiety disorders on educational achievement. *Journal of Anxiety Disorders*, 17(5), 561-571. doi: 10.1016/S0887-6185(02)00228-1
- Vernberg, E. M., Abwender, D. A., Ewell, K. K., & Beery, S. H. (1992). Social anxiety and peer relationships in early adolescence: A prospective analysis. *Journal of Clinical Child Psychology*, 21(2), 189-196.
- Willoughby, Teena, & Fortner, Adrian. (2014). At-risk depressive symptoms and alcohol use trajectories in adolescence: A person-centred analysis of co-occurrence. *Journal of Youth and Adolescence*. doi: 10.1007/s10964-014-0106-y
- Woolf, K., Potts, H. W. W., Patel, S., & McManus, C. (2012). The hidden medical school: A longitudinal study of how social networks form, and how they relate to academic performance. *Medical Teacher*, 34, 577-586. doi: 10.3109/0142159X.2012.669082
- Zhao, X., Lynch, J. G., Jr., & Chen, Q. (2010). Reconsidering Baron and Kenny: Myths and truths about mediation analysis. *Journal of Consumer Research*, 37(2), 197-206. doi: 10.1086/651257

Chapter 3: Social Anxiety and Alcohol Use Across the University Years: Adaptive and Maladaptive Groupsⁱ

Introduction

Social anxiety is associated with difficulties in both intrapersonal and interpersonal functioning (e.g., Brook & Willoughby, 2015; La Greca & Lopez, 1998; Morrison & Heimberg, 2013). Its negative effects are found not only in the social domain but also in educational and vocational pursuits (e.g., Brook & Willoughby, 2015; Herbert, Rheingold, & Brandsma, 2010; Van Ameringen, Mancini, & Farvolden, 2003). In addition, clinically diagnosed social anxiety (Social Anxiety Disorder) is highly comorbid with other problematic behaviors such as Alcohol Use Disorder (DSM-IV-TR; American Psychiatric Association, 2000; e.g., Morris, Stewart, & Ham, 2005). A review of the research by Morris and colleagues indicates that individuals with Social Anxiety Disorder are more likely to meet the DSM-IV-TR criteria for alcohol dependence as compared to those who do not have Social Anxiety Disorder.

Although drinking alcohol may be a problematic behavior across the life course, the university years are a prime time and context for alcohol consumption (i.e., going to university simultaneously occurs with increased autonomy, less parental oversight, increased alcohol accessibility, and reaching legal drinking age) and associated negative

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adjustment difficulties (e.g., risky sex, aggression, poor academic performance, and health problems; e.g., Ham & Hope, 2003).

Considerable research has focused specifically on the relation between the use of alcohol and social anxiety in university, but the findings are mixed. For instance, some studies have found that social anxiety is positively linked to alcohol-related problems (e.g. Stewart, Morris, Mellings, & Komar, 2006), whereas other studies have reported a negative relation (e.g., Ham, Bonin, & Hope, 2007) or no significant association between social anxiety and alcohol use (e.g., Ham & Hope, 2006). Schry and White (2013) conducted a meta-analysis to clarify the nature of this association and found a positive correlation between social anxiety and alcohol-related problems (e.g., memory loss, fights with friends/family, injury, risky sex) but a negative correlation between social anxiety and quantity and frequency of alcohol use. The inference from these findings could be that not all individuals with social anxiety drink or drink problematically, but those who do may be at particular risk for adverse outcomes. Thus, an important question that remains to be answered is whether there is meaningful heterogeneity in alcohol use among individuals with social anxiety.

The purpose of the present study was to investigate the relation between social anxiety and alcohol use over time (i.e., co-occurrence) among university students through a person-centered approach. We tested for latent classes or groups of students based on their levels of social anxiety and alcohol consumption to determine whether there were students with social anxiety within our university sample who could be differentiated by their level of alcohol use. A second aim was to examine at Time 1 whether these groups could be discriminated from one another through various psychosocial functioning

indices (e.g., academic achievement, social ties, emotion coping behaviors). It should be noted that we focused on social anxiety symptoms (referred to as social anxiety throughout the paper) as found in nonclinical samples, not Social Anxiety Disorder as diagnosed in clinical populations (also known as Social Phobia). Additionally, we defined social anxiety as a fear of negative evaluation, distress and/or avoidance of new or all social situations (e.g., La Greca & Lopez, 1998).

Theoretical Basis for Co-occurrence between Social Anxiety and Alcohol Use

One of the first psychosocial theories that accounted for the relation between anxiety and alcohol stemmed from the animal work of Conger (1956), who noticed that alcohol significantly reduced the stress or avoidance tendencies of animals when they were faced with fearful stimuli. However, the “fear” in his tension reduction theory lacked specificity to social anxiety, to particular contexts, and to individual differences, and newer models were espoused to address these issues, such as the self-medication hypothesis (SMH; Khantzian, 1985). The SMH proposes that individuals are motivated to use drugs to alleviate their psychological distress or escape from painful emotions. In the case of social anxiety, alcohol is hypothesized to help individuals cope with their symptoms in difficult social situations over the short-term, although the two behaviors are likely to be mutually reinforcing over time (Battista, Stewart, & Ham, 2010). More precisely, it may be that there are bidirectional effects between social anxiety and alcohol use; social anxiety may lead to increased drinking and drinking may lead to greater levels of social anxiety, over time.

From a different perspective, Nock and Prinstein’s (2004) Four-Functions Model suggests “self-medication” with alcohol could function to reinforce four different

processes that regulate affect or alleviate perceived difficulties with social interactions or social evaluations (this model comes from the nonsuicidal self-injury literature but is applicable to understanding different motivations for alcohol use that are not addressed in the more commonly used Cooper (1994) Four-Factor Model of Drinking Motives - e.g., when feeling numb). The four functions include using alcohol for intrapersonal positive reinforcement to generate a positive emotion (e.g., to feel good), intrapersonal negative reinforcement to reduce a negative emotion (e.g., when feeling angry/frustrated), interpersonal positive reinforcement to elicit positive social stimuli (e.g., when feeling ignored), and interpersonal negative reinforcement to remove negative social stimuli (e.g., to distract yourself). From this perspective, social anxiety and its associated negative affect likely contribute to the initial use of alcohol and subsequent continued use as a reinforcing behavior that diminishes unwanted negative emotions or feelings of inadequate social functioning.

Groups of Social Anxiety

Despite the many studies looking at the relation between social anxiety and alcohol use, none have explored their co-occurrence through a person-centered analysis. Previously, heterogeneity in social anxiety has been identified but typically the groups have been distinguished by the type and number of social situations feared or avoided (i.e., generalized or nongeneralized subtypes, e.g., Furmark, Tillfors, Stattin, Ekselius, & Fredrikson, 2000). Researchers also have explored the idea of qualitatively different groups rooted in interpersonal dimensions (e.g., Hofmann, Heinrichs, & Moscovitch, 2004; Kashdan & McKnight, 2010). More specifically, several research groups have identified groups of individuals with social anxiety that differ on impulsivity, risk-prone

behavior, or novelty-seeking in both clinical (e.g., Kashdan & Hofmann, 2008) and nonclinical populations (e.g., Tillfors, Van Zalk, & Kerr, 2013) of varying ages (e.g., Nicholls, Staiger, Williams, Richardson, & Kambouropoulos, 2014). These groups did not differ in severity of social anxiety but rather in approach-motivations and impulsivity; one group was recognized as prototypically inhibited and avoidant, while a second group was identified as atypically disinhibited or impulsive (i.e., this latter group also presented as inhibited and avoidant). As a consequence, the conceptualization of social anxiety shifted to incorporate two distinct profiles based on interpersonal style.

In nonclinical populations the results are mixed as to whether there are differences in psychosocial functioning between the prototypically inhibited and atypically disinhibited or impulsive social anxiety groups. Some studies have reported that the atypically disinhibited or impulsive group, as compared to the prototypically inhibited group, had significantly fewer social resources, greater difficulties in managing emotions and hostile impulses in emerging adulthood (Kashdan, Elhai, & Breen, 2008, who assessed avoidance and approach – i.e., threat and novelty - as the social anxiety group membership indicator specifically), and significantly higher levels of minor delinquency and intoxication frequency (for males only) in adolescence (Tillfors, Van Zalk, et al., 2013, who assessed impulsivity as the social anxiety group membership indicator specifically). On the other hand, other researchers have found no significant difference between the two groups in levels of depression or life satisfaction in an emerging adulthood sample (Tillfors, Mörtberg, Van Zalk, & Kerr, 2013, who assessed impulsivity as the social anxiety group membership indicator specifically). Overall, there is limited evidence as to whether the atypically disinhibited or impulsive social anxiety group,

compared to the prototypically inhibited social anxiety group, is more likely to be vulnerable to psychosocial difficulties, particularly with respect to alcohol consumption (i.e., assessing alcohol use as the social anxiety group membership indicator specifically). However, this line of person-centered research may be useful in clarifying the relation between social anxiety and alcohol use over time.

Indeed, the research on social anxiety groups that are differentiated by their approach-motivation and impulsivity suggests that there likely is heterogeneity in individuals with social anxiety with respect to their alcohol use (e.g., Tillfors, Van Zalk, et al., 2013). It may be that some university students with social anxiety and an interpersonal approach orientation self-medicate with alcohol to cope with their symptoms in social situations rather than avoid social situations involving alcohol consumption (i.e., with the latter demonstrating the expected behavior of individuals with social anxiety). Consequently, there could be quantitative differences in alcohol use among students with social anxiety in the university context. Furthermore, these differences might be associated with differences in psychosocial functioning, given that a higher frequency of alcohol use is related to negative adjustment difficulties (e.g., missing class, falling behind in class, Ham & Hope, 2003).

The Present Study

The overall purpose of this study was to investigate the relation between social anxiety and alcohol use from a person-centered perspective rather than the variable-centered perspective routinely employed in this area of research. Building on past work (e.g., Ham & Hope, 2006; Tillfors, Van Zalk, et al., 2013), we first proposed that the social anxiety-alcohol use association might be clarified by assessing the heterogeneity of

social anxiety with respect to alcohol use, a risk taking behavior that is normative in the university environment. Specifically, we hypothesized that there would be two different groups with social anxiety, one group reporting significantly higher levels of alcohol use and another group reporting lower levels of alcohol use, over time.

A second purpose was to determine what characteristics assessed at Time 1 might differentiate these two proposed social anxiety groups from other nonsocial anxiety groups. First, as compared to the nonsocial anxiety groups, we hypothesized that both social anxiety groups would report higher scores on behavioral inhibition (e.g., Kagan, 2010), emotional reactivity (e.g., Henderson & Zimbardo, 2010), and fewer social ties (e.g., La Greca & Lopez, 1998), characteristics frequently linked with social anxiety. Given our definition of social anxiety (i.e., including avoidance), we also expected that individuals with social anxiety in the university setting would be more likely to avoid social situations such as joining university clubs or living in residence, contexts that are thought to involve focused socialization experiences. Moreover, the new university environment was projected to elicit higher levels of daily hassles (i.e., stress) in students with social anxiety, given that some social situations or social interactions are likely unavoidable.

Third, we proposed that the two social anxiety groups would be distinct from one another on several features. We hypothesized that a social anxiety group with higher drinking levels might exhibit higher levels of the approach-motivation system (i.e., higher levels of drive, responsiveness, and fun seeking) than the social anxiety group with lower drinking levels, based on previous research linking novelty seeking or impulsive behaviors with a social anxiety group that reported unexpectedly higher levels of risky

behavior (e.g., Kashdan et al., 2008; Tillfors, Van Zalk, et al., 2013). We also hypothesized that because alcohol use in university has previously been associated with negative consequences (e.g., Ham & Hope, 2003, 2005), a social anxiety group with higher drinking levels might have poorer academic achievement in comparison to a social anxiety group with lower drinking levels. We further hypothesized that a social anxiety group with higher levels of alcohol use might cope with their negative affect (e.g., emotions) by self-medicating with a variety of drugs commonly found in the university context, such as alcohol, cigarettes or marijuana (e.g., Webb, Ashton, Kelly, & Kamali, 1997). Finally, given that previous research has found links between social anxiety and deliberate self-harm (i.e., nonsuicidal self-injury, e.g., Chartrand, Sarren, Toews, & Bolton, 2011), we explored the possibility that students with social anxiety who drank more alcohol, as compared to students with social anxiety who drank less alcohol, also might cope with their negative emotions through self-injury.

Although sex differences are pertinent to an investigation of social anxiety-alcohol use based groups, the literature is unclear with respect to the possible direction of effects. For instance, males consume more alcohol than females (e.g., Ham & Hope, 2003) but both sexes experience adverse consequences from drinking (e.g., Norberg, Olivier, Alperstein, Zvolensky, & Norton, 2011). In addition, a higher prevalence of social anxiety has been found in females than males (e.g., La Greca & Lopez, 1998), but other results suggest there are no differences in prevalence between the sexes (e.g., Biggs, Vernberg, & Wu, 2012). Given the lack of clarity and mixed findings, we did not predict any sex effects in this exploratory person-centered research.

Finally, three covariates were included in the latent class growth analysis (LCGA). General anxiety was used to control for its known shared variance with social anxiety (e.g., McNeil, 2010) and depressive symptoms were included given their comorbidity with social anxiety (e.g., Cummings, Caporino, & Kendall, 2014). We also controlled for parent education as a proxy for socioeconomic status given its link to mean differences in social anxiety and alcohol use (e.g., Johansson, San Sebastian, Hammarström, & Gustafsson, 2015; Wilkinson, 1999).

Method

Participants

Participants were 1132 undergraduate students (70.5% female, 35% of the freshman class at Time 1) in a mid-sized university in southern Ontario, Canada who were surveyed annually for three consecutive years. At the first assessment, all participants were in their first year of university ($M_{age} = 19.06$, $SD = 0.93$). Data on socioeconomic status as indicated by the mean level of education for mothers and fathers fell between “some college, university, or apprenticeship program” and “completed a college/apprenticeship and/or technical diploma”. The sample was composed of mostly domestic-Canadian students (88.2%). Within this domestic-Canadian group, participants also indicated whether their family belonged to another culture or ethnic background – the most common ethnic groups identified were British (17%), Italian (15%), French (8%), and German (8%), consistent with the broader demographics for the university and the region (Statistics Canada, 2006). The remaining participants were international

students (11.8%) who were predominantly from Asia (4%), the European Union (2%), the Caribbean (1%), and Africa (1%).

Procedure

First-year students from a wide variety of academic disciplines (e.g., biology, business, kinesiology, psychology) were invited through posters, classroom announcements, website postings, and visits to on-campus student residences, to complete a survey on factors relating to stress, coping and adjustment to university. The participants were given course credit or monetary compensation for their participation at Time 1 (\$10), monetary compensation for Time 2 (\$20), and Time 3 (\$30). Only students who participated in the first assessment were invited to do so again in Times 2 and 3 by way of e-mails, posters, and classroom announcements. All three assessments were completed during the winter term (i.e., end of January to beginning of March) for three consecutive years. Trained research assistants administered the survey. Approval for the study was obtained from the university ethics board prior to survey administration at all three assessments and participants provided informed active consent prior to participation.

Missing Data

Missing data occurred within each assessment time point because some students did not finish the entire questionnaire (average missing data = 4.30%, 1.39% and 1.47% across the three time points, respectively) and because some students did not complete all three waves of the survey (i.e., students were no longer registered, could not be reached, or chose not to participate in all three waves). Of the original sample, 71.9% completed all three waves, 10.0% completed two waves, and 18.1% completed only one wave. A

MANOVA was run with “missingness across three waves” as the independent variable and all study measures of interest as the dependent variable. Results indicated that there was a significant effect of missingness on the study variables, $\Lambda = .821$, $F(44, 2216) = 5.236$, $p < .001$. Post hoc tests revealed that participants who completed only one or two waves were significantly more likely to be male and have lower marks and general anxiety than those who completed all three waves, and participants who completed only one wave were significantly more likely not to have participated in clubs than those who completed all three waves ($ps < .017$). All missing data were imputed using the expectation maximization method with all study measures included in the analysis, thus avoiding the biased parameter estimates that can occur with pairwise, listwise or mean substitution (Schafer & Graham, 2002). The overall pattern of results remained the same using either the original or imputed data set.

Measures

Demographics. Age, sex, parent education (one item per parent using a scale from 1 = *did not finish high school* to 6 = *professional degree*, which was averaged for participants reporting on both parents, $r = .40$), and living situation (*home, residence, off-campus*, and *off-campus with others*) were measured at Time 1.

General anxiety. General anxiety was measured using The Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990) to estimate trait anxiety and general anxiety disorders. We included a 7-item version of the original 16-item scale at Time 1 (e.g., “I do tend to worry about things” – we used the highest loaded items from a factor analysis when scales were reduced in size), which was measured on a 5-point Likert scale ranging from 1 = *not at all like me* to 5 = *completely like me*, such

that higher scores indicated higher levels of general anxiety. Cronbach's alpha at Time 1 was .80.

Depressive symptoms. Depressive symptoms were assessed using The Center for Epidemiologic Studies Depression Scale (CES-D Scale; Radloff, 1977). This 20-item scale (e.g., "I felt like doing nothing") is measured on a 5-point Likert scale ranging from 1 = *none of the time* to 5 = *most of the time*, such that higher scores indicated higher levels of depressive symptoms. Cronbach's alpha at Time 1 was .91.

Social anxiety symptoms. Social anxiety was measured with The Social Anxiety Scale for Adolescents (SAS-A; La Greca & Lopez, 1998) at all three time periods and this scale assesses adolescent social anxiety in an age range consistent with our late adolescent sample. The 14-item scale was composed of three subscales including fear of negative evaluation (e.g. 5 items, "I'm afraid that other people my age will not like me"), social avoidance and distress of new situations (4 items, "I feel shy with people my age that I don't know"), and social avoidance and distress generally (5 items, "It is hard for me to ask other people my age to hang out with me"). Responses were based on a 4-point Likert scale ranging from 1 = *almost never or never* to 4 = *almost always or always*. A composite measure was formed from all three subscales, consistent with previous research (e.g. La Greca & Lopez, 1998), such that higher scores indicated higher levels of social anxiety. Cronbach's alphas at Time 1, Time 2, and Time 3 were .89, .90, and .91.

Alcohol use. Alcohol use was measured at all three time periods and was formed from a mean composite of frequency of use scored on an 8-point scale ranging from 1 = *never* to 8 = *every day*, and average consumption per alcohol use event scored on a scale ranging from 1 = *less than 1 drink* to 6 = *over 10 drinks*. The 8-point frequency of use

item was recoded to a 6-point scale (recalculated based on ratio proportions) and subsequently combined with the average consumption item to form an average of the two measures, such that higher scores indicated higher levels of alcohol use over the past year. Correlations between frequency of use and average consumption per event were .70, .63, .57 at Time 1, Time 2, and Time 3, respectively.

Behavioral inhibition/Behavioral approach. Dispositional sensitivity to aversive and appetitive stimuli was measured at Time 1 with the Behavioral Inhibition and Behavioral Approach Scales, respectively (BIS/BAS Scales; Carver & White, 1994). The BIS scale is composed of one factor (7 items; e.g. “I worry about making mistakes”), while the BAS scale is composed of three subfactors including reward responsiveness (5 items, e.g. “When good things happen to me, it affects me strongly”), drive (4 items, e.g. “I go out of my way to get what I want”), and fun seeking (4 items; e.g., “I often act on the spur of the moment”). As recommended by Carver and White (2007), the three BAS subfactors were used to assess the different aspects of approach-motivation sensitivity. All four scales were measured on a 4-point Likert scale ranging from 1 = *strongly disagree* to 4 = *strongly agree*, such that higher scores indicated higher levels of BIS and BAS. The Cronbach’s alphas for the BIS, BAS-reward responsiveness, BAS-drive, and BAS-fun seeking scales at Time 1 were .73, .85, .85, and .83, respectively.

Emotional reactivity. Emotional reactivity was assessed with The Emotion Reactivity Scale (ERA; Nock, Wedig, Holmberg, & Hooley, 2008) at Time 1 to determine individual differences in emotional reactivity. Participants rated themselves on 13 items (e.g., “People often tell that my emotions are often too intense for the situation”) based on a 5-point Likert scale ranging from 1 = *not at all like me* to 5 = *completely like*

me, such that higher scores indicated higher levels of emotional reactivity. This scale measured the intensity and rapidity of emotional reactions in general including anger, but not other emotions specifically. The Cronbach's alpha at Time 1 was .84.

Daily hassles. This scale was designed as a measure of perceived stress relating to how bothered participants felt by hassles with peers, family, school and money (25 items; e.g., "Thinking about finding a summer job"; scale was developed for a research project on youth lifestyles choices with high school students – see Tavernier & Willoughby, 2012). Responses at Time 1 were given on a 3-point Likert scale ranging from 1 = *almost never bothers me* to 3 = *often bothers me*, such that higher scores indicated higher levels of perceived daily hassles. The Cronbach's alpha at Time 1 was .84.

Social ties. Items from the social subscale of the multifaceted Student Adaptation to College Questionnaire (SACQ, Baker & Siryk, 1989) were used to form a composite. The three items included, "I have several close social ties at university", "I am satisfied with how much I am participating in social activities at university", and "I am meeting people and making friends at university". Student responses were recorded on a 5-point Likert scale ranging from 1 = *not at all like me* to 5 = *completely like me*, such that higher scores indicated higher levels of social ties. Cronbach's alpha at Time 1 was .69.

Club activities. This measure was based on the question "Since the previous September, how often have you participated in non-religious school or community clubs that are NOT sports clubs?" Responses to this item were recorded on a 6-point Likert scale from 1 = *never* to 6 = *several times a week*, such that higher scores indicated increased participation in club activities.

Academic achievement. The average academic grade at year-end across all Time 1 courses were accessed from the university's Registrar's Office with permission granted from the participants.

Emotion coping behaviors. To assess the emotional/functional motivations (e.g., when feeling numb, anxious, good) for coping behaviors (e.g., drink alcohol, smoke tobacco, self-injure), we used 7 of the 20 items of commonly endorsed functional motivations for nonsuicidal self-injury (Nock & Prinstein, 2004). These emotional/functional motivations are categorized under four reinforcement processes for behavior, including intrapersonal positive reinforcement (i.e., Which of the following do you do to generate a positive emotion like feeling good or to punish self?), intrapersonal negative reinforcement (i.e., Which of the following do you do to reduce a negative emotion like feeling frustrated or angry, stressed or anxious, or feeling numb?), interpersonal positive reinforcement (i.e. Which of the following do you do to elicit a positive social stimulus when feeling ignored?), and interpersonal negative reinforcement (i.e., Which of the following do you do to remove a negative social stimulus by distracting yourself?). Participants at Time 1 indicated which coping behaviors [e.g., drink alcohol, smoke tobacco, smoke marijuana, and/or engage in self-injury (e.g., cutting, burning)] they engaged in for each of the seven emotional/functional motivations (e.g., "Which of the following do you do or have you done when you are numb and want to just feel something?"), using "yes" or "no" for each behavior (note that participants could indicate that all behaviors were applicable). Scores for drink alcohol, smoke tobacco, and smoke marijuana were combined into a composite called "self-medication".

Plan of Analysis

Descriptive statistics were calculated for all study variables (SPSS 22). These tests were followed by a parallel-process LCGA (Nagin, 2005) to identify group heterogeneity based on social anxiety and alcohol use as indicators of group membership. The person-centered analysis was carried out using MPlus (version 7.2, Muthén & Muthén, 1998-2014) with parent education, general anxiety and depressive symptoms as covariates. To determine the number of classes that best fit the data, we used six criteria including the theoretical interpretability of the classes, the Bayesian Information Criterion (BIC; such that successively smaller numbers with increasing number of classes indicate better fit of the data to the model), entropy (an index of separation in which values $> .80$ indicate well-identified classes), the Lo-Mendell-Rubin-Adjusted Likelihood Ratio Test and the Bootstrap Loglikelihood Ratio Test (LMR-LRT and BLRT, a significant p value indicates that the estimated model provides a better fit to the data than the comparison model with one fewer classes) and average latent class posterior probabilities (values $> .90$ indicate a high probability that participants are correctly classified; see Nylund, Asparouhiov, & Muthén, 2007). Next, two repeated measures ANOVA were run on the entire sample to determine if there were significant changes in the trajectories of social anxiety and alcohol use over time. This was followed by mixed design ANOVAs to determine whether there were group differences in social anxiety trajectories, as well as group differences in alcohol trajectories. Two MANOVAs were then conducted to determine group differences on the class indicators (social anxiety and alcohol use) and the psychosocial functioning variables, respectively, each followed by Hochberg post hoc tests (due to unequal n 's across groups). Finally, chi-square analyses were used to

established significant group differences in living situation (i.e., home, residence, off-campus or off-campus with others) and in emotion coping behaviors. Bonferroni corrections were applied to all group comparisons.

Results

Preliminary Analyses

Study variable means and standard deviations are listed in Table 3-1 and correlations are found in Table 3-2. All variables showed acceptable levels of skewness and kurtosis. To test for sex differences in all study variables, a MANOVA was conducted with sex as the independent variable. Results revealed a significant main effect for sex, $\Lambda = .713$, $F(21, 1110) = 21.289$, $p < .001$, $\eta^2 = .287$. Males reported significantly higher alcohol use than females across all three waves ($ps < .001$), and higher levels of parent education, BAS-drive, and age than females at Time 1 ($ps < .02$). In contrast, females reported higher levels of BIS, BAS-reward responsiveness, depressive symptoms, general anxiety, emotional reactivity, daily hassles, and academic achievement than males at Time 1 ($ps < .01$).

Primary Analyses

Group membership based on social anxiety and alcohol use (person-centered analysis). The classification precision indices for the LCGA are shown in Table 3-3 and indicate that the best fit to the data was the five-class model. The LMR-LRT first became nonsignificant with the six-class analysis, suggesting that the sixth class did not significantly improve the model. For the five-class analysis, the entropy remained $> .80$ and the average latent class posterior probabilities were all $> .90$ except for one at $.87$,

indicating that a high proportion of the participants were correctly classified and that these five classes were well-identified. The five classes each contained more than 5% of the participant sample and the BIC parameter substantially decreased between the two- and five-class solution, again supporting a better fit of the sample data to the five-class model. Significant class differences in social anxiety and alcohol use were established through a MANOVA, $\Lambda = .094$, $F(24, 3915.400) = 158.261$, $p < .001$, $\eta^2 = .446$. The five classes revealed two high social anxiety groups - one with moderately high alcohol use and the other with moderately low alcohol use (from this point on referred to as social anxiety-high alcohol use group and social anxiety-low alcohol use group, respectively), two low social anxiety groups, one with high alcohol use and the other with moderate alcohol use, and last, a moderately low social anxiety group with low alcohol use (from this point on referred to as high alcohol use group, moderate alcohol use group, and low alcohol use group, respectively, see Table 3-4 for significant group comparisons). In sum, we were able to significantly differentiate between the students who reported higher levels of social anxiety based on their alcohol use patterns. One social anxiety group reported higher levels of alcohol use and the other social anxiety group reported lower levels of alcohol use.

