Measuring Internalizing Symptomatology in Children, Adolescents, and Young Adults with Autism Spectrum Disorders

by

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DEDICATION

To my family, Brian and Norah Hambrick, for their unending patience with this long endeavor; and to my parents, Chris and Doug Buvinger, and in-laws, Pat and John Hambrick, for their immense sacrifices and support which allowed me to reach my goals. None of this could have been done without each and every one of you.

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Chapter 1: Introduction

Autism Spectrum Disorders (ASD) are neurodevelopmental disorders characterized by impairments in social interaction and communication, and the presence of restricted repetitive and stereotyped patterns of behavior, interests, and activities (American Psychiatric Association, 1994). Individuals express varying levels of impairment in each core domain of the disorder, resulting in a wide spectrum of relative strengths and weaknesses. The exact cause of ASD has not been pinpointed, but there is evidence suggesting a genetic component to the disorder, as well as the involvement of multiple complex brain regions (Abrahams & Geschwind, 2010).

Autism spectrum disorders encompass a wide range of abilities and deficits in individuals diagnosed with the disorder. As is the case with many categorizations or labels, as time has passed the manner