Overall sample trajectories for social anxiety and alcohol use. A repeated measures ANOVA with time (Time 1, 2, and 3) as the independent variable and social anxiety as the dependent variable indicated that social anxiety did not differ across the three time periods, $F(2, 2262) = 2.993$, $p = .053$, $\eta^2 = .003$. In contrast, a repeated measures ANOVA with time as the independent variable and alcohol use as the dependent variable revealed that alcohol use differed over time, $F(2, 2262) = 38.619$, $p <$

.001, $\eta^2 = .033$. Post-hoc analyses indicated that mean levels of alcohol use did not differ between Time 1 and Time 2 ($p > .05$), but were significantly higher in both Time 1 and 2 than in Time 3 ($ps < .05$), consistent with other research indicating that university students tend to have the highest levels of alcohol consumption in the first few years of university (Costanzo, Malone, Belsky, Kertesz, Pletcher, & Sloan, 2007). Thus, it appeared that levels of alcohol use, not levels of social anxiety, changed over time for the university student sample.

Group trajectories for social anxiety and alcohol use. To assess group differences in social anxiety over time, a repeated measures ANOVA was conducted that included both time (Time 1, 2, and 3) and group (5 groups) as independent variables and social anxiety as the dependent variable (see Figure 3-1). Results indicated only a significant main effect for group (see Table 3-4). To assess group differences in alcohol use over time, a repeated measures ANOVA was conducted that included both time (Time 1, 2, and 3) and group (5 groups) as independent variables and alcohol as the dependent variable. Results showed a significant main effect for time and group, which were qualified by a significant interaction between time and group, $F(8, 2254) = 13.339$ $p < .001$, $\eta^2 = .045$. Post-hoc analyses revealed that the social anxiety-high alcohol use group and high alcohol use group had higher alcohol use scores in Time 1 than Time 2, and in Time 2 than Time 3, and the social anxiety-low alcohol use group and the low alcohol use group had higher alcohol use scores in Time 2 than Time 1, while the moderate alcohol use group had higher scores in Time 2 than in Time 3 (all $ps < .005$), consistent with research indicating there are different drinking trajectories in early

adulthood (e.g., Costanzo et al., 2007). To summarize, only levels of alcohol use changed over time for all five groups.

Group similarities and differences in psychosocial functioning at Time 1. A MANOVA was conducted on the continuous psychosocial functioning variables to test for similarities and differences across groups, with group as the independent variable and the psychosocial functioning measures as the dependent variables. Results revealed that there was a significant effect of group on psychosocial functioning at the multivariate level, $\Lambda = .67$, $F(68, 4362.197) = 6.725$, $p < .001$, partial $\eta^2 = .093$.

On the one hand, both social anxiety groups descriptively reported the highest scores of general anxiety, depressive symptoms, behavioral inhibition, emotional reactivity, and daily hassles, and the lowest levels of social ties in comparison to the other three groups (see Table 3-4). Although the two social anxiety groups did not significantly differ from each other on any of these variables ($ps > .05$), the social anxiety-high alcohol use group did have significantly higher scores on depressive symptoms, emotional reactivity, and daily hassles than the three nonsocial anxiety groups, and the social anxiety-low alcohol use group had significantly higher scores on general anxiety than the high alcohol use group and significantly higher scores on behavioral inhibition than all three nonsocial anxiety groups ($p < .005$). Thus, as hypothesized, the two social anxiety groups were not significantly different from one another on levels of behavioral inhibition, daily hassles, emotional reactivity, and social ties, but were significantly different from the other three groups in varying patterns.

On the other hand, significant differences were found between the two social anxiety groups ($ps < .005$, see Figure 3-2). First, the social anxiety-high alcohol use

group as compared to the social anxiety-low alcohol use group reported significantly higher levels of BAS-fun seeking. Second, the social anxiety-low alcohol use group as compared to the social anxiety-high alcohol use group was more likely to report being female, and to have significantly higher levels of academic achievement and participation in club activities.

The two social anxiety groups also were different from one another with respect to their living situation. A chi-square test of independence indicated group membership was significantly related to living situation (overall $\chi^2(8) = 62.53, p < .001$). Specifically, we found that both the social anxiety-low alcohol use group and the low alcohol use group were significantly more likely to report living at home than the social anxiety-high alcohol use group, the high alcohol use group and the moderate alcohol use group (significance at z scores $> 2.8, ps < .01$). In addition, the high alcohol use group was less likely to report living at home than the other four groups (z score $> 2.8, p < .01$). Thus, it appeared that at Time 1 the social anxiety-high alcohol use group as compared to the social anxiety-low alcohol use group was less likely to live at home.

Finally, significant differences were seen between the social anxiety-high alcohol use group and social anxiety-low alcohol use group with respect to the endorsement of problematic emotion coping behaviors. Chi-square tests of independence examining the relation between group membership and emotion coping behaviors (i.e., group by each emotion coping behavior - e.g., group by distract with self-medication, group by distract with self-injury, group by numb with self-medication, group by numb with self-injury, etc., 14 chi-square analyses in total) indicated that only the social anxiety-high alcohol use group and high alcohol use group were significantly associated with emotion coping

behaviors (note we tested “self-medication” without alcohol use in the composite to eliminate alcohol use as a confound – we found the same significant relation between group and emotion coping behaviors). More specifically, both of these groups were significantly more likely than the social anxiety-low alcohol use group, the moderate alcohol use group and the low alcohol use group to endorse self-medication when wanting to feel good, feeling angry/frustrated, stressed, ignored and wanting to distract themselves (for the five analyses χ^2 $ps < .001$; significance at adjusted zscores ≥ 2.8 , $ps \leq .01$, see Table 3-5). Furthermore, only the social anxiety-high alcohol use group was significantly more likely than the other four groups to endorse self-medication when wanting to punish themselves and when feeling numb (for the two analyses χ^2 $ps < .001$), as well as to report self-injury when feeling stressed, numb, ignored and when wanting to punish themselves (for the four analyses χ^2 $ps < .033$). Thus, the social anxiety-high alcohol use group was significantly more likely than the social anxiety-low alcohol use group to report self-medication and self-injury as emotion coping behaviors.

Overall, several psychosocial functioning variables differentiated between the two social anxiety groups. Specifically, the social anxiety-high alcohol use group reported higher levels of BAS-fun seeking behavior (but not higher levels of the other two BAS subscales), lower academic achievement, and lower levels of club activities as compared to the social anxiety-low alcohol use group. In addition, the social anxiety-high alcohol use group was significantly more likely than the social anxiety-low alcohol use group to endorse self-medication and/or self-injury as a possible response to different affective states (see Table 3-5).

Discussion

In the past, researchers have examined the association between social anxiety and alcohol use through variable-centered analyses and found conflicting results. A meta-analysis of the data from university students concluded that social anxiety was positively associated with alcohol-related problems but negatively associated with quantity and frequency of alcohol use (Schry & White, 2013). To investigate this confusing finding, we undertook a person-centered analysis to determine if there might be heterogeneity in our socially anxious student sample over time; that is, perhaps not all individuals with social anxiety drink problematically. Indeed, we found five groups of students based on their combined levels of social anxiety and alcohol use, two of which were higher in social anxiety than their peers but not significantly different from each other, and three groups that were lower in social anxiety. One of the social anxiety groups was linked to moderately low levels of alcohol use and the other to moderately high levels of alcohol use. Social anxiety scores for both social anxiety groups did not differ over time. Furthermore, we were able to show that both of these groups were associated with the expected features of social anxiety but dissimilar in other psychosocial functioning behaviors.

Out of the five groups identified (i.e., social anxiety-high alcohol use group, social anxiety-low alcohol use group, high alcohol use group, moderate alcohol use group, low alcohol use group), the two social anxiety groups did not significantly differ from each other on general anxiety, depressive symptoms, behavioral inhibition, emotional reactivity, daily hassles, as well as social ties at Time 1, but had higher scores than the three nonsocial anxiety groups except with respect to social ties, which were

lower (although there was some variation between the social anxiety groups in whether the scores were significantly higher – or lower in the case of social ties - than the three nonsocial anxiety groups, see Table 3-4). Thus, the profiles for the two social anxiety groups were consistent with the expected characteristics associated with social anxiety (i.e. higher levels of inhibited behavior, emotional reactivity and social difficulties; Henderson & Zimbardo, 2010; Kagan, 2010; La Greca & Lopez, 1998).

In the context of university where social drinking is normative (i.e., in bars, parties or in dormitory rooms), it appears that our two social anxiety groups behaved differently from one another with respect to their use of alcohol. First, the findings supported our hypothesis that some students with social anxiety consumed considerable quantities of alcohol despite an assumed underlying social reticence or fundamental desire to avoid social events, drinking in amounts close to those of our high alcohol use group. Second, the drinking behavior of the social anxiety-low alcohol use group was more consistent with the typical safety behaviors of social avoidance. We speculate that perhaps the social anxiety-low alcohol use group likely minimized their exposure to the anxiety-provoking social discourse expected within the context of university social drinking, while in contrast the social anxiety-high alcohol use group perhaps engaged in social drinking situations but minimized their social distress through the anxiolytic effects of alcohol. To some degree, these scenarios parallel the results of the variable-centered analyses in the literature. Our finding of a prototypically inhibited and avoidant social anxiety-low alcohol use group is consistent with the evidence for a negative relation between social anxiety and alcohol use, while the result of a social anxiety-high alcohol use group is more in line with research indicating there is a positive relation between

social anxiety and alcohol-related problems (see Schry & White, 2013). More importantly, our research suggests that not all students with social anxiety are at risk for the negative adjustment related to drinking (e.g., self-injury), but rather a subset whose drinking consumption appears to be elevated.

The two social anxiety groups also reported dissimilar psychosocial functioning at Time 1. In particular, the social anxiety-high alcohol use group on average had significantly lower grades, higher levels of BAS-fun seeking behavior, took part in fewer club activities, and were more likely to report being male than the social anxiety-low alcohol use group (previous research has indicated that males tend to drink more frequently and heavily than females in university, e.g., Ham & Hope, 2003). In addition, the social anxiety-high alcohol use group was significantly more likely than the social anxiety-low alcohol use group to endorse problematic emotion coping behaviors (i.e., self-medication or self-injury). Generally, the social anxiety-high alcohol use group reported greater maladjustment at Time 1 than the social anxiety-low alcohol use group and it appeared that social anxiety alone was not associated with these problematic behaviors but rather the combination of social anxiety and considerably higher levels of alcohol use.

The BAS profile of our social anxiety-high alcohol use group was unexpected. In terms of BAS-reward responsiveness, BAS-drive, and BAS-fun seeking, the scores were not high and the latter two subfactors were significantly lower than those for the high alcohol use group (note none of the five groups significantly differed on BAS-reward responsiveness – see Table 3-4). We had expected the BAS scores to be similar between our social anxiety-high alcohol use group and high alcohol use group because drinking

behavior is associated with higher levels of the BAS (e.g., Murphy, Murphy, & Garavan, 2014). Thus, our findings were not consistent with the previously reported link between a higher BAS and problematic drinking behavior (e.g., Wardell, O'Connor, Read, Colder, 2011) and with other evidence suggesting that a higher BAS may interact with a higher BIS (note both our social anxiety groups had the highest behavioral inhibition scores – see Table 3-4) to alleviate anxiety and lower alcohol avoidance (i.e. shift attention towards the rewarding anxiolytic properties of alcohol; Wardell et al., 2011). We inferred from these results that the higher levels of drinking behavior reported by our social anxiety-high alcohol use group was not necessarily linked to higher levels of approach behavior.

Nonetheless, in previous research, subtypes of social anxiety have been identified as anxious-inhibited and anxious-impulsive based on their differing levels of impulsivity (Tillfors, Mörtberg, et al., 2013), a personality trait associated with the BAS (Corr, 2004). Indeed, our BAS-fun seeking subfactor contained a component of impulsivity (see Carver & White, 2007) and earlier research has reported that socially anxious-impulsive boys have significantly higher levels of problem behavior (e.g., intoxication frequency) than their socially anxious-inhibited comparison group (Tillfors, Van Zalk, et al., 2013). Indeed, we were interested to note that our social anxiety-high alcohol use group had significantly higher levels of BAS-fun seeking as compared to the social anxiety-low alcohol use group (but significantly lower than the high alcohol use group), the only BAS subfactor that has previously been linked to frequency of alcohol use (O'Connor, Stewart, & Watt, 2009). However, caution should be used in interpreting our BAS-fun seeking measure as impulsivity because it cannot be equated with the more comprehensive

measure of impulsivity used by Tillfors, Van Zalk, et al. (2013). Thus, although our social anxiety-high alcohol use group reported moderate BAS scores, their significantly higher levels of BAS-fun seeking, as compared to the social anxiety-low alcohol use group, might have been a necessary but not sufficient condition to account for their higher levels of drinking and other maladaptive behaviors (i.e., self-medication or self-injury).

Emotion coping behaviors also were instructive in differentiating between our two social anxiety groups; that is, the social anxiety-high alcohol use group was significantly more likely than the social anxiety-low alcohol use group to report using alcohol, tobacco or marijuana to cope with positive and negative emotional states. Findings from past studies have suggested that individuals with social anxiety self-medicate with alcohol to cope with their symptoms (e.g., Strahan, Panayiotou, Clements, & Scott, 2011), and this is consistent with both theory and supporting evidence that suggest some individuals may be motivated to regulate their positive and negative emotions with alcohol (e.g., Cooper, Frone, Russell, Mudar, 1995; Sher & Grekin, 2007). Thus, it was not surprising to find that both our high alcohol use groups, social anxiety-high alcohol use group and high alcohol use group, reported self-medication with alcohol, tobacco, or marijuana as a means of regulating positive and/or negative intrapersonal and interpersonal emotions. However, while both groups self-medicated to alleviate what might be considered more commonly endorsed affective states in daily life at university, such as being stressed and wanting to feel good, only the social anxiety-high alcohol use group appeared to have self-medicated when they felt numb or needed to punish themselves, emotional states that might be deemed more serious and problematic.

Another striking finding was that the negative emotions of feeling numb, needing to punish yourself, and feeling ignored were significantly more likely to elicit a response of self-injury from the social anxiety-high alcohol use group than the social anxiety-low alcohol use group, perhaps signaling a more dysfunctional emotion coping behavior in the former group. In the framework of the Four-Function Model (i.e., proposed reasons for self-injury, Nock & Prinstein, 2004), social anxiety may have triggered self-injurious behavior as a means of regulating negative affect (e.g., to escape an aversive emotion as a result of socially anxious thoughts), and in other instances, as a means of escaping an undesirable social situation (e.g., to distract yourself from socially anxious thoughts when feeling overwhelmed in social situations). While there are many reasons why individuals self-harm (Lloyd-Richardson, Nock, & Prinstein, 2009), perhaps in this instance it is related to the difficulties in coping with the strong negative thoughts and feelings associated with social anxiety, especially at a time when students are tested by several competing developmental tasks such as moving away from their familiar childhood environment, creating new social networks, and achieving academically in the more open and flexible context of university. All of these processes are particularly challenging for the person who is socially anxious (i.e., given the defining features of fear of negative evaluation, distress and/or avoidance of new or all social situations) but our results indicate that there is a group of individuals with social anxiety that may be particularly vulnerable, those associated with the social anxiety-high alcohol use group.

Finally, we were interested to discover a group of students with social anxiety that were doing unexpectedly well in university at Time 1. Previous research has indicated that social anxiety directly predicts poorer academic grades over time, as well as

indirectly through fewer social ties (Brook & Willoughby, 2015). In our results, a greater proportion of our social anxiety-low alcohol use group reported living at home rather than off-campus or in residence, which might have reflected less opportunity to interact with new peers in school and form new social ties. However, living at home might have indicated that the social anxiety-low alcohol use group had a good relationship with their parents and that they were largely well adjusted despite having higher levels of social anxiety. Indeed, the social anxiety-low alcohol use group was achieving well academically at Time 1. In addition, despite significantly higher levels of behavioral inhibition, they appeared to be coping with the challenging social circumstances of university in an adaptive manner (e.g., significantly lower levels of substance use, no endorsement of self-medication or self-injury in response to circumstances involving negative affect). Furthermore, we also found that our social anxiety-low alcohol use group was significantly more likely to participate in club activities at Time 1 than the social anxiety-high alcohol use group. We speculated that perhaps the social anxiety-low alcohol use group was more inclined to join clubs because the social role was well defined. It may be that if individuals with social anxiety have a prescribed task or goal, as they could within a club, they might be more willing to interact socially and even build on this strength. In contrast, social interactions involving drinking are perhaps contexts in which social interactions are largely unscripted and this ambiguity might promote safety behaviors in individuals with social anxiety. Indeed, this safety behavior could either involve avoidance of social drinking events or drinking to alleviate social anxiety (i.e., self-medication), behavior that is broadly consistent with our two social anxiety groups.

Overall, the findings of this longitudinal research further contribute to our understanding of the relation between social anxiety and alcohol use in university students. Aside from the longitudinal nature of our class analysis, a strength of this work was that we controlled for depressive symptoms and general anxiety in the LCGA so that group membership was based on social anxiety and alcohol use, not on other internalizing processes known to be highly comorbid with social anxiety. Nonetheless, there were several shortcomings associated with this work that are worth noting. First, future work would benefit from assessing psychosocial functioning over time to determine how changes in these factors are predictive of group membership. Having a fully longitudinal data set would benefit our interpretation of the relationships and direction of effects between social anxiety subgroups and psychosocial functioning.

Second, our information was gathered through self-report with the associated bias of only one informant's perspective. Alternative informants, such as parents or peers, to corroborate these reports would diminish the bias, although whether other informants would be equally aware of the individual's internal state is not clear. Third, although a few of our Cronbach's alpha values were on the lower end of optimal (i.e., social ties), values of approximately .70 and higher are considered to be within recommended reliability levels (Peterson, 1994). Fourth, our sample was composed of 70.5% female participants and the ratio imbalance of males to females might have introduced a sex bias into our results. However, 58% of the students in the incoming year were female, suggesting that our sample was not unduly weighted toward female participants. To add to this potential confound, males were more likely to drop out of the longitudinal study than females, although our missing data procedure (i.e., expectation maximization) took

gender into account during imputation. However, sex differences are likely important to the understanding of the relations among social anxiety, alcohol use and psychosocial functioning (e.g., Norberg et al, 2011) and, thus, biological sex will be an important variable to investigate as a potential moderator in future person-centered longitudinal research.

Last, our findings may not be generalizable to other populations. For instance, two forms of shyness have been identified based on culture, one identified as regulated shyness that is positively related to better psychosocial outcomes in South Korea and another known as anxious shyness that is associated with poorer outcomes in North America (Xu, Farver, & Shin, 2014). Our results could unfold differently in Eastern cultures where the symptoms of social anxiety might not be negatively perceived.

Conclusion

Research findings have been mixed regarding the relation between social anxiety and alcohol use in university students. Our use of a person-centered analysis to investigate this complex relation contributed to a more comprehensive understanding of the association. Indeed, the findings indicate that there is heterogeneity with regard to the relation between social anxiety and alcohol use and that the mechanisms to cope with the symptoms of social anxiety likely are more diverse than previously anticipated. It suggests that welcome programs and mental health services designed to help first-year students adjust to the academic and social aspects of university life should consider a more nuanced approach to helping those who are socially anxious. For the student with social anxiety who has seemingly more adaptive behaviors, guidance might take the form

of developing coping strategies other than avoidance behaviors for reducing the stress associated with managing social anxiety. On the other hand, the social anxiety-high alcohol use group that reported maladaptive behaviors and a dysfunctional emotional coping style might benefit from strategies that also target reducing harmful behaviors, such as self-medication and self-injury. Overall, this study adds to the growing literature on the role of social anxiety in university by showing that individuals with social anxiety display heterogeneity in their drinking patterns, psychosocial functioning and emotion coping behaviors.

Table 3-1

Means and Standard Deviations of Study Variables (N = 1132)

Measures	Time 1	Time 2	Time 3	Range	α
Age	19.11 (0.95)	NA	NA	17-25	-
Sex	70.5% female	NA	NA	1=male	-
Parent Education	3.84 (1.39)	NA	NA	1-6	-
General Anxiety	3.12 (0.84)	NA	NA	1-5	.80
Depressive Symptoms	2.11 (0.64)	NA	NA	1-5	.91
Latent Class Indicators					
Social Anxiety	1.75 (0.52)	1.72 (0.47)	1.72 (0.49)	1-4	.89-91
Alcohol Use	3.36 (1.22)	3.34 (1.03)	3.20 (0.98)	1-6	-
Psychosocial Variables					
BIS	2.74 (0.46)	NA	NA	1-4	.73
BAS-reward responsiveness	3.31 (0.54)	NA	NA	1-4	.85
BAS-drive	2.70 (0.61)	NA	NA	1-4	.85
BAS-fun seeking	2.93 (0.58)	NA	NA	1-4	.83
Emotional Reactivity	2.22 (0.84)	NA	NA	1-5	.84
Daily Hassles	1.93 (0.32)	NA	NA	1-3	.84
Social Ties	3.21 (0.90)	NA	NA	1-5	.69
Club Activities	1.82 (1.37)	NA	NA	-	-
Academic Achievement	67.21 (10.97)	NA	NA	-	-

Note. NA = nonapplicable, higher scores equal higher levels of the construct.

Table 3-2

Correlations of Study Variables

	1	2	3	4	5	6	7	8	9	10
1. Age T1	-	-.072*	-.059*	-.034	.011	-.013	.010	.013	.058*	-.030
2. Sex		-	-.154**	.339**	.195**	.031	-.008	-.026	-.231**	-.259**
3. Par Edu T1			-	-.072*	-.086**	.061*	.029	.053	-.012	-.042
4. Gen Anx T1				-	.463**	.353**	.294**	.265**	-.205**	-.210**
5. Depress T1					-	.378**	.308**	.242**	.032	-.036
6. Soc Anx T1						-	.722**	.623**	-.146**	-.152**
7. Soc Anx T2							-	.708**	-.132**	-.138**
8. Soc Anx T3								-	-.130**	-.127**
9. Alcohol Use T1									-	.803**
10. Alcohol Use T2										-

Note. Par Edu = parent education, Gen Anx = general anxiety, Depress = depressive symptoms, Soc Anx = social anxiety, T1 = time 1, T2 = time 2. * $p < .05$. ** $p < .01$.

Table 3-2

Correlations of Study Variables (continued)

	11	12	13	14	15	16	17	18	19	20
1. Age T1	-.057	-.052	.029	.035	.063*	.009	-.084**	-.116**	-.051	-.071*
2. Sex	-.234**	.301**	.121**	-.071*	.002	.240**	.343**	-.052	.126**	.076*
3. Par Edu T1	.011	-.018	.024	.048	.021	-.043	-.074*	.075*	.006	.073*
4. Gen Anx T1	-.201**	.627**	.047	-.157**	-.184**	.529**	.528**	-.160**	.055	.153**
5. Depress T1	-.033	.404**	-.115**	-.103**	-.014	.597**	.547**	-.214**	-.035	-.137**
6. Soc Anx T1	-.196**	.420**	-.030	-.196**	-.162**	.384**	.362**	-.228**	-.040	.102**
7. Soc Anx T2	-.187**	.364**	-.078**	-.214**	-.183**	.310**	.246**	-.245**	-.009	.120**
8. Soc Anx T3	-.157**	.311**	-.042	-.184**	-.216**	.291**	.268**	-.219**	.000	.092**
9. Alcohol Use T1	.788**	-.199**	-.084**	.153**	.286**	-.072*	-.053	.194**	-.168**	-.307**
10. Alcohol Use T2	.853**	-.190**	-.089**	.121**	.217**	-.073*	-.079**	.123**	-.144**	-.240**
11. Alcohol Use T3	-	-.181**	-.069*	.134**	.215**	-.087**	-.057	.143**	-.156**	-.232**
12. BIS T1		-	.176**	-.126**	-.138**	.518**	.467**	-.132**	.092**	.217**
13. BAS-reward T1			-	.372**	.298**	.026	.028	.102**	.104**	.111**
14. BAS-drive T1				-	.426**	-.026	-.063*	.209**	.022	-.068*
15. BAS-fun seeking T1					-	-.020	-.021	.205**	-.010	-.159**
16. Emo Rea T1						-	.492**	-.133**	.021	-.016
17. Hassles T1							-	-.195**	.039	-.029
18. Soc Ties T1								-	.062*	-.075*
19. Clubs T1									-	.075*
20. Aca Ach T1										-

Note. Par Edu = parent education, Gen Anx = general anxiety, Depress = depressive symptoms, Soc Anx = social anxiety, BIS = behavioral inhibition system, BAS = behavioral approach system, Emo Rea = emotional reactivity, Hassles = daily hassles, Clubs = club activities, Aca Ach = academic achievement, T1 = time 1, T2 = time 2, T3 = time 3. * $p < .05$. ** $p < .01$.

Table 3-3

Fit Indices and Classification Precision Indices for Parallel Process Latent Class Growth Analysis (LCGA) using Social Anxiety and Alcohol Use as Indicators

Latent Classes	2	3	4	5	6
BIC	12792.832	12111.418	11559.839	11268.493	11099.857
Entropy	0.899	0.836	0.833	0.853	0.827
Class > 5%	yes	yes	yes	yes	yes
LMR-LRT	sig	sig	sig	sig	ns
BLRT	sig	sig	sig	sig	sig

Note. BIC = Bayesian Information Criterion (smaller values indicate better fit), Entropy = index of separation (higher values indicate well-identified classes), Class > 5% = expected ratio of sample in all classes (each class contains more than 5% of the total sample), LMR-LRT = Lo-Mendal-Rubin Adjusted Likelihood Ratio Test, BLRT = bootstrap likelihood ratio test (significant LRT test indicates that the fit of the data to the model of interest is better than to the model with one less class, i.e., six class model compared to a five class model), sig = significance, ns = non-significant at $p < .05$.

Table 3-4

Group Similarities and Differences in Means and Standard Deviations for Covariates, Latent Class Indicators, and Psychosocial Functioning Indices

Measures	Social Anxiety High Alcohol Use (<i>M, SD</i>) <i>n</i> = 155	Social Anxiety Low Alcohol Use (<i>M, SD</i>) <i>n</i> = 115	High Alcohol Use (<i>M, SD</i>) <i>n</i> = 350	Moderate Alcohol Use (<i>M, SD</i>) <i>n</i> = 415	Low Alcohol Use (<i>M, SD</i>) <i>n</i> = 97
Age T1	19.07 (0.86) _a	19.18 (0.98) _a	19.11 (0.89) _a	19.07 (0.95) _a	19.19 (1.23) _a
Sex T1	58.10% female	77.40% female	55.40% female	86.00% female	70.10% female
Parent Education T1	3.69 (1.34) _a	3.74 (1.39) _a	4.01 (1.31) _a	3.74 (1.41) _a	3.86 (1.55) _a
General Anxiety T1	3.22 (0.77) _{ab}	3.25 (0.84) _a	2.99 (0.85) _b	3.16 (0.82) _{ab}	3.10 (0.92) _{ab}
Depressive Symptoms	2.30 (0.66) _a	2.18 (0.61) _{ab}	2.05 (0.60) _b	2.08 (0.66) _b	2.04 (0.67) _b
Class Characteristics					
Social Anxiety T1	2.33 (0.48) _a	2.28 (0.44) _a	1.53 (0.37) _c	1.56 (0.37) _c	1.73 (0.50) _b
Social Anxiety T2	2.31 (0.38) _a	2.30 (0.43) _a	1.54 (0.32) _c	1.53 (0.31) _c	1.71 (0.42) _b
Social Anxiety T3	2.29 (0.45) _a	2.25 (0.48) _a	1.53 (0.36) _c	1.56 (0.34) _{bc}	1.67 (0.44) _b
Alcohol Use T1	3.90 (0.74) _b	2.07 (0.84) _d	4.37 (0.60) _a	3.09 (0.66) _c	1.11 (0.49) _e
Alcohol Use T2	3.81 (0.54) _b	2.43 (0.65) _d	4.29 (0.52) _a	3.20 (0.50) _c	1.31 (0.57) _e
Alcohol Use T3	3.51 (0.61) _b	2.31 (0.63) _d	4.14 (0.51) _a	3.06 (0.48) _c	1.33 (0.61) _e
Psychosocial Functioning Indices					
BIS T1	2.87 (0.46) _{ab}	2.94 (0.39) _a	2.63 (0.47) _c	2.74 (0.44) _{bc}	2.71 (0.45) _c
BAS-Reward T1	3.23 (0.59) _a	3.32 (0.45) _a	3.26 (0.56) _a	3.36 (0.50) _a	3.31 (0.55) _a
BAS-Drive T1	2.60 (0.64) _{bc}	2.44 (0.57) _c	2.83 (0.59) _a	2.71 (0.59) _{ab}	2.60 (0.64) _{bc}
BAS-Fun Seeking T1	2.84 (0.62) _{bc}	2.63 (0.53) _d	3.07 (0.54) _a	2.92 (0.50) _{ab}	2.71 (0.61) _{cd}
Emotional Reactivity T1	2.48 (0.92) _a	2.37 (0.81) _{ab}	2.10 (0.81) _c	2.18 (0.83) _{bc}	2.09 (0.75) _c
Daily Hassles T1	2.04 (0.33) _a	1.97 (0.31) _{ab}	1.88 (0.33) _c	1.93 (0.30) _{bc}	1.84 (0.29) _c
Social Ties T1	3.02 (0.91) _{bc}	2.80 (0.92) _c	3.45 (0.87) _a	3.22 (0.85) _{ab}	3.17 (1.00) _b
Club Activities T1	1.64 (1.16) _b	2.19 (1.45) _a	1.63 (1.17) _b	2.00 (1.48) _{ab}	1.98 (1.43) _{ab}
Academic Grades T1	66.79 (9.57) _{cd}	71.48 (8.43) _{ab}	63.99 (12.15) _d	68.18 (10.12) _{bc}	71.86 (10.58) _a

Note. T1 = Time 1, T2 = Time 2, T3 = Time 3, BAS- Reward = BAS-Reward Responsiveness, higher mean scores indicate higher levels of the construct, mean scores in the same row with different subscripts are significantly different at $p < .005$.

Table 3-5

Significant Relations between Group and Emotion Coping Behavior (Response to Emotional or Functional Motivations) at Time 1

Emotion Coping Behaviors	Social Anxiety High Alcohol Use	Social Anxiety Low Alcohol Use	High Alcohol Use	Moderate Alcohol Use	Low Alcohol Use
INTRAPERSONAL					
Positive Reinforcement					
<i>Feel Good</i>					
Self-medicate	✓	-	✓	-	-
Self-injure	-	-	-	-	-
<i>Punish</i>					
Self-medicate	✓	-	-	-	-
Self-injure	✓	-	-	-	-
Negative Reinforcement					
<i>Angry/frustrated</i>					
Self-medicate	✓	-	✓	-	-
Self-injure	-	-	-	-	-
<i>Stressed</i>					
Self-medicate	✓	-	✓	-	-
Self-injure	✓	-	-	-	-
<i>Numb*</i>					
Self-medicate	✓	-	-	-	-
Self-injure	✓	-	-	-	-
INTERPERSONAL					
Positive Reinforcement					
<i>Ignored</i>					
Self-medicate	✓	-	✓	-	-
Self-injure	✓	-	-	-	-
Negative Reinforcement					
<i>Distract</i>					
Self-medicate	✓	-	✓	-	-
Self-injure	-	-	-	-	-

Note. Self-medicate = composite of drink alcohol, smoke alcohol, and smoke marijuana, self-injure = by cutting, burning self, etc., ✓ = a significantly greater proportion of the behavior is reported by the group than expected (Bonferroni corrected for multiple group comparisons, adjusted zscores ≥ 2.8 , $ps < .01$), * numb also factors out under positive reinforcement when the reason for the behavior is “wanting to feel something” instead of “relieving feeling numb”.

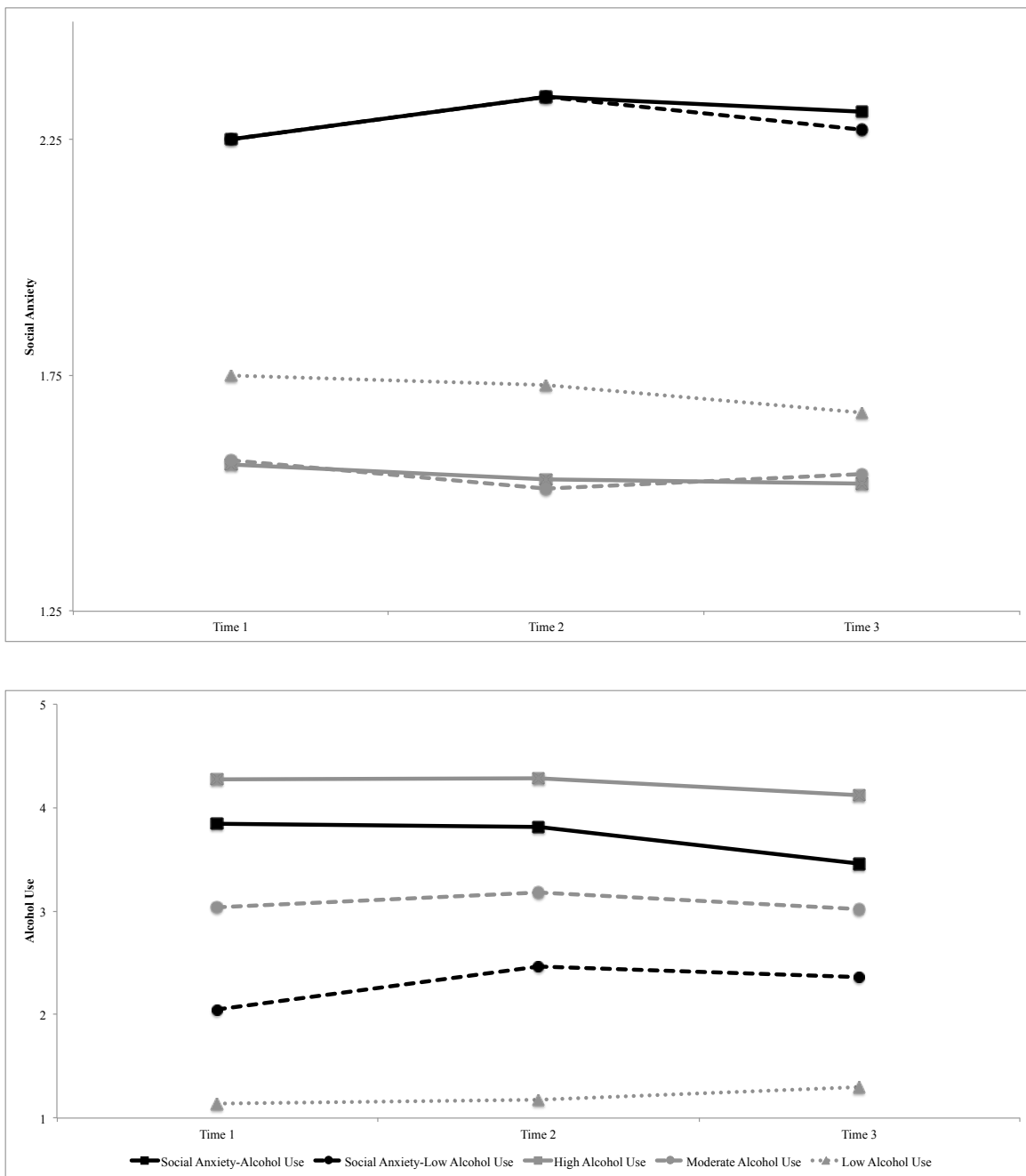


Figure 3-1. Mean values for group trajectories of social anxiety and alcohol use over three waves.

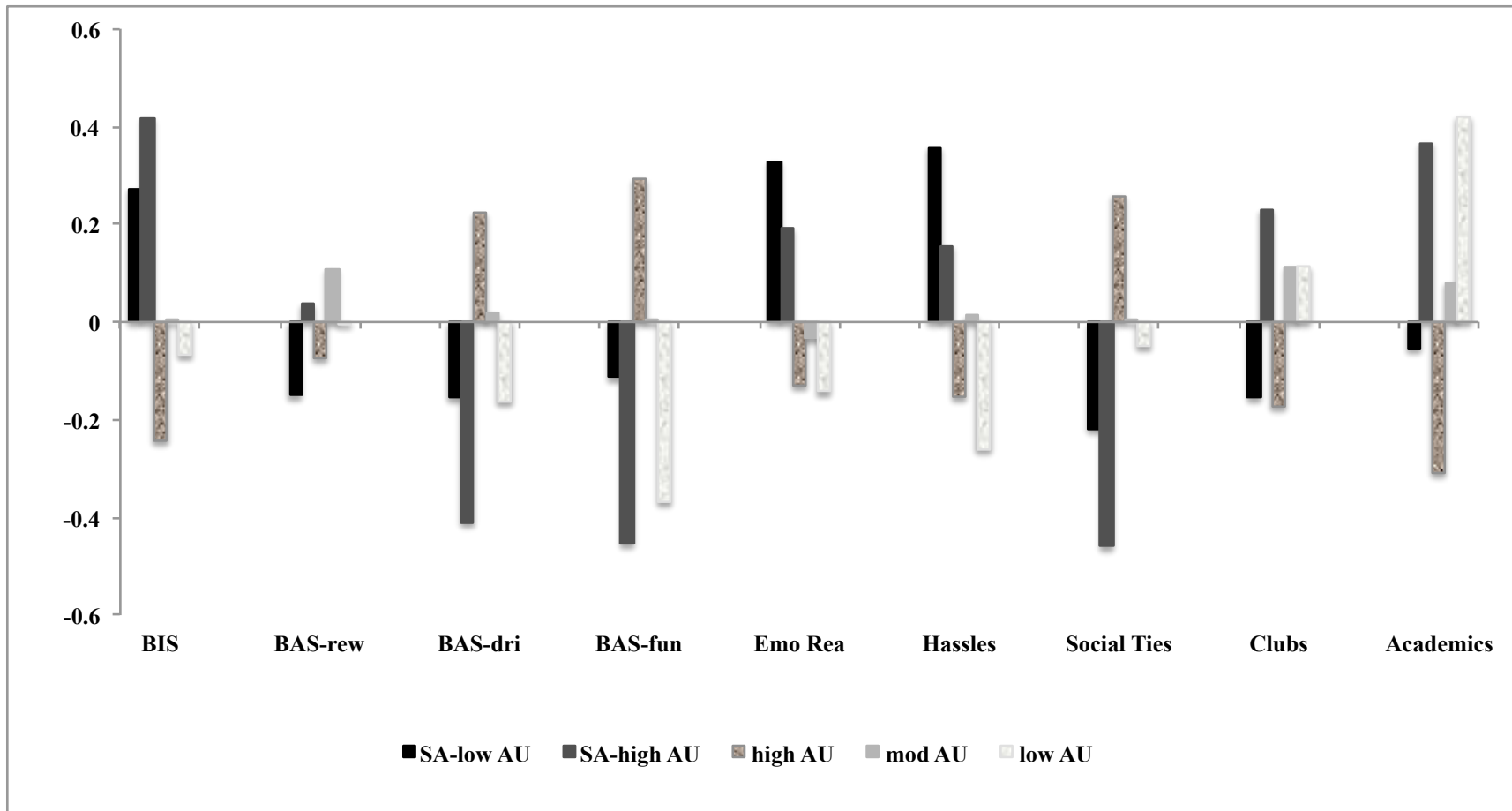


Figure 3-2. Standardized mean values for group differences on psychosocial functioning. BIS = behavioral inhibition system, BAS = behavioral approach system: rew = reward responsiveness, dri = drive, fun = fun seeking, Emo Rea = emotional reactivity, Hassles = daily hassles, Clubs = club activities, Academics = academic achievement, SA = social anxiety, AU = alcohol use, mod = moderate.

References

- American Psychiatric Association (2000). *Diagnostic and statistical manual of mental disorders* (Fourth Edition, Text Revision). Washington, DC.
- Baker, R. W., & Siryk, B. (1989). *Student adaptation to college questionnaire manual*. Los Angeles, CA: Western Psychological Services.
- Battista, S. R., Stewart, S. H., & Ham, L. S. (2010). A critical review of laboratory based studies examining the relationships of social anxiety and alcohol intake. *Current Drug Abuse Reviews*, 3(3-22).
- Biggs, B. K., Vernberg, E. M., & Wu, Y. P. (2012). Social anxiety and adolescents' friendships: The role of social withdrawal. *The Journal of Early Adolescence*, 32(6), 802-823. doi: 10.1177/0272431611426145
- Brook, C. A., & Willoughby, T. (2015). The social ties that bind: Social anxiety and academic achievement across the university years. *Journal of Youth and Adolescence*, 44, 1139-1152. doi: 10.1007/s10964-015-0262-8
- Carver, C. S., & White, T. L. (1994). Behavioral inhibition, behavioral activation, and affective responses to impending reward and punishment: The BIS/BAS Scales. *Journal of Personality and Social Psychology*, 67(2), 319-333. doi: 10.1037/0022-3514.67.2.319
- Carver, C., & White, T. (2007). BIS/BAS Scales. Retrieved May 1, 2015, from <http://www.psy.miami.edu/faculty/ccarver/sclBISBAS.html>
- Chartrand, H., Sareen, J., Toews, M., & Bolton, J. M. (2012). Suicide attempts versus

nonsuicidal self-injury among individuals with anxiety disorders in a nationally representative sample. *Depression and Anxiety*, 29(3), 172-179. doi: 10.1002/da.20882

Conger, J. (1956). Reinforcement theory and the dynamics of alcoholism. *Quarterly Journal of Studies on Alcohol*, 17, 296-305.

Cooper, M. L., Frone, M. R., Russell, M., & Mudar, P. (1995). Drinking to regulate positive and negative emotions: A motivational model of alcohol use. *Journal of Personality and Social Psychology*, 69(5), 990-1005. doi: 10.1037/0022-3514.69.5.990

Corr, P. J. (2004). Reinforcement sensitivity theory and personality. *Neuroscience and Biobehavioral Reviews*, 28 (3), 317-332. doi: 10.1016/j.neubiorev.2004.01.005

Costanzo, P. R., Malone, P. S., Belsky, D., Kertesz, S., Pletcher, M., & Sloan, F. A. (2007). Longitudinal differences in alcohol use in early adulthood. *Journal of Studies on Alcohol and Drugs*, 68(5), 727-737. doi: 10.15288/jsad.2007.68.727

Cummings, C. M., Caporino, N. E., & Kendall, P. C. (2014). Comorbidity of anxiety and depression in children and adolescents: 20 years after. *Psychological Bulletin*, 140(3), 816-845. doi: 10.1037/a0034733

Furmark, T., Tillfors, M., Stattin, H., Ekselius, L., & Fredrikson, M. (2000). Social phobia subtypes in the general population revealed by cluster analysis. *Psychological Medicine*, 30(6), 1335-1344.

Ham, L. S., Bonin, M., & Hope, D. A. (2007). The role of drinking motives in social anxiety and alcohol use. *Journal of Anxiety Disorders*, 21, 991-1003. doi:

10.1016/j.janxdis.2006.10.014

Ham, L. S., & Hope, D. A. (2003). College students and problematic drinking: A review of the literature. *Clinical Psychology Review, 23*(5), 719-759. doi:

10.1016/S0272-7358(03)00071-0

Ham, L. S., & Hope, D. A. (2006). Incorporating social anxiety into a model of college problem drinking: Replication and extension. *Psychology of Addictive Behaviors, 20*(3), 348-355. doi: 10.1037/0893-164X.20.3.348

Henderson, L., & Zimbardo, P. (2010). Shyness, social anxiety, and social anxiety disorder. In S. G. H. P. M. DiBartolo (Ed.), *Social anxiety: Clinical, developmental, and social perspectives (2nd ed.)* (pp. 65-92). San Diego, CA, US: Elsevier Academic Press.

Herbert, J. D., Rheingold, A. A., & Brandsma, L. L. (2010). Assessment of social anxiety and social phobia. In S. G. Hofmann & P. M. DiBartolo (Eds.), *Social anxiety: Clinical, developmental, and social perspectives (2nd ed., pp. 608)*. NY: Elsevier Academic Press.

Hofmann, S. G., Heinrichs, N., & Moscovitch, D. A. (2004). The nature and expression of social phobia: Toward a new classification. *Clinical Psychology Review, 24*(7), 769-797. doi: <http://dx.doi.org/10.1016/j.cpr.2004.07.004>

Johansson, K., San Sebastian, M., Hammarström, A., & Gustafsson, P. E. (2015). Neighbourhood disadvantage and individual adversities in adolescence and total alcohol consumption up to mid-life—Results from the Northern Swedish Cohort. *Health Place, 33*, 187-194. doi: 10.1016/j.healthplace.2015.03.005

- Kagan, J. (2010). Temperamental contributions to the development of psychological profiles. In S. G. H. P. M. DiBartolo (Ed.), *Social anxiety: Clinical, developmental, and social perspectives (2nd ed.)* (pp. 323-345). San Diego, CA, US: Elsevier Academic Press.
- Kashdan, T. B., Elhai, J. D., & Breen, W. E. (2008). Social anxiety and disinhibition: An analysis of curiosity and social rank appraisals, approach-avoidance conflicts, and disruptive risk-taking behavior. *Journal of Anxiety Disorders, 22*, 925-939. doi:0.1016/j.janxdis.2007.09.009
- Kashdan, T. B., & Hofmann, S. G. (2008). The high-novelty-seeking, impulsive subtype of generalized social anxiety disorder. *Depression and Anxiety, 25*, 535-541. doi: 10.1002/da.20382
- Kashdan, T. B., & McKnight, P. E. (2010). The darker side of social anxiety: When aggressive impulsivity prevails over shy inhibition. *Current Directions in Psychological Science, 19*(1), 47-50. doi: 10.1177/0963721409359280
- Khantzian, E. J. (1985). The self-medication hypothesis of addictive disorders: Focus on heroin and cocaine dependence. *The American Journal of Psychiatry, 142*(11), 1259-1264.
- La Greca, A. M., & Lopez, N. (1998). Social anxiety among adolescents: Linkages with peer relations and friendships. *Journal of Abnormal Child Psychology, 26*(2), 83-94. doi: 10.1023/A:1022684520514
- Lloyd-Richardson, E. E., Nock, M. K., & Prinstein, M. J. (2009). Functions of adolescent nonsuicidal self-injury. In M. K. Nixon & N. L. Heath (Eds.), *Self-injury in*

Youth: The essential guide to assessment and intervention (pp. 29-41). NY: Taylor & Francis Group.

McNeil, D. W. (2010). Evolution of terminology and constructs in social anxiety and its disorders. In S. G. Hofmann & P. M. DiBartolo (Eds.), *Social anxiety: Clinical, developmental, and social perspectives* (2nd ed., pp. 3-21). New York: Academic Press.

Meyer, T. J, Miller, M. L., Metzger, R. L., & Borkovec, T. D. (1990). Development and validation of the Penn State Worry Questionnaire. *Behaviour Research and Therapy*, 28(6), 487-495. doi: 10.1016/0005-7967(90)90135-6

Morris, E. P., Stewart, S. H., & Ham, L. S. (2005). The relationship between social anxiety disorder and alcohol use disorders: A critical review. *Clinical Psychology Review*, 25(6), 734-760. doi: 10.1016/j.cpr.2005.05.004

Morrison, A. S., & Heimberg, R. G. (2013). Social anxiety and social anxiety disorder. *Annual Review of Clinical Psychology*, 9, 249-274. doi: 10.1146/annurev-clinpsy-050212-185631

Mörtberg, E., Tillfors, M., Van Zalk, N., & Kerr, M. (2014). An atypical anxious-impulsive pattern of social anxiety disorder in an adult clinical population. *Scandinavian Journal of Psychology*, 55, 350-356. doi: 10.1111/sjop.12117

Murphy, P., Murphy, L., & Garavan, H. (2014). Different measures of behavioural activation system (BAS) sensitivity uniquely predict problem drinking among college students. *The Irish Journal of Psychology*, 35(1), 44-52. doi: 10.1080/03033910.2013.853201

- Muthén, L. K. & Muthén, B. O. (1998-2014). *Mplus User's Guide*. (7th ed.). Los Angeles, CA.
- Nagin, D. S. (2005). *Group-based modeling of development*. Cambridge: Harvard Press.
- Nicholls, J., Staiger, P. K., Williams, J. S., Richardson, B., & Kambouropoulos, N. (2014). When social anxiety co-occurs with substance use: Does an impulsive social anxiety subtype explain this unexpected relationship? *Psychiatry Research*, 220(3), 909-914. doi: <http://dx.doi.org/10.1016/j.psychres.2014.08.040>
- Nock, M. K., & Prinstein, M. J. (2004). A functional approach to the assessment of self-mutilative behavior. *Journal of Consulting and Clinical Psychology*, 72(5), 885-890. doi: 10.1037/0022-006X.72.5.885
- Nock, M. K., Wedig, M. M., Holmberg, E. B., & Hooley, J. M. (2008). The Emotion Reactivity Scale: Development, evaluation, and relation to self-injurious thoughts and behaviors. *Behavior Therapy*, 39(2), 107-116. doi: 10.1016/j.beth.2007.05.005
- Norberg, M. M., Olivier, J., Alperstein, D. M., Zvolensky, M. J., & Norton, A.R. (2011). Adverse consequences of student drinking: The role of sex, social anxiety, drinking motives. *Addictive Behaviors*, 36(8), 821-828. doi: 10.1016/j.addbeh.2011.03.010
- Nylund, K. L., Asparouhov, T., & Muthén, B. O. (2007). Deciding on the number of classes in latent class analysis and growth mixture modeling: A Monte Carlo simulation study. *Structural Equation Modeling*, 14(4), 535-569.
- O'Connor, R. M., Stewart, S. H., & Watt, M. C. (2009). Distinguishing BAS risk for

- university students' drinking, smoking, and gambling behaviors. *Personality and Individual Differences*, 46(4), 514-519. doi: 10.1016/j.paid.2008.12.002
- Peterson, R. A. (1994). A meta-analysis of Cronbach's coefficient alpha. *Journal of Consumer Research*, 21(2), 381-391. doi: <http://dx.doi.org/10.1086/209405>
- Radloff, L. S. (1977). The CES-D Scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*, 1, 385-401.
doi:10.1177/014662167700100306
- Schafer, J. L., & Graham, J. W. (2002). Missing data: Our view of the state of the art. *Psychological Methods*, 7, 147-177. doi: 10.1037/1082-989X
- Schry, A. R., & White, S. W. (2013). Understanding the relationship between social anxiety and alcohol use in college students: A meta-analysis. *Addictive Behaviors*, 38(11), 2690-2706. doi: 10.1016/j.addbeh.2013.06.014
- Sher, K. J., & Grekin, E. R. (2007). Alcohol and affect regulation. In J. J. Gross (Ed.), *Handbook of Emotion Regulation* (pp. 560-580). New York: The Guilford Press.
- Stewart, S. H., Morris, E., Mellings, T., & Komar, J. (2006). Relations of social anxiety variables to drinking motives, drinking quantity and frequency, and alcohol-related problems in undergraduates. *Journal of Mental Health*, 15(6), 671-682.
doi: 10.1080/09638230600998904
- Strahan, E. Y., Panayiotou, G., Clements, R., & Scott, J. (2011). Beer, wine, and social anxiety: Testing the “self-medication hypothesis” in the US and Cyprus. *Addiction Research and Theory*, 19(4), 302-311. doi:
10.3109/16066359.2010.545152

- Tavernier, R., & Willoughby, T. (2012). Adolescent turning points: The association between meaning-making and psychological well-being. *Developmental Psychology, 48*(4), 1058-1068. doi: 10.1037/a0026326
- Tillfors, M., Mörtberg, E., Van Zalk, N., & Kerr, M. (2013). Inhibited and impulsive subgroups of socially anxious young adults: Their depressive symptoms and life satisfaction. *Open Journal of Psychiatry (3)*, 195-201. doi: 10.4236/ojpsych.2013.31A016
- Tillfors, M., Van Zalk, N., & Kerr, M. (2013). Investigating a socially anxious-impulsive subgroup of adolescents: A prospective community study. *Scandinavian Journal of Psychology, 54*(3), 267-273. doi: 10.1111/sjop.12047
- Van Ameringen, M., Mancini, C., & Farvolden, P. (2003). The impact of anxiety disorders on educational achievement. *Journal of Anxiety Disorders, 17*(5), 561-571. doi: 10.1016/S0887-6185(02)00228-1
- Wardell, J. D., O'Connor, R. M., Read, J. P., & Colder, C. R. (2011). Behavioral approach system moderates the prospective association between the behavioral inhibition system and alcohol outcomes in college students. *Journal of Studies on Alcohol and Drugs, 72*(6), 1028-1036.
- Webb, E., Ashton, H., Kelly, P., & Kamali, F. (1997). Patterns of alcohol consumption, smoking and illicit drug use in British university students: Interfaculty comparisons. *Drug and Alcohol Dependence, 47*(2), 145-153. doi: 10.1016/S0376-8716(97)00083-5
- Wilkinson, R. G. (1999). Health, hierarchy, and social anxiety. In N. E. Adler, M.

Marmot, B. S. McEwen & J. Stewart (Eds.), *Socioeconomic status and health in industrial nations: Social, psychological, and biological pathways* (pp. 48-63).

NY: New York Academy of Sciences.

Xu, Y., Farver, J. M., & Shin, Y. (2014). Shyness and psychosocial functioning South Korean children. *European Journal of Personality*, 28(2), 147-155.

Chapter 4: Social Anxiety and Alcohol Use: Stability and Change in Psychosocial Functioning During and After University

The university years are a transitional time during which a new socializing environment is encountered. As compared to adolescence, the university context provides youth with greater autonomy and increased responsibilities, as well as different social opportunities. University also is a time when alcohol is widely consumed, and in this new social situation, it often is linked to problematic behaviors, such as aggression and risk-taking, as well as health problems (Ham & Hope, 2003). Of course, not all students drink extensively and those with social anxiety in particular generally report lower levels of alcohol use than do their peers with lower social anxiety (Schry & White, 2013). At the same time, research into social anxiety has shown that it is positively associated with alcohol-related problems (Schry & White, 2013).

In an attempt to disentangle these conflicting findings, our previous research examining university students with social anxiety found that they could be separated into two distinct groups based on their alcohol consumption over the first three years of university, despite both groups displaying the prototypical behaviors of behavioral inhibition and poorer social interactions (Brook & Willoughby, 2016). One group reported lower levels of alcohol use from Year 1 to 3 and indicated that they engaged in more adaptive behaviors at Year 1 (e.g., greater involvement in club activities, higher academic achievement) than the second group, who reported higher levels of alcohol use from Year 1 to 3 and maladaptive behaviors at Year 1 (e.g., endorsed problematic emotion coping behavior such as self-injury). Although these results, at least in part, help

explain the mixed findings in the literature on the relation between social anxiety and alcohol use, it is not clear whether these differing profiles of behavior remain stable or change after the first three years of university or after graduation, especially since leaving university typically involves another major transition into the adult world.

The purpose of this study, therefore, was to conduct a follow-up of our previous research to assess the stability or change in the groups' trajectories of social anxiety, alcohol use, and psychosocial functioning over the long term. It should be noted that although we refer to social anxiety throughout this paper, we are referring specifically to social anxiety symptoms in a community sample and not Social Anxiety Disorder (SAD), a clinical condition with more severe symptoms and debilitating effects.

A Framework for Understanding Why Social Anxiety Might Impede Healthy Psychosocial Adjustment During Emerging Adulthood

According to Erikson's psychosocial lifespan developmental theory, the university years, which are part of the lifespan phase called emerging adulthood (Arnett, 2000), are a time when two developmental stages are hypothesized to come to some resolution, those of "identity *versus* role confusion" and "intimacy *versus* isolation" (Erikson, 1966). These two stages involve exploring intimate relationships outside the family circle and discovering one's identity within the social world. Given that social anxiety is defined by the fear of negative evaluation, distress and/or avoidance of new and/or all social situations (La Greca & Lopez, 1998), students with social anxiety may face a particularly difficult emotional task of integrating into a new social and academic situation, away from the familiar support of family, in which many social interactions may be perceived as threatening. From this theoretical perspective, social anxiety might

compromise the healthy development of intimacy with others and an identity separate from family.

Social Anxiety and Alcohol Use Trajectories: Stability and Change over the Long-Term

Our previous person-centered research found that there was heterogeneity in social anxiety with respect to alcohol use (Brook & Willoughby, 2016). Through parallel-process latent class growth analysis (LCGA) using data from the first three years of university, five groups of students were identified based on their combined levels of social anxiety and alcohol use: two that were higher in social anxiety than their peers but not significantly different from one another, and three groups that were lower in social anxiety. Furthermore, one of the groups with social anxiety reported moderately low levels of alcohol use (referred to as social anxiety-low alcohol use group), while the other group with social anxiety reported moderately high levels of alcohol use (referred to as social anxiety-high alcohol use group). In comparison, the three groups with low social anxiety were linked to high, moderate and low alcohol use (referred to as high alcohol use group, moderate alcohol use group, low alcohol use group, respectively). While our results showed we had distinct groups with respect to their combined levels of social anxiety and alcohol use between Year 1 and Year 3, we wondered whether the differences between group trajectories might remain the same or change during the transition out of university between Years 4 to 7.

Indeed, drinking trends are relatively well studied in the Western population. Statistics on alcohol use among US respondents aged 18 through 55 years show that the highest levels of drinking occur in emerging adulthood, tapering off slowly after age 30

(Johnston, O'Malley, Bachman, Schulenberg, & Miech, 2015; Willoughby, Good, Adachi, Hamza, & Tavernier, 2013). Alcohol consumption, on average, remains elevated during and after university. On the other hand, social anxiety trends in emerging adulthood are not well studied, especially in nonclinical samples. There seems to be no published research that follows the trajectory of social anxiety, or its co-occurrence with alcohol, in emerging adulthood over the long term (i.e., after graduation from university). Thus, our first question centered on discerning whether the trajectories based on social anxiety and alcohol use originally detected between Year 1 to Year 3 for the five groups would remain stable or change between Year 4 and Year 7.

Psychosocial Functioning Trajectories: Stability and Change Over the Long-Term

In our earlier work that found five groups based on the co-occurrence of social anxiety and alcohol use over the first three years of university (Brook & Willoughby, 2016), group differences in psychosocial functioning were found in Year 1. Both groups with social anxiety, as compared to the three groups without social anxiety, reported the highest scores for depressive symptoms, behavioral inhibition, emotional reactivity, and stress, and the lowest scores for social ties formed in university. These features were consistent with the typical avoidant and inhibited profile for social anxiety. However, the social anxiety-high alcohol use group also was differentiated from the social anxiety-low alcohol group by higher levels of BAS fun seeking (i.e., which included an item of impulsivity), lower levels of academic achievement, less participation in club activities and being less likely to live at home. Indeed, the social anxiety-high alcohol use group behaviors were consistent with those of the high alcohol use group (except for their scores on BAS fun seeking, which were in the same normative range reported by the

moderate alcohol use group). Furthermore, while both the social anxiety-high alcohol use group and alcohol use group endorsed alcohol use to cope with common emotional states such as feeling stressed or wanting to feel good, only the social anxiety-high alcohol use group reported alcohol use *and* self-injury as a response to more problematic emotional states, such as feeling numb or wanting to punish themselves. In regard to the social anxiety-low alcohol use group, some of their behaviors were more in line with the low alcohol group, especially their greater involvement in club activities, higher academic achievement, and greater likelihood of living at home. Thus, we found heterogeneity in our university sample with respect to social anxiety, alcohol use and psychosocial functioning at Time 1. But more importantly, our results indicated that the atypical social anxiety group (i.e., social anxiety-high alcohol use) was linked to more at-risk behaviors than the typical social anxiety group (i.e., social anxiety-low alcohol use).

Our results were consistent with a body of research in the literature that explored heterogeneity within the social anxiety population, both in clinical (Binelli et al., 2015; Kashdan & Hofmann, 2008; Mörtberg, Tillfors, Van Zalk, & Kerr, 2014) and community samples (Nicholls, Staiger, Williams, Richardson, & Kambouropoulos, 2014; Tillfors, Mörtberg, Van Zalk, & Kerr, 2013; Tillfors, Van Zalk, & Kerr, 2013). Yet none of these investigations into social anxiety subgroups were based only on the general use of alcohol – some groups instead were based on impulsivity, while others were based on sensation seeking, and still others based on a composite of reckless behaviors (e.g., vandalism, shoplifting, and use of alcohol while driving), all measured concurrently. Nevertheless, in all cases evidence was reported for the existence of two distinct groups; both groups with social anxiety were characterized by prototypical avoidant and inhibited behavior but

only one group was additionally categorized by atypical personality-based characteristics including impulsivity or sensation seeking (Kashdan, McKnight, Richey, & Hofmann, 2009; Nicholls et al., 2014; Tillfors, Mörtberg, et al., 2013). In general, these studies found that regardless of whether the groups were based on impulsivity, sensation seeking, or reckless behavior, the atypical group, in comparison to the prototypical group, was linked to significantly poorer psychosocial functioning, including unsafe sex, aggression, hostile impulses, and alcohol and drug use or misuse in adults (Binelli et al., 2015; Kashdan, Elhai, & Breen, 2008; Kashdan & Hofmann, 2008; Kashdan et al., 2009).

Among the handful of studies investigating heterogeneity in social anxiety, only one study examined the relation between membership in either the prototypical or atypical group and psychosocial functioning over time, although the co-occurring groups were only based on the first year of data (Tillfors, Van Zalk, et al., 2013). Tillfors and colleagues' longitudinal study (three time points, two years) revealed that an anxious-impulsive group was linked to higher intoxication frequency and minor delinquency than an anxious-inhibited group (ANOVAs were used to make comparisons between the groups at each time point), but only for boys in their adolescent sample. Notably, then, no studies have explored the heterogeneity of social anxiety, or its co-occurrence with alcohol use in relation to psychosocial functioning over the long term, or in a nonclinical sample during the developmental stage of emerging adulthood. Thus, a second question we were interested in studying was whether the trajectories for psychosocial functioning, stemming from the differences detected in Year 1 between the five groups, would remain stable or change between Years 2 to Year 7, a timeframe that spans across the transition from university to post-graduation.

Social Anxiety and Alcohol Use: From the Perspective of Personality-Based Characteristics

Recently, researchers intrigued with the finding that a subset of individuals with social anxiety report risky behaviors, incongruent with the expected behavioral profile of avoidance and inhibition, have turned to personality factors as potential explanations for this anomaly. In fact, only the atypical social anxiety group, as compared to the prototypical social anxiety group, was found to exhibit the personality-based characteristics of impulsivity, sensation seeking or reward sensitivity (Binelli et al., 2015; Nicholls et al., 2014; Tillfors, Mörtberg, et al., 2013). Given these recent developments in understanding heterogeneity in social anxiety, we wondered whether the at-risk behaviors (i.e., drug use and self-injury) associated with our atypical social anxiety-high alcohol use group in Year 1 (see Brook & Willoughby, 2016) also might be related to impulsivity, sensation seeking, reward sensitivity, and sociability, all varying dimensions of personality associated with approach-oriented and/or at-risk behaviors. Accordingly, each of these characteristics will be discussed in turn.

Several researchers have used the first of these dimensions, impulsivity, to identify two distinct social anxiety subgroups in nonclinical samples, one with higher and the other with lower levels of impulsivity (Nicholls et al., 2014; Tillfors, Mörtberg, et al., 2013; Tillfors, Van Zalk, et al., 2013). Moreover, they reported that the atypical impulsive (also displaying avoidant/inhibited behavior) group was more likely to report substance and drug use problems than the prototypical avoidant/inhibited only group. In our work, we showed that the social anxiety-high alcohol use group exhibited significantly higher levels of BAS fun seeking (sensation seeking) in Year 1 of university

than the social anxiety-low alcohol use group (Brook & Willoughby, 2016). However, our measure of BAS fun seeking was confounded by the inclusion of a question assessing impulsivity (Carver & White, 1994; Dawe & Loxton, 2004). To examine whether our finding was related to fun seeking or impulsivity, we introduced a stronger measure of impulsivity into our survey from Year 4 to Year 7 to directly assess the relation between our prototypical/atypical social anxiety groups and impulsivity. We also continued to assess the BAS fun seeking subscale, but without the impulsivity question. Thus, a third question we were interested in examining was whether the trajectory of BAS fun seeking remained the same or changed from its initial status for the five groups between Year 2 and Year 7. Particularly, did the differences detected between the prototypical and atypical social anxiety groups in Year 1 continue over the following six years? Furthermore, did our new measure of impulsivity in Year 4 differentiate among the five groups, and did the group trajectories of impulsivity remain stable or change between Year 4 and Year 7.

A second characteristic referred to as reward sensitivity is correlated with impulsivity, but at the conceptual level it represents approach behavior rather than difficulties with self regulation (Dawe & Loxton, 2004). In a nonclinical population, only one group has specifically investigated reward sensitivity in relation to heterogeneity in social anxiety (Nicholls et al., 2014). Nicholls and colleagues compared groups whose membership was based on a combination of social anxiety, rash impulsivity, reward sensitivity, sensitivity to punishment, and risk taking behavior. While two groups were identified by latent class analysis to have higher levels of social anxiety and sensitivity to punishment, only one of these two groups also had higher levels of rash impulsivity,

reward sensitivity, and reckless taking behavior (Nicholls et al., 2014). The atypical approach-oriented and impulsive group (who also reported the typical avoidant/inhibited profile) also was linked to significantly higher levels of alcohol and drug misuse than the prototypical avoidance/inhibited only group. In our previous research, however, the approach subfactors of BAS drive and BAS reward responsiveness that tap into the construct of reward sensitivity (Dawe & Loxton, 2004), did not distinguish between our two social anxiety groups (Brook & Willoughby, 2016). Thus, in contrast to Nicholls and colleagues (2014), we concluded that the personality-based characteristic of reward sensitivity might not be linked to heterogeneity in social anxiety. Nevertheless, to confirm and expand on our original findings, we were interested in examining whether the trajectories for BAS drive and BAS reward responsiveness remained the same or changed from their initial status over the long term between Year 2 and Year 7, especially for our two social anxiety groups.

And finally, heterogeneity in the closely related construct of shyness has been tied to individual differences in personality-based sociability (Asendorpf, 1990; Jones, Schulkin, & Schmidt, 2014). Two shyness subtypes have been categorized that align convincingly with the prototypical and atypical subtypes found in the social anxiety population: avoidant shyness that is typified by high shyness and low sociability, and conflicted shyness that is characterized by high shyness and high sociability. Furthermore, the conflicted group has been reported to display more at-risk behavior patterns than the avoidant group. For instance, Santesso and colleagues (Santesso, Schmidt, & Fox, 2004) have found that conflicted shyness in a US college sample was associated with higher substance use over and above shyness or sociability alone. The inference from the

conflicted shyness literature is that if a combination of high sociability and shyness leads to problematic consequences (Schmidt & Buss, 2010), then perhaps a similar dispositional profile of high sociability and social anxiety might describe our atypical social anxiety group. Thus, our third question also included investigating whether the personality-based feature of affinity for aloneness (an inverse proxy for sociability) might differentiate between our social anxiety-high alcohol use group and social anxiety-low alcohol use group in Year 7.

Purpose of Study

The purpose of this study was threefold. First, we were interested in following the trajectories of five previously identified groups during their senior years of university and after graduation. In particular, we were most interested in determining whether the co-occurring patterns of social anxiety and alcohol use identified between Year 1 and Year 3 remained stable or changed over time (Year 4 to Year 7). Second, we also followed the trajectories for psychosocial functioning that characterized our five groups in Year 1 to determine if these behaviors would remain stable or change over the following six years; that is, would there be similar differences in at-risk behaviors between the social anxiety-high alcohol use group and the social anxiety-low alcohol group in Years 2 to 7 as there was in Year 1. In this study, the same characteristics were examined longitudinally, including social anxiety, alcohol use, internalizing problems (i.e., a composite of BIS, emotional reactivity, stress), nonsuicidal self-injury (NSSI), friendship quality (i.e., a proxy for the social ties measure that was specific to the university context which was examined in our earlier study – see Brook & Willoughby, 2016), drug use (i.e., smoking, marijuana use, hard drug use), club activities, BAS fun seeking, BAS drive, BAS reward

responsiveness, and living circumstances. Third, we explored the relations between an atypical behavioral style of social anxiety and the personality-based characteristics of impulsivity, fun seeking, reward sensitivity, and affinity for aloneness (inverse proxy for sociability) to develop a better understanding of the heterogeneity found in the social anxiety population at university.

In addition, five covariates were included in the longitudinal analyses. General anxiety was used to control for its known shared variance with social anxiety (McNeil, 2010) and depressive symptoms were included to account for their comorbidity with social anxiety (Cummings, Caporino, & Kendall, 2014; McNeil, 2010). In addition to age, we also controlled for parent education as a proxy for socioeconomic status because it has been linked to mean differences in social anxiety and alcohol use (Johansson, San Sebastian, Hammarström, & Gustafsson, 2015; Wilkinson, 1999). Last, sex was added as a covariate because it was important to control for sex differences in the consumption of alcohol and the consequences resulting from its use (Norberg, Olivier, Alperstein, Zvolensky, & Norton, 2011) and for sex differences in the prevalence of social anxiety (La Greca & Lopez, 1998).

In summary, this study was a follow-up to our previous research (Brook & Willoughby, 2016) that found five distinct groups using the indicators of social anxiety and alcohol use in a parallel-process LCGA (i.e., two social anxiety groups and three low social anxiety groups, with varying levels of alcohol use). The present study extended this research by including measures of social anxiety and alcohol use from Years 4 to Year 7 and measures of psychosocial adjustment from Year 2 to Year 7 (only Year 1 was used in the previous study). Although we included all five groups in this follow-up study, we

were most particularly interested in following our two previously identified social anxiety groups.

Method

Participants

The participants were part of a larger longitudinal study on stress and psychosocial adjustment during and after graduating from a mid-sized university in southern Ontario, Canada. In 2010, the first year undergraduate students completed self-report surveys, which continued annually for seven consecutive years ($N = 1132$, $M_{\text{age}} = 19.06$, $SD_{\text{age}} = 9$ months, 70.5% female, 35% of the freshman class). Data on socioeconomic status as indicated by the mean level of education for mothers and fathers fell between “some college, university, or apprenticeship program” and “completed a college/apprenticeship and/or technical diploma”. The sample was composed of mostly domestic-Canadian students (88.2%). Within this domestic-Canadian group, participants also indicated whether their family belonged to another culture or ethnic background – the most common ethnic groups identified were British (17%), Italian (15%), French (8%), and German (8%), consistent with the broader demographics for the university and the region (Statistics Canada, 2006). The remaining participants were international students (11.8%) who were predominantly from Asia (4%), the European Union (2%), the Caribbean (1%), and Africa (1%).

Procedure

First-year students from a wide variety of academic disciplines (biology, business, kinesiology, psychology, etc.) were invited through posters, classroom announcements,

website postings, and visits to on-campus student residences, to complete a survey on factors relating to stress, coping and adjustment to university. The participants were given course credit or monetary compensation for their participation in Year 1 (\$10), and increasing monetary compensation for their participation over the following six years. Only students who participated in the first assessment (regardless of whether they were still registered at the university) were invited to do so again by way of emails, posters, and classroom announcements, and subsequent to the second survey, through email only. Trained research assistants administered the first two surveys in person and later surveys were filled out online. All seven assessments were completed between the end of January and the beginning of March of each year. Approval for the study was obtained from the university ethics board prior to survey administration at all seven assessments and participants provided informed active consent prior to participation.

Missing Data

Missing data occurred within each assessment time because some students did not finish the entire questionnaire (average missing data = 4.07%) and some students did not complete all seven waves of the survey (i.e., students could not be reached or chose not to participate in all seven waves). In total, 43.1% completed all seven waves, 15.6% completed six waves, 8.4% completed five waves, 6.3% completed four waves, 4.8% completed three waves, 6.7% completed two waves, and 15.1% completed one wave. The results of a MANOVA between the independent variable of “missingness across waves” and the dependent variables of all wave one study variables of interest showed a significant effect, $\Lambda = .869$, $F(84, 6204.326) = 1.890$, $p < .001$, $\eta^2 = .023$. Post hoc tests revealed that the participants who took part in all seven waves were more likely to report

being female than those who took part in only two or three waves, higher levels of general anxiety than those who participated in only three or four waves, lower levels of alcohol use than participants who participated in only three waves; and lower levels of drug use than those who participated in only one, two, or four waves ($ps < .001$). Data for analyses in SPSS 24 were imputed using the expectation maximization method (EM). All study measures were included in the imputation to avoid biased parameter estimates that can occur with pairwise, listwise or mean substitution (Schafer & Graham, 2002). Data analysis in Mplus 7.4 (Muthén & Muthén, 1998-2015) employed the full information maximum likelihood (FIML) estimation method whereby all available data from the participants were used to estimate the models.

Measures

Demographics. Age, sex, and parent education (one item per parent using a scale from 1 = *did not finish high school* to 6 = *professional degree*, which was averaged for participants reporting on both parents, $r = .40$) were measured in Year 1.

General anxiety. General anxiety was measured in Year 1 using The Penn State Worry Questionnaire- PSWQ (Meyer, Miller, Metzger, & Borkovec, 1990) to estimate trait anxiety. We included 7 items from a 16 item scale (e.g., “I do tend to worry about things” - we used the highest loaded items from a factor analysis when scales were reduced in size) that were measured on a 5-point Likert scale ranging from 1 = *not at all like me* to 5 = *completely like me*, such that higher scores indicated higher levels of general anxiety. The Cronbach alpha was .80.

Depressive symptoms. Depressive symptoms were assessed in Year 1 using The Center for Epidemiologic Studies Depression Scale – CES-D (Radloff, 1977). This 20-

item scale (e.g., “I felt like doing nothing”) was measured on a 5-point Likert scale ranging from 1 = *none of the time* to 5 = *most of the time*, such that higher scores indicated higher levels of depressive symptoms. The Cronbach alpha was .91.

Social anxiety symptoms. Social anxiety was measured from Years 1 to 7 with the Social Anxiety Scale for Adolescents-SAS-A (La Greca & Lopez, 1998) and assessed social anxiety symptoms in an age range consistent with our late adolescent sample. The 14-item scale was composed of three subscales including fear of negative evaluation (e.g. 5 items, “I’m afraid that other people my age will not like me”), social avoidance and distress of new situations (4 items, “I feel shy with people my age that I don’t know”), and social avoidance and distress generally (5 items, “It is hard for me to ask other people my age to hang out with me”). Responses were based on a 4-point Likert scale ranging from 1 = *almost never or never* to 4 = *almost always or always*. A composite measure was formed from all three subscales, consistent with previous research (e.g. La Greca & Lopez, 1998), such that higher scores indicated higher levels of social anxiety. Cronbach alphas ranged between .90-.93 over the seven assessments.

Alcohol use. Past year alcohol use was assessed from Years 1 to 7. “Frequency of use” scored on an 8-point Likert scale ranging from 1 = *never* to 8 = *every day*, and “average consumption per alcohol use event” scored on a 6-point Likert scale ranging from 1 = *less than 1 drink* to 6 = *over 10 drinks* were combined to form the measure for alcohol use. The 8-point “frequency of use” item was recoded to a 6-point scale (calculated based on ratio proportions) prior to combining the two items. Higher scores indicated higher levels of alcohol use. Correlations among the items were .70, .63, .57, .53, .48, .37, and .31 for Year 1 to 7, respectively.

Internalizing problems. This scale was composed of three measures averaged together, including the Behavioral Inhibition Scale-BIS from the BIS/BAS scale (Carver & White, 1994), the Emotional Reactivity Scale-ERS (Nock, Wedig, Holmberg, & Hooley, 2008), and the Daily Hassles Scale - Stress (Tavernier & Willoughby, 2012). The BIS assessed dispositional sensitivity to aversive stimuli. It included 7 items (e.g., “I worry about making mistakes”) measured on a 4-point Likert scale ranging from 1 = *strongly disagree* to 4 = *strongly agree*. Cronbach alphas over the seven years ranged between .73-.81. The ERS determined individual differences in emotional reactivity. Participants rated themselves with 13 items (e.g., “My feelings get hurt easily”) on a 5-point Likert scale ranging from 1 = *not at all like me* to 5 = *completely like me*. Over the seven surveys, the Cronbach alphas ranged between .93-95. The Daily Hassles Scale was developed for a research project on youth lifestyle choices (Tavernier & Willoughby, 2012) and contained 17 items on perceived stress relating to how bothered participants felt by hassles with peers, family, and money (e.g., “Not having enough time”). Responses were given on a 3-point Likert scale ranging from 1= *almost never bothers me* to 3 = *often bothers me*. The Cronbach alphas over the seven surveys ranged between .79-.85. Both the BIS and Daily Hassles scales were recoded (calculated based on ratio proportions) so that the resulting internalizing composite was measured on a 5-point Likert scale, with higher scores indicating higher levels of BIS, emotional reactivity and stress. Correlations among the behaviors ranged between .240 and .518 over the seven years.

Nonsuicidal self-injury lifetime. Participants were asked to respond to the following question, “Please estimate the number of times in your life you have

intentionally (i.e., on purpose) done each type of nonsuicidal self-injury”, which was followed by a list of NSSI behaviors (e.g. cutting, burning; note only behaviors with tissue damage were included). To normalize the measure, response counts were collapsed into seven categories where 0 = *never*, 1 = *1 time*, 2 = *2-4 times*, 3 = *5-10 times*, 4 = *11-50 times*, 5 = *51-100 times*, 6 = *more than 100 times*, as have been previously classified (Heath, Toste, Nedecheva, & Charlebois, 2008).

Friendship quality. This assessment was based on the peer component of the Inventory of Parent and Peer Attachment–IPPA (Armsden & Greenberg, 1987). Peer attachment was assessed using 18 items (e.g., “My friends are concerned about my well being”) measured on a 4-point Likert scale ranging from 1 = *almost always or always* to 4 = *almost never or never*. Responses were reverse coded such that higher scores represented higher levels of peer attachment. Cronbach alphas ranged between .89-.93 over the seven years.

Drug use. Drug use was measured by combining responses to three questions related to daily cigarette smoking, use of marijuana, and use of hard drugs. Participants were asked whether “In the past twelve months, how often did you use the following substances or engage in the following behaviors?” including “used hash, marijuana (weed, joint)” and “used other illegal drugs (e.g., Cocaine/Crack, Ecstasy, etc.)”. Both responses were coded on a 6-point Likert scale ranging from 1 = *never* to 6 = *everyday*. Participants also were asked, “Have you ever smoked a full cigarette?” and “How many cigarettes do you usually smoke each day?” The responses to these two questions were combined such that daily smoking was coded as 0 = *never smoked*, 1 = *no longer smoked*, 2 = *don't smoke every day*, 3 = *1 a day...8 = more than a pack a day*. Daily smoking was recoded

to a 6-point Likert scale starting with 1 (calculated based on ratio proportions) prior to combining the three items. Higher scores indicated higher levels of drug use. Correlations among the behaviors ranged between .33 and .48 over the seven years.

Impulsivity. This behavior was measured with the Barratt Impulsiveness Scale Version 11-BIS11 (Patton, Stanford, & Barratt, 1995). All 7 items (e.g., “I act on the spur of the moment”) were answered on a 5-point Likert scale ranging from 1 = *rarely, never* to 5 = *almost always, always*, with higher scores indicating higher levels of impulsive behavior. Impulsivity was an addition to the survey in Years 4 to 7 to investigate the construct of rash impulsivity more thoroughly in relation to social anxiety. Cronbach alphas ranged between .78-.82 over the four years.

Club activities. This measure was based on the question “Since the previous September, how often have you participated in non-religious school or community clubs that are NOT sports clubs?” Responses were recorded on a 6-point Likert Scale ranging from 1 = *never* to 6 = *several times a week*, with higher scores indicating greater frequency of participation in club activities.

Behavioral approach system (BAS). Dispositional sensitivity to appetitive stimuli was measured across the seven years with the BIS/BAS Scale (Carver & White, 1994). The BAS was composed of three subfactors including fun seeking (3 items, e.g., “I crave excitement and new sensations”), drive (4 items, e.g., “I go out of my way to get what I want”), and reward responsiveness (5 items, e.g., “When good things happen to me, it affects me strongly”). As recommended, the three subfactor scores were used separately to assess the different components of the approach motivation system. The scales were measured on a 4-point Likert scale ranging from 1 = *strongly disagree* to 4 =

strongly agree, such that higher scores indicated higher levels of the BAS subfactors. Cronbach's alphas ranged between .83-.89 for the three subfactors over the 7 years.

Affinity for aloneness. To assess sociability, we used a subscale from the Louvain Loneliness Scale (Marcoen, Goossens, & Caes, 1987) that measured the perceived positive aspects of being alone. Affinity for aloneness was an addition to the survey in Year 7. The 8-item scale was measured on a 4-point Likert scale ranging from 1 = *almost never or never* to 4 = *almost always or always* (e.g., "I like to do things on my own at home") such that higher scores represented *lower* levels of sociability. The Cronbach alpha was .88 in Year 7.

Living situation. Participants were asked, "What best describes your current living situation?" Possible responses to this question between Year 1 and Year 4 included: *live at home with parent(s)/guardian(s), in residence, off-campus* or *off campus with others*. Between Year 5 and Year 7, the off campus response was additionally partitioned into live off-campus with a boyfriend/girlfriend or boyfriend/girlfriend and others. Thus, participants chose among four responses between Year 1 to Year 4, and among six responses between Year 5 to Year 7.

Plan of Analysis

Descriptive statistics were measured for all study variables. These were followed by latent growth curve analysis (LGCAs) in Mplus (Muthén & Muthén, 1998-2015) to identify univariate trajectories for our eleven study variables including: social anxiety, alcohol use, internalizing problems (i.e., composite of BIS, daily hassles/stress, and emotional reactivity), NSSI lifetime, friendship quality, drug use, impulsivity, club activities, BAS fun seeking, BAS drive, and BAS reward responsiveness. The linear,

quadratic, and cubic functional forms for each study variable growth curve were tested to determine the best functional fit to data as calculated by the χ^2 difference test. If the models were not significantly different, the more parsimonious model with greater degrees of freedom was selected as the best fitting model. Overall model fit was assessed simultaneously with the χ^2 test, the root mean square error of approximation (RMSEA < .06), and the comparative fit index (CFI > .95) indicators of goodness-of-fit, (Hu & Bentler, 1999).

Next, for each of the eleven study variables, comparisons of their best-fitting growth curves among our five latent groups were conducted. To recall, membership in the latent groups was based on differing levels of social anxiety and alcohol use in combination across three consecutive annual time points beginning in the first year of university - see Brook and Willoughby (2016) for the details of the parallel-process LCGA that identified the five latent groups; the groups were social anxiety-high alcohol use, social anxiety-low alcohol use, high alcohol use, moderate alcohol use, and low alcohol use. To facilitate comparisons among the five latent group growth factors, a grouping variable indicating group membership was dummy coded into two sets of predictors. For the first set, the social anxiety-high alcohol use group was selected as the control group, and for the second set, the social anxiety-low alcohol use group was used as the control group. Each set of dummy variables was entered separately (different analyses) into the baseline unconditional growth model for each of the 11 study variables as predictors of the intercept, slope and other identified slope factors (i.e., depending on the best fitting baseline model). Age, sex, parental education, general anxiety, and

depression in Year 1 were entered into all LGCAs as covariates. The analyses were performed in Mplus 7.4 (Muthén & Muthén, 1998-2015).

Finally, we ran an ANOVA to determine group differences in affinity for aloneness (Year 7 only, Bonferroni corrected for ten comparisons, $p < .005$). We also analyzed whether the categorical living situation variable was significantly related to group membership through a χ^2 test. Significance was assessed at each year (seven tests) by the presence of an overall significant χ^2 test followed by a significant zscore (Bonferroni corrected for ten comparisons, zscores ≥ 2.8 , $ps \leq .005$). Both analyses were performed in SPSS 24 with imputed data.

Results

Preliminary Analysis

The means and standard deviations for the study variables are found in Table 4-1 and the correlations for Year 1 in Table 4-2. All values of skew (between ± 2) and kurtosis (below 7) were well within prescribed cutoff scores (Tabachnick & Fidell, 2013). To test for sex differences, a MANOVA was run with the eleven study variables as the dependent variables and sex as the independent variable for each assessment time. There were significant multivariate effects for sex in every year ($ps < .001$). Males reported higher alcohol use and drug use than females across the seven assessments ($ps < .001$). They also reported higher levels of NSSI lifetime in Year 2, in Year 3, in Year 4, and in Year 6, ($ps = .037$), impulsiveness between Year 4 and Year 7 ($ps < .001$), levels of BAS drive in Year 1 ($p = .021$), BAS fun seeking in Year 5 ($p = .016$), and affinity for aloneness in Year 7 ($p = .008$), than their female counterparts. Females, on the other hand,

reported higher levels of internalizing problems, friendship quality, and BAS reward responsiveness than males across the seven assessments ($ps < .001$).

Primary Analyses

Latent growth curve analysis. The χ^2 difference test indicated a significant difference between the linear and quadratic models for all study variable growth curves ($ps < .001$). Cubic models were rejected because none were identifiable. Therefore, a quadratic growth model was chosen as the best fit for all eleven psychosocial variables except for impulsivity, which was only measured over four time points. The best fitting model for impulsivity was linear. In all models, there was evidence of significant random effects in the intercept, linear slope, and quadratic slope ($ps < .001$, note there were no quadratic effects for impulsivity). Subsequently, time-invariant covariates were incorporated (Curran, Obeidat, & Losardo, 2010). Each set of the time-invariant covariates (i.e., set one had four variables from a comparison between the social anxiety-high alcohol use group and each of the other four groups in turn, and set two had three variables from a comparison between social anxiety-low alcohol use group and the three remaining low social anxiety groups, in turn) was tested in a separate LGCA for the eleven study variables.

Social anxiety and alcohol use trajectories: Stability and change over the long term. The model fit statistics were good for both the social anxiety and alcohol use latent growth curve models (see Table 4-3).

Social anxiety. In terms of the intercept, the two social anxiety groups reported significantly higher levels of social anxiety in Year 1 than the three low social anxiety groups, but they were not significantly different from one another (see Table 4-3 and

Figure 4-1). More importantly, there was significant change between the group trajectories over time. Two significant quadratic slopes indicated that the two social anxiety group trajectories declined relative to the low alcohol use group trajectory that showed an inclining trajectory after graduation. The differences between the two social anxiety groups, and between the two social anxiety groups and the two remaining low social anxiety groups, were maintained over time.

Alcohol use. All five groups differed significantly in levels of alcohol use at Year 1 (see Table 4-3 and Figure 4-1). Notably, the social anxiety-high alcohol use group as compared to the social anxiety-low alcohol use group reported higher levels of alcohol use in the first year of university. Significant linear and quadratic slopes also showed that there was considerable change in the alcohol use trajectories among the five groups over seven years of data. Generally, the pattern of effects indicated that the social anxiety-high alcohol use group and the high alcohol use group decreased in alcohol use, the low alcohol use group increased in alcohol use, and the difference between the two social anxiety groups lessened over time. However, the pattern of effects remained the same over the long term.

Psychosocial functioning: Stability and change across seven years. The model fit statistics were good for each psychosocial variable growth curve model, except for club activities and NSSI lifetime, which were just satisfactory (see Table 4-4).

Internalizing problems, NSSI, friendship quality. The two social anxiety groups reported higher levels of internalizing problems and NSSI lifetime, as well as lower levels of friendship quality than the three low social anxiety groups at Year 1 (see Table 4-4 and Figure 4-2). However, while levels of internalizing problems for both social

anxiety groups were significantly higher than the low social anxiety groups, and the levels of friendship quality for both social anxiety groups were significantly lower than the high alcohol use group and the moderate alcohol use group, only the social anxiety-high alcohol use group reported significantly higher scores on NSSI lifetime than the moderate alcohol use group (trend but nonsignificant difference with respect to the high alcohol use group, $p < .013$). Nonsignificant linear and quadratic slopes indicated that the pattern of effects found among groups in Year 1 for internalizing problems, NSSI lifetime and friendship quality were maintained across time.

Drug use, impulsivity. The social anxiety-high alcohol use group as compared to the social anxiety-low alcohol use group reported significantly higher levels of drug use in Year 1 and this remained stable across time (see Table 4-4 and Figure 4-2). With respect to impulsivity first measured in Year 4, the social anxiety-high alcohol use group had the highest levels of impulsivity, which were significantly different from all other groups except for the high alcohol use group. The differences among the groups at Year 4 were maintained over time.

Club Activities. The social anxiety-low alcohol use group as compared to the social anxiety-high alcohol use group had significantly higher levels of club activities in Year 1 (see Table 4-4 and Figure 4-2). However, significant linear and quadratic slopes indicated that a change in the differences among the five groups at Year 1 occurred between the social anxiety-low alcohol use group trajectory and the four remaining groups. The social anxiety-low alcohol use group had a continual downward trend after the first year, which differed in shape from the common pattern of growth trajectory for the other four groups – initially inclining trajectories that subsequently declined after

Year 4. Unexpectedly, the social anxiety-high alcohol use group maintained a trajectory that was not significantly different from those of the three low social anxiety groups.

BAS fun seeking, BAS drive, BAS reward responsiveness. In Year 1, the social anxiety-high alcohol use group had significantly higher levels of BAS fun seeking than the social anxiety-low alcohol group, significantly lower levels of BAS fun seeking than the high alcohol use group, but not significantly different levels of BAS fun seeking compared to the moderate alcohol use group (see Table 4-4 and Figure 4-2). This pattern of effects remained stable across time (we note that the results were the same for BAS fun seeking whether we included the item of impulsivity in the subscale or not). With respect to the trajectories of BAS drive and BAS reward responsiveness, there were no significant differences between the two social anxiety groups at Year 1 and this pattern of effects did not change over time.

Psychosocial functioning: Group differences over the long term.

Living Circumstances. A significant association between group membership and living circumstance was seen in Year 1, $\chi^2(12) = 70.887, p < .01$, with the social anxiety-low alcohol use group and the low alcohol group reporting that they were significantly more likely than the other three groups to live at home (z scores $> 2.8, ps < .005$).

Furthermore, the high alcohol use group was less likely to report living at home as compared to the other four groups (z score $> 2.8, p < .005$). There were no significant differences in living circumstances between the two social anxiety groups after Year 1.

Affinity for Aloneness. An ANOVA comparing the five groups on affinity for aloneness in Year 7 indicated that there were significant differences among the groups, $F(4, 1127) = 19.585, p < .001, \eta^2 = .065$. Post hoc tests (Hochberg for unequal n 's across

groups) revealed that the two social anxiety groups had significantly higher levels of affinity for aloneness than the high alcohol use group and the moderate alcohol use group ($ps < .001$), but were not significantly different from one another. Conversely, a frequency count by group indicated that 76.1% of the social anxiety-high alcohol use group as compared to 63.5% of the social anxiety-low alcohol use group reported affinity for aloneness scores above the sample average ($M = 2.30, SD = .49$). The proportion of individuals above the sample average for the high alcohol use group, the moderate alcohol use group, and the low alcohol use group was 40.3%, 40%, and 48.5%, respectively.

Discussion

The purpose of this research was to follow five previously identified groups whose membership was based on their combined levels of social anxiety and alcohol use over the first three years of university (Brook & Willoughby, 2016). We were interested in examining whether there was stability or change in social anxiety and alcohol use within each group over the long term and whether the differences in psychosocial functioning detected in Year 1 among the groups remained the same or changed over the subsequent six years. Our interest was primarily focused on the two groups that reported higher levels of social anxiety but were differentiated by their levels of alcohol use; both groups reported the prototypical inhibited and avoidant style of behavior but only the group with higher levels of alcohol use also displayed atypical fun-seeking tendencies and at-risk behaviors. Overall, the present follow-up study indicated that there was stability within and among groups across time in psychosocial functioning, although there were a few exceptions to this outcome (i.e., social anxiety, alcohol use and club

activities). Moreover, the differences in psychosocial functioning detected between the two social anxiety groups in Year 1 continued over the university years and after graduation. Indeed, the more at-risk status of our social anxiety-high alcohol use group, as compared to the social anxiety-low alcohol use group, persisted over the long term.

Social Anxiety, Alcohol Use, and Psychosocial Functioning: Stability Over the Long Term

In line with previous research, both social anxiety groups showed the prototypical inhibited and avoidant behaviors that distinguished them from the low social anxiety groups, including higher levels of social anxiety, internalizing problems (a composite of BIS, emotional reactivity, stress), NSSI lifetime, and lower levels of friendship quality in Year 1 (Chartrand, Sareen, Toews, & Bolton, 2012; La Greca & Lopez, 1998; Lahat, Hong, & Fox, 2011). More importantly, this pattern of effects remained stable across time. One exception was with respect to the social anxiety trajectories. Although the trajectories for the social anxiety-high alcohol use group and the social anxiety-low alcohol use group appeared to decrease over time (see Figure 4-1), the two social anxiety group trajectories did not change significantly relative to one another and relative to the high and moderate alcohol use groups. We also noted that while both of the social anxiety groups reported the highest levels of NSSI lifetime, only the social anxiety-high alcohol use group was different from the moderate and high alcohol use groups (the latter comparison was only a trend). This finding was consistent with our previous research that showed only the social anxiety-high alcohol use group, as compared to the other four groups, reported NSSI as a means of coping with emotions, specifically when feeling stressed, numb, ignored or wanting to punish themselves (Brook & Willoughby, 2016).

Thus, the atypical group displayed a more at-risk NSSI behavior profile than the average university student who consumed moderate levels of alcohol. Most notably, this relation persisted over the long term.

Over time, we found that the drug use trajectories (i.e., daily smoking, marijuana use, hard drug use) for all five groups remained stable whereas a different pattern of effects (change) was seen with respect to alcohol use. Broadly, the findings indicated that while drinking behaviors continued to significantly differentiate between the groups over the years, the gap separating them lessened. Consistent with some research indicating there tends to be a change in drinking behavior during emerging adulthood (Costanzo et al., 2007), the groups in our sample that were associated with higher levels of alcohol use showed a significant declining trajectory. Yet, the social anxiety-low alcohol use group and the low alcohol use group trajectories increased significantly after Year 1. While unexpected, the average level of alcohol use was still far below standards for heavy drinking and may have represented a desire (i.e., social acceptance) and/or opportunity (i.e., greater autonomy) to integrate into the social culture of university and society. Despite the narrowing trends in alcohol use, the social anxiety-high alcohol use group still reported significantly higher alcohol use than the social anxiety-low alcohol use group. Thus, the pattern of findings for alcohol use originally detected in Year 1 continued over time. Moreover, they were consistent with the conclusions reported in a meta-analysis on the relation between social anxiety and alcohol use; although social anxiety was negatively associated with alcohol use in college students as reflected in our social anxiety-low alcohol use group, social anxiety also was positively associated with alcohol-related problems as seen in our social anxiety-high alcohol use group (Schry &

White, 2013), such as illnesses relating to drinking, not being able to do homework or study for tests (Buckner, Schmidt, & Eggleston, 2006).

In terms of drug use, our results were partially consistent with investigations into the relation between social anxiety and marijuana use. In the literature, social anxiety was found to co-occur with marijuana-related problems such as memory loss or problems with friends and family (Buckner, Heimberg, & Schmidt, 2011). However, in our study we found only a subset of individuals with social anxiety who smoked marijuana (i.e., the social anxiety-high alcohol use group) and, hence, only a subset was vulnerable to the problematic behavior associated with its use. Taken together, our results filled a gap in the literature by showing that not only did an atypical social anxiety subgroup exist over time, but that they were engaging in more maladaptive behaviors (alcohol use, drug use, NSSI) than the social anxiety-low alcohol use group over the long term in emerging adulthood.

While higher levels of club activities differentiated the social anxiety-low alcohol use group from the social anxiety-high alcohol use group in Year 1, this pattern of effects did not remain stable over time. Instead, the social anxiety-low alcohol use group displayed a downward trend, starting in first year, that was distinct from the other groups; the four remaining groups exhibited an initially increasing trajectory that peaked in fourth year and subsequently decreased over the last three years. In our previous research (Brook & Willoughby, 2016), we interpreted the association of significantly higher levels of club activities in Year 1 with the social anxiety-low alcohol use group relative to the social anxiety-high alcohol use group as a more adaptive behavior. Yet, the implication from the evidence gathered longitudinally suggests that it was the social anxiety-low

alcohol use group that actually exhibited the more unusual club activities behavior. It is unclear as to why this discrepancy existed. We speculate that reports on club activities in the first year might have reflected participation in activities prior to university, and that entrance into a new and socially threatening context may have solicited behavior more consistent with that which is typical of the social anxiety profile (i.e., inhibition and avoidance of social situations). In contrast, the higher levels of the personality-based trait BAS fun seeking might have been instrumental in the manifestation of a “normative” club activities trend for the social anxiety-high alcohol use group as compared to the social anxiety-low alcohol use group.

Heterogeneity in Social Anxiety: Relations with Personality-Based Characteristics

In nonclinical populations, heterogeneity in social anxiety has been explained by differences in impulsivity (Tillfors, Van Zalk, et al., 2013) and reward sensitivity (Nicholls et al., 2014). Heterogeneity in shyness – a construct closely associated with social anxiety through its defining features of fear and anxiety in relation to social situations - also has been examined in relation to sociability (Jones et al., 2014). To build on these findings, we were interested in identifying whether heterogeneity in our two social anxiety groups also might be related to personality-based characteristics. Our results indicated that only impulsivity and sensation seeking (BAS fun seeking), but not reward sensitivity or affinity for aloneness (an inverse proxy for sociability), distinguished between our two social anxiety groups. These findings are discussed below in more detail.

In consideration of the personality-based characteristic of impulsivity, our previous work had reported that the social anxiety-high alcohol use group was associated

with significantly higher scores of BAS fun seeking in Year 1 than the social anxiety-low alcohol use group and significantly lower scores than the alcohol use group (Brook & Willoughby, 2016). We had speculated that perhaps the one item of impulsivity contained in the BAS fun seeking scale might have accounted for the social anxiety-high alcohol use group's more at-risk behavioral profile. Even after taking out this impulsivity item, however, the results from the current research confirmed our original findings that BAS fun seeking still differentiated between the two social anxiety groups. Furthermore, BAS fun seeking showed considerable stability among the five groups across time.

A stronger measure of impulsivity was introduced into the study at Year 4. Not only did the social anxiety-high alcohol use group have the highest scores on impulsivity across the four waves, but impulsivity also exhibited stability among all five groups over the same time period. Thus, both the results for BAS fun seeking and impulsivity were consistent with previous work that linked an atypical impulsive social anxiety group with the at-risk behaviors of alcohol and drug misuse (Tillfors, Mörtberg, et al., 2013). Indeed, our results converged with the well-established evidence of a strong relation between the personality characteristics of impulsivity and sensation seeking (fun seeking) with risk taking behavior (Zuckerman & Kuhlman, 2000). Our findings, however, further added to the literature on social anxiety by providing evidence that the pattern of effects continued across the university years and after graduation, suggesting considerable stability in the relation among social anxiety, impulsivity, fun seeking and a vulnerability to risk taking behavior over emerging adulthood.

In our research, differences in reward sensitivity were not related to heterogeneity in social anxiety. This was first observed in our previous study in which we showed that

the two social anxiety groups were not significantly differentiated by either BAS drive or BAS reward responsiveness in Year 1. Moreover, this was confirmed in the current research as both BAS drive and BAS reward responsiveness remained stable across time among the five groups. These results were contradictory to a report in the literature on a nonclinical population that found reward sensitivity was associated with heterogeneity in social anxiety (Nicholls et al., 2014). Nicholls and colleagues' (2014) differing results, however, might have been a consequence of using a different BIS/BAS scale. Nonetheless, our data indicated that there might be an important distinction between BAS drive/BAS reward responsiveness and BAS fun seeking with respect to heterogeneity in social anxiety – a finding that is worth investigating further in future research.

In this study we also explored whether affinity for aloneness (inverse proxy for sociability) would discriminate between our two social anxiety groups in Year 7, but our findings were not significant. Indeed, the social anxiety-high alcohol use group appeared to report the highest levels of affinity for aloneness. Unfortunately, our results were not consistent with the shyness literature, despite the fact that our reasoning for testing this hypothesis was grounded in evidence that showed the closely related construct of shyness also was multidimensional (Asendorpf, 1990; Jones et al., 2014). These previous studies found that shyness existed along a continuum of varying levels of shyness and sociability together; those high in shyness but low in sociability displayed avoidant behavior in social circumstances, whereas those high in shyness and high in sociability exhibited conflicted behavior with respect to socialization. Furthermore, behavioral correlates distinguished between these two subtypes of shyness such that the conflicted subtype was more likely to engage in risk-taking behaviors than the avoidant subtype. Our lack of significant findings for affinity for aloneness may

have been to due to our measure. Questions that specifically assessed preference for spending time with people (e.g., I like to be with people) would have been helpful to include rather than only questions that measured the positive merits of being alone (e.g., to think something over, I want to be alone). Indeed, those with social anxiety likely have a preference for being alone given the characteristics that are typically associated with social anxiety, such as avoidance and withdrawal. However, this does not exclude the possibility that some individuals with social anxiety also might like being with people. Consequently, in light of past research in the shyness domain, future research should consider a retest of the hypothesis that sociability is related to heterogeneity in social anxiety with a more compelling measure.

Strengths and Limitations

The longitudinal nature of this research not only expanded our knowledge of the stability and change in social anxiety, alcohol use, and psychosocial functioning in the senior years of university, but also added to the literature by continuing to study these effects after graduation. More importantly, we established that the two social anxiety groups originally differentiated by their behavior in Year 1 of university maintained their distinct profiles over the long term, across a key transition into the adult world. The social anxiety-high alcohol use group continued to display greater at-risk behaviors than the social anxiety-low alcohol use group and this persisted over seven waves of data. The inference from this work is that social anxiety remains relatively stable across emerging adulthood. Indeed, the maladaptive behaviors associated with only a subset of individuals with social anxiety is concerning because these behaviors continued to persist over the long term.

Despite the significant strengths of this research with respect to measuring stability and change in psychosocial functioning over university and after graduation, there were several limitations to this research. To begin, our intention to assess specific personality-based characteristics as potential explanations of heterogeneity in social anxiety was confounded in part by the measures used. For instance, affinity for aloneness did not specifically tap into the construct being studied – the inverse desire to be with others. Furthermore, we realize that a more in-depth study that included several measures capturing the multidimensional nature of impulsivity also might have best assessed this construct. A recent publication reviewed the many terms associated with impulsivity and concluded that there were common themes associated with the multidimensional nature of impulsivity including perseverance, premeditation, and negative urgency (Kocka & Gagnon, 2014). While the addition of an impulsivity scale to the survey in Year 4 confirmed the findings from our original study with respect to BAS fun seeking (i.e., a component of impulsiveness was associated with our atypical group), a more thorough understanding of the differing personality-based characteristics (e.g., impulsivity, sociability, reward sensitivity, etc.) and their relation to heterogeneity in social anxiety might be achieved by studying a variety of measures (Kocka & Gagnon, 2014). We also had some concern with our measurement of club activities. While our original intent was to assess another aspect of sociability outside of friendship, it may be that the exclusion of sport activities might have biased our results. In the university context, sports are often the most popular extra curricular activity, and consequently, the pattern of effects found among the groups might have differed if we had included this activity in our measure.

Finally, future research should explore whether sex might moderate any of the relations studied in this research. While we did not find significant differences in social anxiety between male and female participants over time, research has suggested that females are likely to report higher levels of social anxiety than males (La Greca & Lopez, 1998). Sex differences also are important to studying alcohol use. Evidence indicates that males are likely to consume more alcohol than females, although both sexes experience adverse consequences from drinking (Ham & Hope, 2003). Thus, the lack of clarity on sex differences suggests they should be considered in testing hypotheses on social anxiety and alcohol use, but the complexity of this longitudinal study compelled us to set aside questions about sex differences for future research.

Conclusions

Our research indicated that a previously identified atypical social anxiety type (i.e., impulsive and fun seeking) continued to report at-risk behaviors across university and after graduation, including alcohol use, drug use and NSSI lifetime. Health professionals interested in reducing the potentially negative effects of social anxiety on psychosocial outcomes (i.e., emotional, social, or physical) during emerging adulthood might consider a two-pronged approach. On the one hand, they could offer strategies for coping with and reducing avoidant behaviors for students with social anxiety who exhibit internalizing problems – such as cognitive-behavioral strategies that redirect negative thoughts. On the other hand, an atypical group of students with social anxiety also displaying externalizing difficulties might benefit from an added focus on strategies that deal with preventing or reducing the problematic behaviors associated with alcohol use, illegal drug use and NSSI behavior – perhaps strategies that address impulsivity or self-regulation. From a

developmental perspective, the findings of stability in behavior suggest it might be important for health and educational programs to target younger populations with prevention strategies that are continued in a cohesive manner across university, a transitional time when students are exposed to the many pressures of achieving in competing developmental tasks.

Table 4-1
Means and Standard Deviations of Study Variables between Year 1 to Year 7 (N = 1132).

Measure	Time 1	Time 2	Time 3	Time 4	Time 5	Time 6	Time 7	Range	α
<i>Covariates</i>									
Age	19.06 (0.87)	-	-	-	-	-	-	17-25	-
Sex	70.5% female	-	-	-	-	-	-	1=male	-
Parent Education	3.82 (1.98)	-	-	-	-	-	-	1-6	-
General Anxiety	3.12 (0.72)	-	-	-	-	-	-	1-5	.80
Depressive	2.11 (0.65)	-	-	-	-	-	-	1-5	.91
<i>Class Indicators</i>									
Social Anxiety	1.74 (0.52)	1.73 (0.51)	1.73 (0.54)	1.71 (0.51)	1.68 (0.54)	1.67 (0.57)	1.68 (0.56)	1-4	.90-.93
Alcohol Use	3.32 (1.19)	3.37 (1.07)	3.22 (1.03)	3.15 (0.99)	3.12 (0.95)	3.05 (0.89)	2.95 (0.92)	1-6	-
<i>Psychosocial Functioning</i>									
Internalizing	2.33 (0.86)	2.36 (0.84)	2.41 (0.87)	2.46 (0.86)	2.71 (0.60)	2.71 (0.61)	2.69 (0.62)	1-4	-
NSSI Lifetime	1.20 (1.18)	1.46 (1.95)	1.61 (2.04)	1.76 (2.09)	1.83 (2.14)	1.89 (2.17)	1.91 (2.18)	1-6	-
Friendship	3.22 (0.48)	3.19 (0.54)	3.18 (0.51)	3.17 (0.52)	3.18 (0.53)	3.22 (0.56)	3.21 (0.55)	1-4	.89-.93
Drug Use	1.75 (0.88)	1.78 (0.83)	1.79 (0.82)	1.77 (0.81)	1.73 (0.79)	1.72 (0.79)	1.73 (0.82)	1-6	-
Impulsivity	-	-	-	2.55 (0.61)	2.43 (0.63)	2.42 (0.64)	2.36 (0.62)	1-5	.78-.82
Club Activities	1.86 (1.37)	1.80 (1.48)	1.90 (1.53)	2.00 (1.59)	1.85 (1.45)	1.47 (1.15)	1.47 (1.13)	1-6	-
BAS fun seeking	2.91 (0.57)	2.82 (0.62)	2.83 (0.62)	2.78 (0.62)	2.76 (0.61)	2.73 (0.62)	2.69 (0.63)	1-4	.83-.86
BAS drive	2.70 (0.62)	2.69 (0.59)	2.74 (0.60)	2.73 (0.59)	2.75 (0.59)	2.75 (0.60)	2.72 (0.61)	1-4	.83-.86
BAS reward	3.31 (0.54)	3.29(0.55)	3.34 (0.55)	3.34 (0.52)	3.33 (0.54)	3.30 (0.55)	3.31 (0.60)	1-4	.85-.89
Affinity for Aloneness	-	-	-	-	-	-	2.30 (0.38)	1-4	.88

Note. Depressive = depressive symptoms, Internalizing = composite of behavioral inhibition system, emotional reactivity, and daily hassles, NSSI = suicidal self-injury, Friendship = friendship quality, Drug use = composite of daily smoking, marijuana use, and hard drug use, BAS = behavioral approach system, reward = reward responsiveness. For all study variables, higher scores equaled higher levels of the construct.

Table 4-2

Correlations of Study Variables at Time 1

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 Age	-	-.067*	-.077**	-.033	-.010	-.032	-.005	.004	.030	-.065*	.044	-.005	-.004	.020	.012
2 Sex		-	-.149**	.333**	.190**	.033	-.320**	.259**	-.028	.230**	-.207**	.121**	.008	-.069*	.126**
3 Par Edu			-	-.072**	-.090**	.056	-.023	-.045	-.033	-.004	.008	.016	.008	.045	.017
4 Gen Anx				-	.463**	.355**	-.215**	.542**	.124**	-.096**	-.212**	.053	-.195**	-.157**	.044
5 Depress					-	.373**	.012	.575**	.242**	-.364**	.060*	-.023	-.039	-.107**	-.126**
6 Soc Anx						-	-.166**	.387**	.156**	-.356**	-.086**	-.031	-.185**	-.199**	-.033
7 Alcohol							-	-.091**	.023	-.023	.556**	-.135**	.242**	.143**	-.101**
8 Int								-	.171**	-.172**	-.049	.041	-.036	-.030	.050
9 NSSI									-	-.204**	.126**	.033	.080**	-.009	-.040
10 Friend										-	-.085**	.053	.125**	.116**	.293**
11 Drug Use											-	-.076*	.276**	.097**	-.128**
12 Clubs												-	.037	.035	.117**
13 BASfun													-	.426**	.294**
14 BASdri														-	.369**
15 BASrew															-

Note. Par Edu = parent education, Gen Anx = general anxiety, Depress = depressive symptoms, Soc Anx = social anxiety, Alcohol = alcohol use, Int = composite of behavioral inhibition system, emotional reactivity, and daily hassles, NSSI = nonsuicidal self-injury over the lifetime, Friend = friendship quality, Drug Use = composite of behavioral inhibition system, emotional reactivity, and daily hassles daily smoking, marijuana and hard drug use, Clubs = club activities, BAS = behavioral approach system: fun = fun seeking, dri = drive, rew = reward responsiveness. T1 = time 1, T2 = time 2, T3 = time 3. * $p < .05$. ** $p < .01$.

Table 4-3

Dummy Coded Comparisons Between Five Latent Groups on the Growth Factors from Trajectories of Social Anxiety Symptoms and Alcohol Use Between Year 1 and Year 7 (N = 1132).

Measure	Group Comparisons	Growth Factors		
		Intercept	Linear Slope	Quadratic Slope
<i>Social Anxiety Symptoms</i>	1-2	ns	ns	ns
	1-3	< .001	ns	ns
	1-4	< .001	ns	ns
	1-5	< .001	ns	.002
	2-3	< .001	ns	ns
	2-4	< .001	ns	ns
	2-5	< .001	ns	< .001
$\chi^2(39) = 158.601, p < .001, RMSEA = .042 (.034, .049), p = .965, CFI = .973$				
<i>Alcohol Use</i>	1-2	< .001	< .001	ns
	1-3	< .001	ns	ns
	1-4	< .001	< .001	ns
	1-5	< .001	< .001	.004
	2-3	< .001	< .001	ns
	2-4	< .001	ns	ns
	2-5	< .001	ns	ns
$\chi^2(39) = 213.516, p < .001, RMSEA = .051 (.044, .059), p = .355, CFI = .977$				

Note: 1 = social anxiety-high alcohol use, 2 = social anxiety-low alcohol use, 3 = low social anxiety-high alcohol use, 4 = low social anxiety-moderate alcohol use, 5 = low social anxiety-low alcohol use. ns = non significant differences between groups (Bonferroni corrected for multiple comparisons, $p < .007$).

Table 4-4
Dummy Coded Comparisons Between Five Latent Groups on Growth factors from Trajectories of Nine Psychosocial Functioning Study Variables Between Year 1 and Year 7 (N = 1132).

Measure	Group Comparisons	Growth Factors		
		Intercept	Linear Slope	Quadratic Slope
<i>Internalizing Problems</i>	1-2	ns	ns	ns
	1-3	.002	ns	ns
	1-4	< .001	ns	ns
	1-5	< .001	ns	ns
	2-3	ns	ns	ns
	2-4	.002	ns	ns
	2-5	.001	ns	ns
$\chi^2(39) = 70.365, p = .079, RMSEA = .016 (.000, .026), p = 1.000, CFI = .995$				
<i>NSSI Lifetime</i>	1-2	ns	ns	ns
	1-3	ns	ns	ns
	1-4	.002	ns	ns
	1-5	ns	ns	ns
	2-3	ns	ns	ns
	2-4	ns	ns	ns
	2-5	ns	ns	ns
$\chi^2(39) = 796.159, p < .001, RMSEA = .110 (.104, .117), p < .001, CFI = .963$				
<i>Friendship Quality</i>	1-2	ns	ns	ns
	1-3	<.001	ns	ns
	1-4	<.001	ns	ns
	1-5	ns	ns	ns
	2-3	<.001	ns	ns
	2-4	<.001	ns	ns
	2-5	ns	ns	ns
$\chi^2(39) = 55.744, p = .447, RMSEA = .004 (.000, .019), p = 1.000, CFI = 1.000$				
<i>Drug Use</i>	1-2	<.001	ns	ns
	1-3	ns	ns	ns
	1-4	<.001	ns	ns
	1-5	<.001	ns	ns
	2-3	<.001	ns	ns
	2-4	<.001	ns	ns
	2-5	ns	ns	ns
$\chi^2(39) = 158.009, p < .001, RMSEA = .042 (.034, .049), p = .967, CFI = .984$				
<i>Impulsivity*</i>	1-2	.003	ns	-
	1-3	ns	ns	-
	1-4	<.001	ns	-
	1-5	<.001	ns	-
	2-3	ns	ns	-
	2-4	ns	ns	-
	2-5	ns	ns	-
$\chi^2(23) = 26.685, p = .270, RMSEA = .014 (.000, .033), p = 1.00, CFI = .997$				

<i>Club Activities</i>	1-2	.004	.004	ns
	1-3	ns	ns	ns
	1-4	ns	ns	ns
	1-5	ns	ns	ns
	2-3	<.001	.003	ns
	2-4	ns	.002	.006
	2-5	ns	.002	.002
$\chi^2(39) = 165.022, p < .001, RMSEA = .043 (.035, .051), p = .937, CFI = .858$				
<i>BAS-fun seeking</i>	1-2	.002	ns	ns
	1-3	<.001	ns	ns
	1-4	ns	ns	ns
	1-5	ns	ns	ns
	2-3	<.001	ns	ns
	2-4	<.001	ns	ns
	2-5	ns	ns	ns
$\chi^2(39) = 73.177, p = .193, RMSEA = .017 (.000, .027), p = 1.000, CFI = .990$				
<i>BAS-drive</i>	1-2	ns	ns	ns
	1-3	<.001	ns	ns
	1-4	ns	ns	ns
	1-5	ns	ns	ns
	2-3	<.001	ns	ns
	2-4	<.001	ns	ns
	2-5	ns	ns	ns
$\chi^2(39) = 64.466, p = .179, RMSEA = .013 (.000, .024), p = 1.000, CFI = .995$				
<i>BAS-reward responsive</i>	1-2	ns	ns	ns
	1-3	ns	ns	ns
	1-4	ns	ns	ns
	1-5	ns	ns	ns
	2-3	ns	.004	ns
	2-4	ns	ns	ns
	2-5	ns	ns	ns
$\chi^2(39) = 56.175, p = .431, RMSEA = .004 (.000, .020), p = 1.000, CFI = .999$				

Note: 1 = social anxiety-high alcohol use, 2 = social anxiety-low alcohol use, 3 = low social anxiety-high alcohol use, 4 = low social anxiety-moderate alcohol use, 5 = low social anxiety-low alcohol use.

Internalizing Problems = composite of BIS, daily hassles/stress, and emotional reactivity. Drug Use = composite of smoking, marijuana use, and illegal drugs use. BAS = Behavioral Approach System. ns = non significant differences between groups. *The linear function was the best fitting model for the impulsivity data over four waves. All other psychosocial variables in the graph were measured over seven waves.

(Bonferroni corrected for multiple comparisons, $p < .007$).

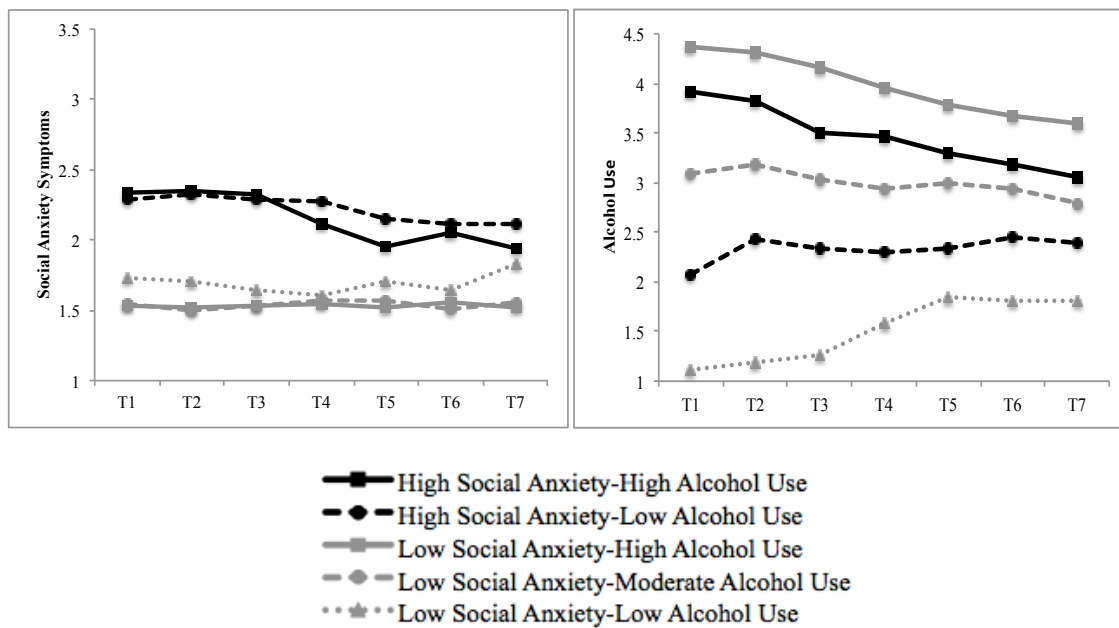
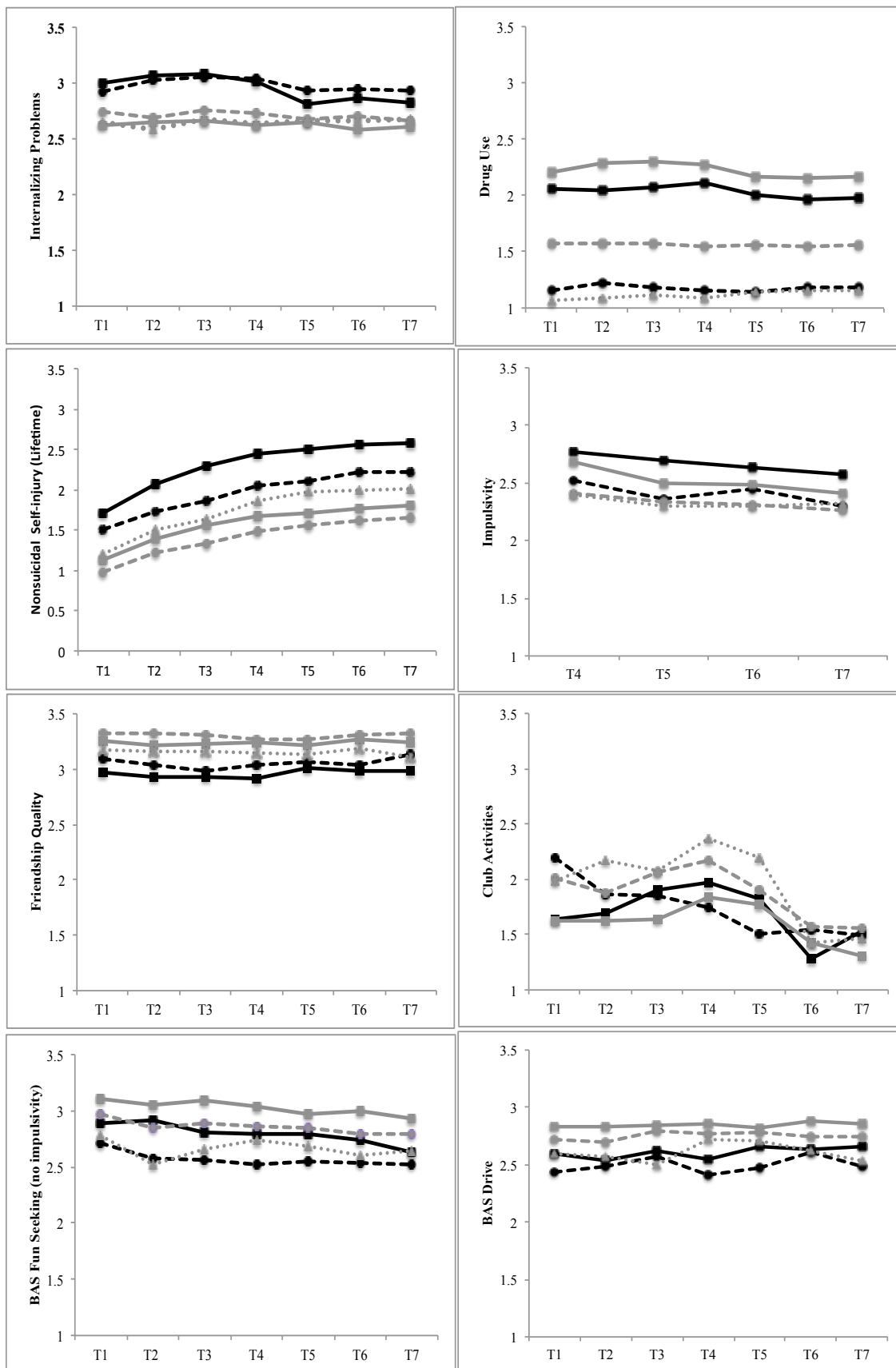


Figure 4-1. The latent growth trajectories of social anxiety symptoms and alcohol use for the five groups. T = successive annual time points of the estimated means.



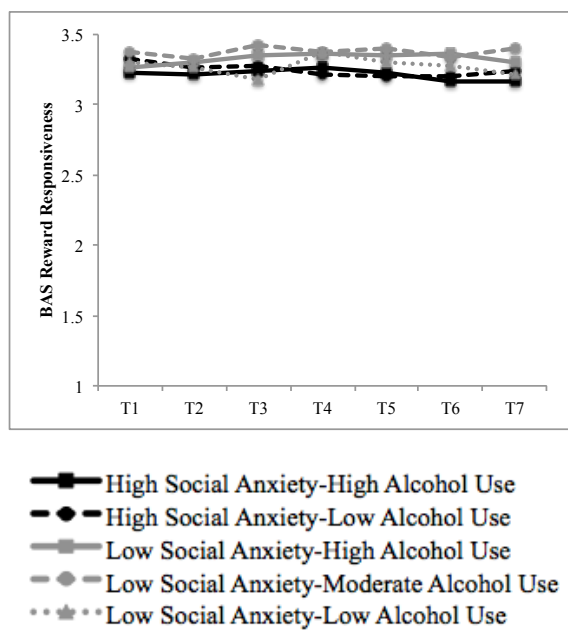


Figure 4-2. The latent growth trajectories of psychosocial functioning for the five groups. T = successive annual time points of the estimated means.

References

- Armsden, G. C., & Greenberg, M. T. (1987). The inventory of parent and peer attachment: Individual differences and their relationship to psychological well-being in adolescence. *Journal of Youth and Adolescence*, *16*(5), 427-454. doi:org/10.1007/BF02202939
- Arnett, J. J. (2000). Emerging adulthood: A theory of development from the late teens through the twenties. *American Psychologist*, *55*(5), 469-480. doi:10.1037/0003-066x.55.5.469
- Asendorpf, J. B. (1990). Beyond social withdrawal: Shyness, unsociability, and peer avoidance. *Human Development*, *33*(4-5), 250-259.
- Binelli, C., Muñiz, A., Sanches, S., Ortiz, A., Navines, R., Egmond, E., . . . Martín-Santos, R. (2015). New evidence of heterogeneity in social anxiety disorder: Defining two qualitatively different personality profiles taking into account clinical, environmental and genetic factors. *European Psychiatry*, *30*(1), 160-165. doi:10.1016/j.eurpsy.2014.09.418
- Brook, C. A., & Willoughby, T. (2016). Social anxiety and alcohol use across the university years: Adaptive and maladaptive groups. *Developmental Psychology*, *52*(5), 835-845. doi:10.1037/dev0000110
- Buckner, J. D., Heimberg, R. G., & Schmidt, N. B. (2011). Social anxiety and marijuana-related problems: The role of social avoidance. *Addictive Behaviors*, *36*(1-2), 129-132. doi:10.1016/j.addbeh.2010.08.015

- Buckner, J. D., Schmidt, N., B., & Eggleston, A. M. (2006). Social anxiety and problematic alcohol consumption: The mediating role of drinking motives and situations. *Behavior Therapy, 37*, 381-391. doi:10.1016/j.beth.2006.02.007
- Carver, C. S., & White, T. L. (1994). Behavioral inhibition, behavioral activation, and affective responses to impending reward and punishment: The BIS/BAS Scales. *Journal of Personality and Social Psychology, 67*(2), 319-333. doi:10.1037/0022-3514.67.2.319
- Chartrand, H., Sareen, J., Toews, M., & Bolton, J. M. (2012). Suicide attempts versus nonsuicidal self - injury among individuals with anxiety disorders in a nationally representative sample. *Depression and Anxiety, 29*(3), 172-179. doi:10.1002/da.20882
- Costanzo, P. R., Malone, P. S., Belsky, D., Kertesz, S., Pletcher, M., & Sloan, F. A. (2007). Longitudinal differences in alcohol use in early adulthood. *Journal of Studies on Alcohol and Drugs, 68*(5), 727-737. doi:10.15288/jsad.2007.68.727
- Cummings, C. M., Caporino, N. E., & Kendall, P. C. (2014). Comorbidity of anxiety and depression in children and adolescents: 20 years after. *Psychological Bulletin, 140*(3), 816-845. doi:10.1037/a0034733
- Curran, P. J., Obeidat, K., & Losardo, D. (2010). Twelve frequently asked questions about growth curve modeling. *Journal of Cognition and Development, 11*(2), 121-136. doi:10.1080/15248371003699969
- Dawe, S., & Loxton, N. J. (2004). The role of impulsivity in the development of substance use and eating disorders. *Neuroscience and Biobehavioral Reviews, 28*(3), 343-351. doi:10.1016/j.neubiorev.2004.03.007

- Erikson, E. H. (1966). Eight ages of man. *International Journal of Psychiatry*, 2(3), 281-300. doi:none
- Ham, L. S., & Hope, D. A. (2003). College students and problematic drinking: A review of the literature. *Clinical Psychology Review*, 23(5), 719-759. doi:10.1016/S0272-7358(03)00071-0
- Heath, N. L., Toste, J. R., Nedecheva, T., & Charlebois, A. (2008). An Examination of Nonsuicidal Self-Injury Among College Students. *Journal of Mental Health Counseling*, 30(2), 137-156.
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6(1), 1-55. doi:org/10.1080/10705519909540118
- Johansson, K., San Sebastian, M., Hammarström, A., & Gustafsson, P. E. (2015). Neighbourhood disadvantage and individual adversities in adolescence and total alcohol consumption up to mid-life—Results from the Northern Swedish Cohort. *Health Place*, 33, 187-194. doi:10.1016/j.healthplace.2015.03.005
- Johnston, L. D., O'Malley, P. M., Bachman, J. G., Schulenberg, J. E., & Miech, R. A. (2015). Monitoring the future national survey results on drug use, 1975-2015: Volume 2, College students and adults ages 19-55. In (Vol. II: College students and adults ages 19-55). Ann Arbor, Michigan: University of Michigan. Retrieved from http://www.monitoringthefuture.org//pubs/monographs/mtf-vol2_2015.pdf.
- Jones, K. M., Schulkin, J., & Schmidt, L. A. (2014). Shyness: Subtypes, psychosocial correlates, and treatment interventions. *Psychology*, 5(3), 244-254. doi:10.4236/psych.2014.53035

- Kashdan, T. B., Elhai, J. D., & Breen, W. E. (2008). Social anxiety and disinhibition: An analysis of curiosity and social rank appraisals, approach-avoidance conflicts, and disruptive risk-taking behavior. *Journal of Anxiety Disorders, 22*(6), 925-939.
doi:10.1016/j.janxdis.2007.09.009
- Kashdan, T. B., & Hofmann, S. G. (2008). The high-novelty-seeking, impulsive subtype of generalized social anxiety disorder. *Depression and Anxiety, 25*(6), 535-541.
doi:doi: 10.1002/da.20382
- Kashdan, T. B., McKnight, P. E., Richey, J. A., & Hofmann, S. G. (2009). When social anxiety disorder co-exists with risk-prone, approach behavior: Investigating a neglected, meaningful subset of people in the National Comorbidity Survey-Replication. *Behaviour Research and Therapy, 47*(7), 559-568.
doi:10.1016/j.brat.2009.03.010
- Kocka, A., & Gagnon, J. (2014). Definition of Impulsivity and Related Terms Following Traumatic Brain Injury: A Review of the Different Concepts and Measures Used to Assess Impulsivity, Disinhibition and other Related Concepts. *Behavioral Sciences, 4*(4), 352-370. doi:10.3390/bs4040352
- La Greca, A. M., & Lopez, N. (1998). Social anxiety among adolescents: Linkages with peer relations and friendships. *Journal of Abnormal Child Psychology, 26*(2), 83-94. doi:10.1023/A:1022684520514
- Lahat, A., Hong, M., & Fox, N. A. (2011). Behavioural inhibition: Is it a risk factor for anxiety? *International Review of Psychiatry, 23*(3), 248-257.
doi:10.3109/09540261.2011.590468

- Marcoen, A., Goossens, L., & Caes, P. (1987). Loneliness in pre- through late adolescence: Exploring the contributions of a multidimensional approach. *Journal of Youth and Adolescence*, *16*(6), 561-577. doi:10.1007/BF02138821
- McNeil, D. W. (2010). Evolution of terminology and constructs in social anxiety and its disorders. In S. G. Hofmann & P. M. DiBartolo (Eds.), *Social anxiety: Clinical, developmental, and social perspectives* (2nd ed., pp. 3-21). New York: Academic Press.
- Meyer, T. J., Miller, M. L., Metzger, R. L., & Borkovec, T. D. (1990). Development and validation of the Penn State Worry Questionnaire. *Behaviour Research and Therapy*, *28*, 487-495. doi:10.1016/0005-7967(90)90135-6
- Mörtberg, E., Tillfors, M., Van Zalk, N., & Kerr, M. (2014). An atypical anxious - impulsive pattern of social anxiety disorder in an adult clinical population. *Scandinavian Journal of Psychology*, *55*, 350-356. doi:10.1111/sjop.12117
- Muthén, L. K., & Muthén, B. O. (1998-2015). *Mplus User's Guide* (7th ed.). Los Angeles, CA: Muthén & Muthén.
- Nicholls, J., Staiger, P. K., Williams, J. S., Richardson, B., & Kambouropoulos, N. (2014). When social anxiety co-occurs with substance use: Does an impulsive social anxiety subtype explain this unexpected relationship? *Psychiatry Research*, *220*(3), 909-914. doi:10.1016/j.psychres.2014.08.040
- Nock, M. K., Wedig, M. M., Holmberg, E. B., & Hooley, J. M. (2008). The Emotion Reactivity Scale: Development, evaluation, and relation to self-injurious thoughts and behaviors. *Behavior Therapy*, *39*(2), 107-116. doi:10.1016/j.beth.2007.05.005

- Norberg, M. M., Olivier, J., Alperstein, D. M., Zvolensky, M. J., & Norton, A. R. (2011). Adverse consequences of student drinking: The role of sex, social anxiety, drinking motives. *Addictive Behaviors, 36*(8), 821-828.
doi:10.1016/j.addbeh.2011.03.010
- Patton, J. H., Stanford, M. S., & Barratt, E. S. (1995). Factor structure of the Barratt Impulsiveness Scale. *Journal of Clinical Psychology, 51*(6), 768-774.
doi:10.1002/1097-4679(199511)51:6<768::AID-JCLP2270510607>3.0.CO;2-1
- Radloff, L. S. (1977). The CES-D Scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1*, 385-401.
doi:10.1177/014662167700100306
- Santesso, D. L., Schmidt, L. A., & Fox, N. A. (2004). Are shyness and sociability still a dangerous combination for substance use? Evidence from a US and Canadian sample. *Personality and Individual Differences, 37*(1), 5-17.
doi:10.1016/j.paid.2003.08.023
- Schafer, J. L., & Graham, J. W. (2002). Missing data: Our view of the state of the art. *Psychological Methods, 7*, 147-177. doi:10.1037/1082-989X
- Schmidt, L. A., & Buss, A. H. (2010). Understanding shyness: Four questions and four decades of research. In K. H. Rubin & R. J. Coplan (Eds.), *The development of shyness and social withdrawal*. (pp. 23-41). New York, NY US: Guilford Press.
- Schry, A. R., & White, S. W. (2013). Understanding the relationship between social anxiety and alcohol use in college students: A meta-analysis. *Addictive Behaviors, 38*(11), 2690-2706. doi:10.1016/j.addbeh.2013.06.014

- Tabachnick, B. G., & Fidell, L. S. (2013). *Using multivariate statistics* (6th ed.). Boston: Pearson Education.
- Tavernier, R., & Willoughby, T. (2012). Adolescent turning points: The association between meaning-making and psychological well-being. *Developmental Psychology, 48*(4), 1058-1068. doi:10.1037/a0026326
- Tillfors, M., Mörtberg, E., Van Zalk, N., & Kerr, M. (2013). Inhibited and impulsive subgroups of socially anxious young adults: Their depressive symptoms and life satisfaction. *Open Journal of Psychiatry*(3), 195-201.
doi:10.4236/ojpsych.2013.31A016
- Tillfors, M., Van Zalk, N., & Kerr, M. (2013). Investigating a socially anxious-impulsive subgroup of adolescents: A prospective community study. *Scandinavian Journal of Psychology, 54*(3), 267-273. doi:10.1111/sjop.12047
- Wilkinson, R. G. (1999). Health, hierarchy, and social anxiety. In N. E. Adler, M. Marmot, B. S. McEwen, & J. Stewart (Eds.), *Socioeconomic status and health in industrial nations: Social, psychological, and biological pathways* (pp. 48-63). New York, NY, US: New York Academy of Sciences.
- Willoughby, T., Good, M., Adachi, P. J., Hamza, C. A., & Tavernier, R. (2013). Examining the link between adolescent brain development and risk taking from a social-developmental perspective. *Brain and Cognition, 83*, 315-323.
doi:org/10.1016/j.bandc.2013.09.008
- Zuckerman, M., & Kuhlman, D. M. (2000). Personality and risk-taking: Common biosocial factors. *Journal of Personality, 68*(6), 999-1029. doi:10.1111/1467-6494.00124

Chapter 5: General Discussion

The purpose of my dissertation was to investigate the impact of social anxiety on the psychosocial functioning of students during university and over the longer term. My focus was on the developmental tasks of academic achievement and socialization (specifically related to the effects of new social ties and the normative social custom of drinking alcohol), which play a role in future health and wellbeing (Erikson, 1966; McMahon & Oketch, 2013). Previous research has descriptively explored the relation between social anxiety and social, emotional and academic difficulties in university (Russell & Topham, 2012). I expanded on this work by longitudinally investigating the association between social anxiety and psychosocial functioning over time, considering temporal order and reciprocal associations (using an autoregressive cross-lagged model), examining the possibility of heterogeneity in the co-occurrence of social anxiety and alcohol use over time (using latent class growth analysis), investigating whether that heterogeneity was associated with psychosocial functioning at Time 1, and whether those results were stable over the long-term.

Across the three studies, the results significantly supported the following conclusions: 1) a direct negative relation between social anxiety and academic achievement across time, and an indirect negative association between social anxiety and achievement through new social ties (which was bidirectional); 2) heterogeneity in the co-occurrence of social anxiety and alcohol use (i.e., one group reported lower levels and the other higher levels of alcohol use), with both groups reporting similar avoidant/inhibited behaviors but dissimilar impulsive and fun seeking (sensation seeking)

behaviors; 3) relative stability in the co-occurrence of social anxiety and alcohol use across seven years (i.e., throughout emerging adulthood); 4) with very few exceptions, the stability of group psychosocial functioning profiles across time.

Using the results from my three studies as a foundation, the purpose of this discussion is to synthesize general themes arising from the research, and discuss the associated issues. Generally, the following discussion will be organized around two topics: 1) *The Development of Social Anxiety in Emerging Adulthood*; and 2) *The Psychosocial Functioning Correlates of Social Anxiety across Emerging Adulthood*. Furthermore, I will discuss how my findings about social anxiety during the period of emerging adulthood specifically can be integrated into a broader discussion of social anxiety across the developmental spectrum. Finally, I will outline a path for future research that will expand our knowledge on the development of social anxiety and its correlates across the lifespan.

Development of Social Anxiety in Emerging Adulthood

There have been very few studies investigating the development of social anxiety across emerging adulthood. Indeed, little research has assessed social anxiety longitudinally or in nonclinical samples. Until now, much of the longitudinal research has examined social anxiety across childhood and adolescence (Broeren, Muris, Diamantopoulou, & Baker, 2013; Marmorstein et al., 2010), investigated anxiety in general (Duchesne, Larose, Vitaro, & Tremblay, 2010), or examined SAD in clinical contexts (Merikangas & Angst, 1995). With respect to childhood and adolescence, the development of social anxiety has been reported to follow various pathways, based on a combination of high, moderate, or low social anxiety with stable or changing trajectories

(Broeren et al., 2013). These different trajectories, mapping both increasing and decreasing symptoms of social anxiety, indicated that there were individual differences in the development of social anxiety across this developmental period, which likely depended on some combination of temperament, the maturation of the emotional and cognitive systems, and exposure to new contexts and social situations. In fact, children take on many new developmental tasks over time (e.g., going to school, forming intimate friendships), which take them beyond the family circle to socialize with their peers and society at large. Those children with the greatest fear and avoidance tendencies followed a relatively persistent course of social anxiety across time (Broeren et al., 2013; Marmorstein et al., 2010). In contrast to childhood and adolescent anxiety, little is known about the course of social anxiety after late adolescence in nonclinical populations.

My longitudinal research fills a gap in the nonclinical literature by investigating the course of social anxiety across emerging adulthood. While all three of my studies looked at social anxiety, study three in particular captured the developmental trend of social anxiety over seven years. All five groups identified in study two – their membership based on the indicators of social anxiety and alcohol use - showed considerable stability in social anxiety across time, suggesting that group patterns of social anxiety persist across emerging adulthood. In my third study, a closer look at their trajectories indicated that social anxiety was highest during the first four years of university (highest marginal means across seven years) and probably were a reflection of the stressful nature of this transitional period. Indeed, these findings were most likely associated with the intense social expectations and academic pressures that existed within the university lifestyle and the fact that many students were living away from the support

of family for the first time. Overall, social anxiety seemed to chart a chronic course in emerging adulthood, possibly in response to the transition-related stresses and pressures of the university setting and after graduation.

Psychosocial Functioning Correlates of Social Anxiety across Emerging Adulthood

An overriding theme from this research was that social anxiety was associated with problematic behaviors related to achieving academically, socialization, risky behaviors, impulsivity, sensation seeking and emotional difficulties that appeared to occur over the long term. Although I studied these areas of psychosocial functioning through different methodologies (autoregressive cross-lagged path analysis, MANOVA, latent class, growth curve analysis) to tease apart the different relations between variables, the overall conclusion of my research was that individuals with social anxiety in university struggle more than their peers in a variety of domains. While some of these issues have been studied previously, they have not been considered together, in emerging adulthood, and most importantly, longitudinally for seven years. Each of these areas will be addressed below to present a more comprehensive picture of the relation between social anxiety and psychosocial functioning in emerging adulthood.

Academic achievement. The literature hints at social anxiety being related to difficulties in school but there was no evidence to support this hypothesis in emerging adulthood. For instance, two studies attempting to establish a direct relation between social anxiety and academic achievement in university were unsuccessful (Strahan, 2003; Topham & Moller, 2011). In younger populations, trajectories of general anxiety in elementary school predicted high school noncompletion (Duchesne, Vitaro, Larose, & Tremblay, 2008) and Social Phobia (clinical SAD) was associated with a greater risk of

leaving school early as retrospectively reported by adults (Van Ameringen, Mancini, & Farvolden, 2003). However, these latter two studies failed to take advantage of their longitudinal design to control for previous scores on academic achievement or to control for comorbidity with general anxiety and depressive symptoms. In contrast, in my first study, I found a direct link between social anxiety and academic achievement by addressing some statistical concerns (e.g., confounds, using path analysis to assess direction of effects). Thus, it appears that my results are the first to support the idea that social anxiety is directly related to academic achievement in emerging adulthood. Indeed, since social anxiety is defined by distress, avoidance, and/or fear of negative evaluation, it was not unexpected to find that social anxiety was likely disadvantageous to participation in class, group projects or any social situation encountered in the university setting. After all, university life and academia more broadly are largely contingent on social interactions among students, teaching assistants, professors and other staff and all these social activities are challenging for those with social anxiety.

Yet, a robust caveat to this conclusion was introduced by the results of my second study. Heterogeneity in social anxiety (based on alcohol use) revealed a subset of students with social anxiety and low alcohol use that were doing surprisingly well academically, with overall marks higher than the other social anxiety group with high alcohol use and many of their peers with low social anxiety. This heterogeneity in individuals reporting social anxiety points to the importance of assessing individual differences in distinct populations (looking for subgroups within groups), and being careful about making assumptions regarding individuals with social anxiety as though this were a homogeneous group. Most importantly, the choice of latent class growth

analysis revealed differences that were not detected through path analysis in my first study. Thus, these findings stress the importance of analyzing data from a number of different perspectives to discover the subtleties of the relation among variables.

Furthermore, it is likely that researchers, such as Strahan (2003) or Topham and Mollar (2011), had difficulty in detecting a direct relation between social anxiety and academic achievement because the social anxiety population is heterogeneous in nature. In this regard, my dissertation provided an important extension to previous research in this area.

Social ties. Another area of psychosocial functioning that was investigated in this thesis was social ties or the formation of new social connections in university. My first two studies examined this behavior in Year 1 and between Year 1 and Year 3 of university, respectively, and found those with social anxiety reported fewer new social ties than their peers. This was not surprising. In the literature, strong evidence was reported that supports the idea of social anxiety being associated with fewer intimate or close friendships and more negative peer experiences in adolescence. These findings in adolescence have been well summarized elsewhere (La Greca & Ranta, 2015). However, few researchers have looked at this relation in emerging adulthood and those who have, obtained conflicting results. One study found evidence of an inverse relation between social anxiety and the ease of forming relations in the first semester of university (Parade, Leerkes, & Blankson, 2010). Another longitudinal investigation across six months showed that social anxiety did not predict friendship quality in undergraduate students, although the reverse relation between friendship quality and social anxiety was found to be significant (Rodebaugh, Lim, Shumaker, Levinson, & Thompson, 2015). In contrast, my first study added to the literature by reporting evidence of a significant bidirectional

effect between social ties and social anxiety over three years. My third study also indicated that the relation between poorer friendship quality and social anxiety remained stable across seven waves of data. Thus, based on this research, students with social anxiety seem to have difficulty making friends and establishing close relations over the long term in emerging adulthood, signifying that the difficulties with friendships that were reported in adolescence appear to continue across university and after graduation. Furthermore, these results point to the benefits of research conducted over the long term revealing important information about the bidirectional and inverse relation between social anxiety and social ties/friendship, as compared to short-term (six-month) studies (Parade et al., 2010; Rodebaugh et al., 2015).

At-risk behaviors. The psychosocial functioning of students with social anxiety also was investigated in relation to alcohol use. In fact, the university years provided the perfect context for assessing this behavior; in the university setting increased drinking is normative behavior exacerbated by the pressure to conform socially (Terlecki & Buckner, 2015). Indeed, the literature reports extensively on a strong relation between alcohol use and problematic outcomes in general (Alcoholism, 2015). In regard to social anxiety specifically, a meta-analysis of the research studying the relation between social anxiety and alcohol use concluded that social anxiety was negatively associated with alcohol use but positively linked to alcohol-related problems, such as illnesses related to drinking and not being able to do homework or study for tests (Buckner, Schmidt, & Eggleston, 2006; Schry & White, 2013). To clarify these apparently contradictory findings, my person-centered second study found evidence for heterogeneity, yielding two groups with equivalent social anxiety scores but differential alcohol use scores. In Year 1 of

university, a subgroup of students with social anxiety and higher levels of alcohol use who exhibited an atypical avoidant/inhibited *and* impulsive/fun seeking profile reported more *at-risk behaviors* (sensation seeking, drug use, nonsuicidal self-injury - NSSI) than their peers with social anxiety and lower levels of alcohol use who displayed a prototypical avoidant/inhibited only profile. Not all students with social anxiety were drinking above average rates, but those who were appeared to be at particular risk for adverse outcomes, indeed, significantly more so than their peers. While the deficits associated with the negative effect of social anxiety (fear of negative evaluation, inhibition, and/or avoidance behavior) were expected to hinder a successful transition through university, my evidence indicated that there was a subgroup of those with social anxiety who were compromised even further by problem behaviors such as illegal drug use and NSSI.

Other researchers have explored heterogeneity in social anxiety but not in terms of its co-occurrence with alcohol use. Instead, researchers have explored heterogeneity in the nonclinical social anxiety population based on reward sensitivity (Nicholls, Staiger, Williams, Richardson, & Kambouropoulos, 2014), impulsivity (Tillfors, Van Zalk, & Kerr, 2013), or reckless behaviors other than general alcohol use, such as vandalism, shoplifting, and use of alcohol while driving (Kashdan, Elhai, & Breen, 2008). Consistent with my findings, these researchers all found an atypical social anxiety group as compared to a prototypical social anxiety group that was linked to alcohol and drug use/misuse (Nicholls et al., 2014; Tillfors et al., 2013). However, none of the studies looked at heterogeneity in social anxiety in relation to psychosocial functioning over the long term during emerging adulthood. Indeed, the strength of my third study was to

follow the trajectory of several at-risk behaviors - first identified in Year 1 of university - over 7 years, including after graduation. Through this transition, I found that psychosocial functioning remained stable across time, with very few exceptions. Moreover, the at-risk status associated with the atypical social anxiety group in Year 1 of university persisted over the long term. I speculated, based on the stability of behaviors over seven years, that if this sample were assessed further into the future, at-risk behaviors (e.g., financial, gambling, extra martial affairs) might well continue over the life course, especially as new challenging psychosocial developmental tasks came on line (e.g., marriage, parenthood, work, divorce) without the social support that appears to diminish the effects of social anxiety.

Emotional reactivity and impulsivity. A last but important area of psychosocial functioning assessed in my three studies was emotional reactivity, a characteristic considered to be a core component of social anxiety. In fact, social anxiety is a behavior that is rooted in constitutionally derived negative affect (a relation that is likely bidirectional over time). Thus, individuals with social anxiety are expected to be more emotionally reactive than their peers simply because it is an instinctive tendency before, during, and after social interactions or social situations that elicit social fear (Goldin, Manber, Hakimi, Canli, & Gross, 2009). In study two, both social anxiety groups reported the highest levels of emotional reactivity compared to their peers and this was consistent with models that have emphasized those with social anxiety have a bias toward attending to social threat (Rapee & Heimberg, 1997). Moreover, the findings from study three confirmed that this emotional tendency was a stable attribute across time. The more surprising finding was the realization that these emotional tendencies did not differentiate

between the prototypical and atypical social anxiety groups, despite the differences in their at-risk behavioral profiles.

A better understanding of the unique profile of the atypical group came from study two, in which I solicited information about behavioral responses to both positive and negative moods – referred to as emotion coping behaviors in the study.

Unexpectedly, only the atypical social anxiety group, as compared to all other groups, indicated that they self-injured in response to negative emotions (e.g., when feeling numb or wanting to punish themselves). I argued that this behavioral response signified a more dysfunctional emotion coping behavior while the prototypical social anxiety group was probably responding to negative affect with the expected avoidance safety behaviors. This association between the atypical group and NSSI was concerning in itself, but was even more concerning in light of recent evidence from our lab suggesting that NSSI might be a indicator of suicidal risk (Hamza & Willoughby, 2016). Indeed, given that I found NSSI persisted over time at significantly higher levels for the atypical social anxiety group, as compared to the other social anxiety and low social anxiety groups, it suggested that the atypical group presented a troubling and persistent at-risk profile that warrants attention by those involved in delivering suicide and other mental health prevention programs.

Finally, it was unclear in my second study, which identified heterogeneity in the socially anxious population based on alcohol use, why only the atypical social anxiety group appeared to be more susceptible to maladaptive (emotion coping) behaviors as compared to the prototypical social anxiety group. This was especially true because both groups reported having similar difficulties with emotional reactivity but only the atypical

social anxiety group reported a pattern of behaviors that included drinking above average consumption patterns, taking illegal drugs, self-injuring, and achieving more poorly in school. However, my third study shed some light on these differences by investigating impulsivity, which is a well-studied personality-based factor linked to many maladaptive outcomes including substance use and misuse, as well as NSSI (Dawe & Loxton, 2004; Hamza, Willoughby, & Heffer, 2015). My results indicated that the atypical group consistently had the highest levels of impulsivity over four years (a measure introduced into the study in Year 4), including levels of impulsivity higher than those of the high alcohol use group with low social anxiety.

From a neuroscience perspective, robust evidence has indicated that emotional reactivity (i.e., negative affect) and impulsivity are different behavioral responses that emanate from separate areas of the brain, namely, the socio-emotional and cognitive control systems, respectively (Steinberg, 2008). My findings conform to the research that posits two functionally different brain systems. While both the social anxiety groups in my research displayed similar emotional reactivity, as associated with the socio-emotional system, only the atypical social anxiety group reported poorer impulse control that is linked to the cognitive control system, suggesting that there were constitutional or maturational differences in this system between the two social anxiety groups. Indeed, only the atypical social anxiety group, as compared to the prototypical social anxiety group, also reported higher levels of approach behavior in the form of fun seeking or sensation seeking – behavior also closely associated with the socio-emotional system (Steinberg, 2008). Thus, my research suggested it might be the personality-based characteristics of impulsivity and sensation seeking linked to the at-risk behaviors of

alcohol use/misuse, illegal drug use, and NSSI that differentiated between the prototypical and atypical social anxiety groups. Furthermore, evidence from the second study proposed that these at-risk behaviors were a response to negative emotions that might be deemed more problematic (e.g., feeling numb, wanting to punish yourself) than affective states that might be usually encountered in daily university life (e.g., feeling stressed, angry or frustrated).

Future Research Directions

Based on the foregoing discussion, several avenues of future research suggest themselves. Most importantly, while this dissertation has focused considerable attention on the longitudinal associations between social anxiety and psychosocial functioning, it did not investigate mechanisms, except in relation to social anxiety, social ties and academic achievement in study one. Yet, the findings from study two and study three underscored the need to understand why only a subgroup of individuals with social anxiety was particularly vulnerable to behaviors that were maladaptive (e.g., self-injury). In the literature, a handful of groups have studied heterogeneity in social anxiety and its relations to psychosocial functioning concurrently, both in clinical (Binelli et al., 2015; Kashdan & McKnight, 2010) and nonclinical samples (Kashdan et al., 2008; Nicholls et al., 2014). The one exception was a community-based longitudinal study undertaken by Tillfors and colleagues (2013) that examined heterogeneity in social anxiety in relation to intoxication frequency/minor delinquency over three time points. Despite evidence for associations over time, the analysis did not control for stability of effects in behavior. I propose that a better approach to understanding reciprocal relations over the long term would be through an autoregressive cross-lagged design. This proposed study would

control for stability effects, associations between variables measured at the same time, and for all time-invariant covariates included at time one, while also examining the bidirectionality between constructs of interest. An analysis of this type would clarify the temporal ordering of effects and, from a developmental perspective, might reveal valuable information about behaviors and characteristics that precede or maintain the at-risk behaviors of the atypical social anxiety group over time.

Another issue that needs to be addressed is the possible effects of moderators on the relation between social anxiety and psychosocial functioning over the long term, particularly moderation by sex. Evidence for sex differences is mixed with respect to the key psychosocial functioning variables studied in this dissertation – social anxiety and alcohol use. On the one hand, some research has indicated that the prevalence of social anxiety is higher in females than males (La Greca & Lopez, 1998). However, other work has shown there are no differences in prevalence of social anxiety between males and females (Biggs, Vernberg, & Wu, 2012). Furthermore, although females and males differ in their consumption of alcohol, they both seem to experience the same problematic consequences from its use (Norberg, Olivier, Alperstein, Zvolensky, & Norton, 2011). Although I found sex did not moderate the relation between social anxiety and academic achievement in my first study, statistical considerations prohibited studying these moderating effects in study two and three. A person-centered design and use of a categorical analysis resulted in very small groups sizes that violated an assumption of the chi-square test. Indeed, group size concerns may have been a consequence of the imbalance of females to males in our sample (2.4:1), yet this ratio was not inconsistent with the sex composition of the incoming first year cohort (64% to 36%, respectively).

Nonetheless, any future investigation in this area of research should consider the design of the study carefully such that a test for moderation by sex is incorporated into the model.

While emerging adulthood is an important developmental period to investigate, especially with respect to the effects of social anxiety on developmental tasks such as identity exploration, my research suggests that a lifespan view of social anxiety, psychosocial functioning and risk taking is warranted given the chronicity observed in the behavior over seven years. Indeed, a recent challenge was issued to the research community to consider risk taking in the broader sense by assessing risk that is age relevant (Willoughby, Good, Adachi, Hamza, & Tavernier, 2013). For example, Willoughby and colleagues published statistics on death rates by suicide, which showed the highest rates were associated with individuals 65 years and older and not with individuals from the adolescent age period. These statistics suggest that at-risk behaviors are also germane to older populations and important to understanding health and well being at this later stage of life. While there is some research on social anxiety in older populations, studies have mostly focused on examining its prevalence (Karlsson et al., 2016), investigating its clinical manifestation as SAD (Chou, 2009), or developing scales that specifically measure social anxiety in older ages (Gould, Gerolimatos, Ciliberti, Edelstein, & Smith, 2012). To the best of my knowledge, there is no research on social anxiety and at-risk behaviors in older populations despite this being a major stage in the developmental course of life. According to Erikson's psychosocial lifespan developmental theory, individuals 65 or older have the developmental task of resolving the issues that come with aging, those of "ego integrity versus despair" (Erikson, 1966).

Either older people develop a sense of integrity and contentment in their daily life or they fall into depression or helplessness. I propose that studying older populations will provide rich data for investigating the link between heterogeneity in social anxiety, psychosocial functioning and at-risk behaviors. Indeed, knowledge of the relations between these behaviors will be an important guide for good mental health programs as our population ages in the coming decades.

Following in this same line of thought, investigations into childhood social anxiety over the long term also might be informative from a developmental perspective. As mentioned in the introduction, the literature is conflicted over the exact nature of the relation between shyness and social anxiety but research links childhood behavioral inhibition to later shyness (Henderson, Gilbert, & Zimbardo, 2014) and social anxiety (Clauss & Blackford, 2012). Thus, an investigation into social anxiety, together with shyness, over the long term in young children might unravel the developmental similarities and differences between these two constructs. Furthermore it might enrich our understanding of whether social anxiety is a temperament issue, as is shyness, or whether differing developmental patterns over time in childhood and adolescence distinguish between the two constructs.

Summary

The work completed within this program of research filled a gap in literature by broadening our understanding of the effects of social anxiety in emerging adulthood. Overall, each of the studies revealed that social anxiety was related to poorer psychosocial functioning. More notably, all of the studies looked at the relations between social anxiety, alcohol use and various psychosocial functioning indices within

longitudinal designs. In the first study, I was able to account for bidirectional relations between the study variables of social anxiety, social ties, and academic achievement. In study two I was able to identify heterogeneity in social anxiety based on alcohol use to find an atypical social anxiety group that reported more at-risk behaviors than its comparison prototypical social anxiety group. Study three followed behaviors over seven years to reveal that most of the behaviors being studied remained relatively stable across university and after graduation. Importantly, relations between the atypical social anxiety group and at-risk behaviors did not change meaningfully with time.

The findings of this research may have practical implications in the university context. Indeed, they could provide some useful insight to those involved in formulating guidelines for mental health programs. There are two major points to be noted. First, social anxiety impedes individuals who have the strong tendency to fear being evaluated and interacting with others. Both cognitive and behavioral strategies are useful tools to reframe these social fears and have shown considerable success in counseling programs. However, a secondary issue is the existence of an atypical group with social anxiety that displays both avoidance- and approach-oriented behaviors. It may be that these individuals also might benefit from strategies that improve self-regulation and help restructure emotion coping behaviors. With the compelling evidence that these behaviors exist over the long term, the information contained within this dissertation may prove of interest to those interested in helping emerging adults adjust successfully over the long term.

References

- Alcoholism, N. I. o. A. A. a. (2015). College Drinking. Retrieved from <https://www.niaaa.nih.gov/alcohol-health/special-populations-co-occurring-disorders/college-drinking>
- Biggs, B. K., Vernberg, E. M., & Wu, Y. P. (2012). Social anxiety and adolescents' friendships: The role of social withdrawal. *The Journal of Early Adolescence*, 32(6), 802-823. doi:10.1177/0272431611426145
- Binelli, C., Muñiz, A., Sanches, S., Ortiz, A., Navines, R., Egmond, E., . . . Martín-Santos, R. (2015). New evidence of heterogeneity in social anxiety disorder: Defining two qualitatively different personality profiles taking into account clinical, environmental and genetic factors. *European Psychiatry*, 30(1), 160-165. doi:10.1016/j.eurpsy.2014.09.418
- Broeren, S., Muris, P., Diamantopoulou, S., & Baker, J. R. (2013). The course of childhood anxiety symptoms: developmental trajectories and child-related factors in normal children. *Journal of Abnormal Child Psychology*, 41, 81-95.
- Buckner, J. D., Schmidt, N., B., & Eggleston, A. M. (2006). Social anxiety and problematic alcohol consumption: The mediating role of drinking motives and situations. *Behavior Therapy*, 37, 381-391. doi:10.1016/j.beth.2006.02.007
- Chou, K.-L. (2009). Social anxiety disorder in older adults: Evidence from the National Epidemiologic Survey on alcohol and related conditions. *Journal of Affective Disorders*, 119(1-3), 76-83. doi:10.1016/j.jad.2009.04.002
- Clauss, J. A., & Blackford, J. U. (2012). Behavioral inhibition and risk for developing social anxiety disorder: A meta-analytic study. *Journal of the American Academy*

of Child & Adolescent Psychiatry, 51(10), 1066-1075. doi:doi:

10.1016/j.jaac.2012.08.002

- Dawe, S., & Loxton, N. J. (2004). The role of impulsivity in the development of substance use and eating disorders. *Neuroscience and Biobehavioral Reviews*, 28(3), 343-351. doi:10.1016/j.neubiorev.2004.03.007
- Duchesne, S., Larose, S., Vitaro, F., & Tremblay, R. E. (2010). Trajectories of anxiety in a population sample of children: Clarifying the role of children's behavioral characteristics and maternal parenting. *Development and Psychopathology*, 22(2), 361-373. doi:10.1017/S0954579410000118
- Duchesne, S., Vitaro, F., Larose, S., & Tremblay, R. E. (2008). Trajectories of anxiety during elementary-school years and the prediction of high school noncompletion. *Journal of Youth and Adolescence*, 37(9), 1134-1146. doi:10.1007/s10964-007-9224-0
- Erikson, E. H. (1966). Eight ages of man. *International Journal of Psychiatry*, 2(3), 281-300. doi:none
- Goldin, P. R., Manber, T., Hakimi, S., Canli, T., & Gross, J. J. (2009). Neural bases of social anxiety disorder: Emotional reactivity and cognitive regulation during social and physical threat. *Archives of General Psychiatry*, 66(2), 170-180. doi:10.1001/archgenpsychiatry.2008.525
- Gould, C. E., Gerolimatos, L. A., Ciliberti, C. M., Edelstein, B. A., & Smith, M. D. (2012). Initial evaluation of the Older Adult Social-Evaluative Situations Questionnaire: A measure of social anxiety in older adults. *International Psychogeriatrics*, 24(12), 2009-2018. doi:10.1017/S1041610212001275

- Hamza, C. A., & Willoughby, T. (2016). Nonsuicidal self-injury and suicidal risk among emerging adults. *Journal of Adolescent Health, 59*(4), 411-415.
doi:10.1016/j.jadohealth.2016.05.019
- Hamza, C. A., Willoughby, T., & Heffer, T. (2015). Impulsivity and nonsuicidal self-injury: A review and meta-analysis. *Clinical Psychology Review, 38*, 13-24.
doi:10.1016/j.cpr.2015.02.010
- Henderson, L., Gilbert, P., & Zimbardo, P. (2014). Shyness, social anxiety, and social phobia. In S. G. Hofmann & P. M. DiBartolo (Eds.), *Social anxiety: Clinical, developmental, and social perspectives* (3rd ed., pp. 95-115). San Diego, CA, US: Elsevier Academic Press.
- Karlsson, B., Sigström, R., Östling, S., Waern, M., Börjesson-Hanson, A., & Skoog, I. (2016). DSM-IV and DSM-5 prevalence of social anxiety disorder in a population sample of older people. *The American Journal of Geriatric Psychiatry, 24*(12), 1237-1245. doi:10.1016/j.jagp.2016.07.023
- Kashdan, T. B., Elhai, J. D., & Breen, W. E. (2008). Social anxiety and disinhibition: An analysis of curiosity and social rank appraisals, approach-avoidance conflicts, and disruptive risk-taking behavior. *Journal of Anxiety Disorders, 22*, 925-939.
doi:10.1016/j.janxdis.2007.09.009
- Kashdan, T. B., & McKnight, P. E. (2010). The darker side of social anxiety: When aggressive impulsivity prevails over shy inhibition. *Current Directions in Psychological Science, 19*(1), 47-50. doi:10.1177/0963721409359280

- La Greca, A. M., & Lopez, N. (1998). Social anxiety among adolescents: Linkages with peer relations and friendships. *Journal of Abnormal Child Psychology*, *26*(2), 83-94. doi:10.1023/A:1022684520514
- La Greca, A. M., & Ranta, K. (2015). Developmental Transitions in Adolescence and Their Implications for Social Anxiety. In K. Ranta, A. M. La Greca, L.-J. Garcia-Lopez, & M. Marttunen (Eds.), *Social Anxiety and Phobia in Adolescents: Development, Manifestation and Intervention Strategies* (pp. 95-117). Cham: Springer International Publishing.
- Marmorstein, N. R., White, H., Chung, T., Hipwell, A., Stouthamer-Loeber, M., & Loeber, R. (2010). Associations between first use of substances and change in internalizing symptoms among girls: Differences by symptom trajectory and substance use type. *Journal of Clinical Child and Adolescent Psychology*, *39*(4), 545-558. doi:10.1080/15374416.2010.486325
- McMahon, W. W., & Oketch, M. (2013). Educations's effects on individual life chances and on development: An overview. *British Journal of Educational Studies*, *61*(1), 79-107. doi:10.1080/00071005.2012.756170
- Merikangas, K. R., & Angst, J. (1995). Comorbidity and social phobia: Evidence from clinical, epidemiologic, and genetic studies. *European Archives of Psychiatry and Clinical Neuroscience*, *244*(6), 297-303. doi:none
- Nicholls, J., Staiger, P. K., Williams, J. S., Richardson, B., & Kambouropoulos, N. (2014). When social anxiety co-occurs with substance use: Does an impulsive social anxiety subtype explain this unexpected relationship? *Psychiatry Research*, *220*(3), 909-914. doi:10.1016/j.psychres.2014.08.040

- Norberg, M. M., Olivier, J., Alperstein, D. M., Zvolensky, M. J., & Norton, A. R. (2011). Adverse consequences of student drinking: The role of sex, social anxiety, drinking motives. *Addictive Behaviors*, *36*(8), 821-828.
doi:10.1016/j.addbeh.2011.03.010
- Parade, S. H., Leerkes, E. M., & Blankson, A. N. (2010). Attachment to parents, social anxiety, and close relationships of female students over the transition to college. *Journal of Youth and Adolescence*, *39*(2), 127-137. doi:10.1007/s10964-009-9396-x
- Rapee, R. M., & Heimberg, R. G. (1997). A cognitive-behavioral model of anxiety in social phobia. *Behaviour Research and Therapy*, *35*(8), 741-756.
doi:[http://dx.doi.org/10.1016/S0005-7967\(97\)00022-3](http://dx.doi.org/10.1016/S0005-7967(97)00022-3)
- Rodebaugh, T. L., Lim, M. H., Shumaker, E. A., Levinson, C. A., & Thompson, T. (2015). Social anxiety and friendship quality over time. *Cognitive Behaviour Therapy*, *44*(6), 502-511. doi:10.1080/16506073.2015.1062043
- Russell, G., & Topham, P. (2012). The impact of social anxiety on student learning and well-being in higher education. *Journal of Mental Health*, *21*(4), 375-385.
doi:10.3109/09638237.2012.694505
- Schry, A. R., & White, S. W. (2013). Understanding the relationship between social anxiety and alcohol use in college students: A meta-analysis. *Addictive Behaviors*, *38*(11), 2690-2706. doi:10.1016/j.addbeh.2013.06.014
- Steinberg, L. (2008). A social neuroscience perspective on adolescent risk-taking. *Developmental Review*, *28*(1), 78-106. doi:10.1016/j.dr.2007.08.002

- Strahan, E. Y. (2003). The effects of social anxiety and social skills on academic performance. *Personality and Individual Differences, 34*(347-366).
- Terlecki, M. A., & Buckner, J. D. (2015). Social anxiety and heavy situational drinking: Coping and conformity motives as multiple mediators. *Addictive Behaviors, 40*, 77-83. doi:10.1016/j.addbeh.2014.09.008
- Tillfors, M., Van Zalk, N., & Kerr, M. (2013). Investigating a socially anxious-impulsive subgroup of adolescents: A prospective community study. *Scandinavian Journal of Psychology, 54*(3), 267-273. doi:10.1111/sjop.12047
- Topham, P., & Moller, N. (2011). New students' psychological well-being and its relation to first year academic performance in a UK university. *Counselling and Psychotherapy Research, 11*(3), 196-203. doi:10.1080/14733145.2010.519043
- Van Ameringen, M., Mancini, C., & Farvolden, P. (2003). The impact of anxiety disorders on educational achievement. *Journal of Anxiety Disorders, 17*(5), 561-571. doi:10.1016/S0887-6185(02)00228-1
- Willoughby, T., Good, M., Adachi, P. J., Hamza, C. A., & Tavernier, R. (2013). Examining the link between adolescent brain development and risk taking from a social-developmental perspective. *Brain and Cognition, 83*, 315-323. doi:org/10.1016/j.bandc.2013.09.008

APPENDIX A**Demographics**

1. What is your birth date? _____year _____month _____day
2. Are you male or female? Male _____ Female _____
3. What is the highest level of education that your MOTHER/STEPMOTHER (female guardian) whom you have lived with the MOST has completed? (If more than one mother, answer for one of them or if you have no contact with your mother/stepmother or female guardian please skip to Question 4 below)
 - Did not finish high school
 - Finished high school
 - Some college, university, or apprenticeship program
 - Completed a college/apprenticeship diploma (e.g., electrician) and/or technical diploma (i.e., graphic design, hair dressing)
 - Completed a university undergraduate degree
 - Completed a professional degree (e.g., masters, PhD, medical doctor, lawyer)
 - Still going to school
 - Don't know
4. What is the highest level of education that your FATHER/STEPFATHER (male guardian) whom you have lived with the MOST has completed? (If more than one father, answer for one of them or if you have no contact with your father/stepmother or male guardian please skip)
 - Did not finish high school
 - Finished high school
 - Some college, university, or apprenticeship program
 - Completed a college/apprenticeship diploma (e.g., electrician) and/or technical diploma (i.e., graphic design, hair dressing)
 - Completed a university undergraduate degree
 - Completed a professional degree (e.g., masters, PhD, medical doctor, lawyer)
 - Still going to school
 - Don't know
5. What best describes your current living situation?

I live at home with one or both parents/guardians

I live in residence

I live off-campus on my own

I live off-campus with others

(between Year 5 to Year 7 off-campus was partitioned into two more responses)

I live off-campus with a boyfriend/girlfriend

I live off-campus with a boyfriend/girlfriend and others

APPENDIX B
Social Anxiety Symptoms

In general, how much are the following statements like you?

	Almost Never or Never	Sometimes	Often	Almost Always or Always
a) I'm quiet when I'm with a group of other people my age	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) I only talk to other people my age that I know really well	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) I feel that other people my age talk about me behind my back	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) I worry about what other people my age think of me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e) I feel that other people my age are making fun of me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f) I'm afraid that other people my age will not like me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g) If I get into an argument with another person, I worry that he or she won't like me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h) I worry about being teased	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i) I feel shy with people my age that I don't know	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j) I get nervous when I talk to people my age that I don't know very well	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
k) I worry about doing something new in front of other people my age	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
l) I feel shy even with other people my age I know well	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
m) It's hard for me to ask other people my age to hang out with me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
n) I'm afraid to invite other people my age to my house because they might say no	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

APPENDIX C
Social Ties

Fill in the answer that best describes you.

	Not at all like me	A little like me	Somewhat like me	A lot like me	Completely like me
a) I have several close social ties at university	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) I am satisfied with how much I am participating in social activities at university	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) I am meeting people and making friends at university	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

APPENDIX D
General Anxiety

In general, how much are the following statements like you?

	Not at all like me	A little like me	Somewhat like me	A lot like me	Completely like me
a) If I do not have enough time to do everything, I do not worry about it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) I do not tend to worry about things	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) I know I should not worry about things, but I just cannot help it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) As soon as I finish one task, I start to worry about everything else I have to do	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e) When there is nothing more I can do about a concern, I don't worry about it any more	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f) I have been a worrier all my life	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g) Once I start worrying, I cannot stop	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

APPENDIX E
Depression Symptoms

Fill in the answer that best describes how often you felt or behaved this way DURING THE PAST TWO WEEKS.

	None of the time (less than 1 day)	Rarely (1-2 days)	Some of the time (3-5 days)	Occasionally (10-14 days)	Most of the time (10-14 days)
a) I was happy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) I do not feel like eating; my appetite was poor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) I felt that I could not feeling sad, even with help from my family and friends	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) I felt that I was just as good as other people	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e) I had trouble keeping my mind on what I was doing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f) I felt depressed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g) I felt that everything I did was an extra effort	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h) I felt hopeful about the future	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i) I thought my life had been a failure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j) I felt fearful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
k) My sleep was restless	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
l) I was bothered by things that usually don't bother me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
m) I talked less than usual	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
n) I felt lonely	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
o) People were unfriendly	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
p) I felt like doing nothing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- | | | | | | |
|-----------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| q) I had crying spells | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| r) I felt sad | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| s) I felt like people disliked me | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| r) I enjoyed life | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

APPENDIX G
BIS/BAS

Fill in the circle that best describes you.

	Strongly disagree	Disagree	Agree	Strongly agree
a) If I think something unpleasant is going to happen I usually get pretty worked up	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) I worry about making mistakes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) Criticism or scolding hurts me quite a bit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) I feel pretty worried or upset when I think or know somebody is angry at me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e) Even if something bad is about to happen to me, I rarely experience fear or nervousness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f) I feel worried when I think I have done poorly at something	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g) I have very few fears compared to my friend	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h) When I get something I want I feel excited and energized	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i) When I'm doing well at something, I love to keep at it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j) When good things happen to me, it affects me strongly	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
k) It would excite me to win a contest	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
l) When I want something, I usually go all out to get it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
m) I go out of my way to get things I want	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
n) If I see a chance to get something I want, I move on it right away	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

o) When I go after something I use a
“no fear” approach

p) I will often do things for no other
reason than that they might be fun

q) I crave excitement and new
sensations

r) I’m always willing to try something
new if I think it will be fun

r) I often act on the spur of the
moment

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

APPENDIX H

Emotional Reactivity

Please rate the following statements.

	Not at all like me	A little like me	Somewhat like me	A lot like me	Completely like me
a) When something happens that upsets me, it's all I can think about for a long time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) My feelings get hurt easily	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) When I experience emotions, I feel them very strongly/intensely	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) I tend to get very emotional very easily	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e) When I feel emotional, it's hard for me to imagine feeling any other way	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f) If I have a disagreement with someone, it takes a long time for me to get over it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h) When I am angry/upset, it takes much longer than most people to calm down	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i) I get angry at people very easily	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j) I am often bothered by things that other people don't react to	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
k) When something bad happens, my mood changes very quickly. People tell me I have a very short fuse	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
l) I often get so upset it's hard for me to think straight	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
m) Other people tell me I'm overreacting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

APPENDIX I
Daily Hassles

Below is a list of daily hassles that commonly bother students*. Please indicate how often each one bothers you.

	Almost never bothers me	Sometimes bothers me	Often bothers me
a) Not having enough time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) Not having enough money	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) My weight	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) Too much school work*	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e) Not enough close friends	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f) Not enough time to talk to friends	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g) Too few dates	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h) How I look	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i) Problems with roommates	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j) Problems with friends	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
k) Getting to class on time*	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
l) Problems with boyfriend/girlfriend	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
m) Problems with my family	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
n) Being lonely	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
o) Others opinion of me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
p) Not enough sleep	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
q) Taking tests/exams*	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
r) Household chores	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
s) Trying to get good marks*	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
t) What I'm going to do after my undergrad degree is done*	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
u) Thinking about where I am going	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

to live next year

v) Thinking about picking a major*

w) Thinking about finding a summer
job*

x) Trying to manage both a job and
school work*

y) Not being able to meet my
deadlines for school work*

z) If living away from home, missing
my family/friends/home

* Student hassle items not included in the Daily Hassles Composite for the third study

APPENDIX K Emotion Coping Behavior

Please tell us if any of these things have happened in your life.

1. Which of the following do you do or have you done because it makes you feel **good** (check all that apply):
2. Which of the following do you do or have you done when you are “**numb**” and want to just feel something (check all that apply):
3. Which of the following do you do or have you done when you are **anxious** or **stressed** (check all that apply):
4. Which of the following do you do or have you when you are **frustrated** or **angry** (check all that apply):
5. Which of the following do you do or have you want to get out of doing something, to get others to leave you alone, or to get people close to you stop fights (i.e., **distract**) (check all that apply):
6. Which of the following do you do or have you done when you are feeling **ignored** and want to get the attention of others (check all that apply):
7. Which of the following do you do or have you done when you want to **punish** yourself (check all that apply):

For each of the 7 questions the following emotion coping behaviors were listed below:

- | | | | |
|-------------------------------------|--|--|--|
| <input type="radio"/> drink alcohol | <input type="radio"/> smoke tobacco | <input type="radio"/> smoke marijuana | <input type="radio"/> engage in strenuous exercise (e.g. jogging) |
| <input type="radio"/> pop pills | <input type="radio"/> bite my nails | <input type="radio"/> binge/under eat | <input type="radio"/> self-injure (e.g., cut, burn yourself, etc.) |
| <input type="radio"/> shoplift | <input type="radio"/> punch or hit someone | <input type="radio"/> punch or hit hard object | <input type="radio"/> talk to a friend/family member |
| <input type="radio"/> go shopping | | | |

APPENDIX L
NSSI Lifetime

Please estimate the number of times in your life you have intentionally (i.e., on purpose) done each type of nonsuicidal self-injury:

	Number of times (e.g., 0, 10, 100, 500)
a) Cut yourself on purpose	_____
b) Burned yourself on purpose	_____
c) Hit yourself or banged your head on purpose	_____
d) Pulled your hair or pinched yourself on purpose	_____
e) Bit yourself on purpose	_____
f) Scratched yourself on purpose so severely that you started to bleed	_____
g) Prevented wounds from healing	_____
h) Stuck yourself with needles on purpose	_____
i) Rubbed your skin against a rough surface on purpose	_____

APPENDIX M Friendship Quality

Think about your FRIENDS and answer the following questions.

	Almost always or always	Often	Sometimes	Almost never or never
a) I like to get my friends' points of view on things I'm concerned about	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) My friends can tell when I'm upset about something	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) When we discuss things, my friends care about my point of view	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) Talking over my problems with my friends makes me feel ashamed and foolish	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e) I wish I had different friends	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f) My friends understand me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g) My friends accept me as I am	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h) My friends don't understand what I'm going through these days	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i) I feel alone or apart when I am with my friends	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j) My friends listen to what I have to say	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
k) My friends are fairly easy to talk to	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
l) My friends are concerned about my well being	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
m) I feel angry with my friends	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
n) I can count on my friends when I need to get something off my chest	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
o) I trust my friends	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
p) I get upset a lot more than my	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

friends know about

q) It seems as if my friends are
irritated with me for no reason

r) I tell my friends about my problems
and troubles

APPENDIX O
Behavioral Impulsivity

Please indicate how often you do each of the following:

	Never	A little	Sometimes	Pretty often	Usually
a) I plan tasks carefully	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) I do things without thinking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) I don't pay attention	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) I am self-controlled	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e) I can concentrate easily	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f) I am a careful thinker	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g) I say things without thinking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h) I act on the spur of the moment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

APPENDIX P
Affinity for Aloneness (positive aspects)

For each statement below, fill in the answer that best suits you.

	Almost always or always	Often	Sometimes	Almost never or never
a) To think something over, I want to be alone	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) If I have an argument with someone, I want to be alone to think it over	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) I am happy when I am the only one at home, because I can do some quiet thinking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) I want to be alone	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e) I get away from others because they disturb me with their noise	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f) Being alone makes me take up my courage	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g) I like to do things on my own at home	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h) When I am alone, I quiet down	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

APPENDIX Q**Consent Form****Project Title:** Stressed @ Brock?

Principal Investigator: Teena Willoughby (Professor)

Department of Psychology, Brock University

Email: twilloug@brocku.ca; Phone: 905-688-5550, ext 5474**INVITATION**

You are invited to participate in a study that involves research. The purpose of this study is to explore stress, coping, and academic achievement in undergraduate students. We are interested in looking at factors that both contribute to and reduce stress, as well as promote academic success during the transition to university. We are particularly interested in what happens over time, as students go through university.

WHAT'S INVOLVED

As a participant, you will be fill out a survey assessing aspects of your university experience that create and reduce stress, as well as questions that assess mental health, such as academic pressures, depression, anxiety, suicide ideation, self-harming behaviors, spirituality, personality, and coping.

Participation will take approximately 60 minutes of your time. In addition to completing the questionnaire, your participation also involves giving your consent to allow the researchers to compare your responses with your academic records at Brock (university and high school course selection and grades, course withdrawals, and a yes or no to whether there have been any suspensions). Records will be accessed annually throughout undergraduate studies, at the end of each winter term each year you are registered at Brock

POTENTIAL BENEFITS AND RISKS

Benefits of participation include either (a) the payment of \$10 or (b) proof of one hour research participation for credit in any one course that offers such credit, as well as the experience of taking part in psychological research. You will also get the opportunity to reflect on your life and your experiences in a confidential manner. The only anticipated risks associated with participation in this study is that some of the questions focus on negative aspects of yourself or negative events in your life, which may result in some discomfort. There is some loss of privacy that your grades and course selections will be accessed by the researchers, but please be assured that these data are used for research purposes only and will be kept entirely confidential.

Please indicate your choice between (a) payment and (b) proof of one-hour research participation for course credit by checking ONE of the two spaces below:

I wish to receive \$10 for participation OR

I wish to use this form for one hour course research participation credit

CONFIDENTIALITY

All information you provide is considered confidential. Because our interest is in the average responses of the entire group of participants, neither you nor your responses will be identified individually in any way in written reports of this research. Group data only may be published, presented at conferences, used to evaluate programs, or used for secondary data analyses by other researchers. Data collected during this study will be stored in a secure location in Teena Willoughby's office in Plaza 519. Your name will not be kept in the same data file with your questionnaire responses; instead, your name will be kept in a separate file that will be available only to Dr. Teena Willoughby. The student investigators involved in data collection/analyses will only access the unidentifiable data; they will not be able to identify your responses. Note that your responses will NOT be made available to Brock University itself, so there will be no university record of your responses.

VOLUNTARY PARTICIPATION

Participation in this study is voluntary. If you wish, you may decline to answer any questions or participate in any component of the study. Further, you may decide to withdraw from this study at any time without any penalty or loss of benefits to which you are entitled. If at some future date, you decide to withdraw your permission for the researchers to obtain access to your academic records, you may do so by contacting the researchers, without losing your payment or proof of participation. Because we are interested in what happens to students as they go through university, you will be contacted via email (using the email address you provided on this consent form or when you signed up for the study) in the future with opportunities to participate in follow-up studies, but your participation in those studies is completely voluntary.

PUBLICATION OF RESULTS

Results of this study may be published in professional journals and presented at conferences. We will also email you with a summary of the results from this study by August (year).

CONTACT INFORMATION AND ETHICS CLEARANCE

If you have any questions about this study or require further information, please contact Dr. Teena Willoughby, Faculty Supervisor, using the contact information provided above. This study has been reviewed and received ethics clearance through the Research Ethics Board at Brock University (file 09-118). If you have any comments or concerns about your rights as a research participant, please contact the Research Ethics Office at (905) 688-5550 Ext. 3035, reb@brocku.ca. Thank you for your assistance in this project. Please keep a copy of this form for your records.

Name (printed): _____

Email address: _____

Student number: _____

Signature: _____

Date: _____



Brock University
 Research Ethics Office
 Tel: 905-688-5550 ext. 3035
 Email: reb@brocku.ca

Social Science Research Ethics Board

Certificate of Ethics Clearance for Human Participant Research

DATE: February 3, 2012
 PRINCIPAL INVESTIGATOR: WILLOUGHBY, Teena - Psychology
 FILE: 09-118 - WILLOUGHBY
 TYPE: Faculty Research STUDENT:
 SUPERVISOR: Teena Willoughby
 TITLE: Stressed @ Brock?

ETHICS CLEARANCE GRANTED

Type of Clearance: MODIFICATION

Expiry Date: 1/31/2013

The Brock University Social Sciences Research Ethics Board has reviewed the above named research proposal and considers the procedures, as described by the applicant, to conform to the University's ethical standards and the Tri-Council Policy Statement. Clearance granted from **2/3/2012** to **1/31/2013**.

The Tri-Council Policy Statement requires that ongoing research be monitored by, at a minimum, an annual report. Should your project extend beyond the expiry date, you are required to submit a Renewal form before **1/31/2013**. Continued clearance is contingent on timely submission of reports.

To comply with the Tri-Council Policy Statement, you must also submit a final report upon completion of your project. All report forms can be found on the Research Ethics web page at <http://www.brocku.ca/research/policies-and-forms/research-forms>.

In addition, throughout your research, you must report promptly to the REB:

- a) Changes increasing the risk to the participant(s) and/or affecting significantly the conduct of the study;
- b) All adverse and/or unanticipated experiences or events that may have real or potential unfavourable implications for participants;
- c) New information that may adversely affect the safety of the participants or the conduct of the study;
- d) Any changes in your source of funding or new funding to a previously unfunded project.

We wish you success with your research.

Approved:

Jan Frijters, Chair
 Social Sciences Research Ethics Board

Note: Brock University is accountable for the research carried out in its own jurisdiction or under its auspices and may refuse certain research even though the REB has found it ethically acceptable.

If research participants are in the care of a health facility, at a school, or other institution or community organization, it is the responsibility of the Principal Investigator to ensure that the ethical guidelines and clearance of those facilities or institutions are obtained and filed with the REB prior to the initiation of research at that site.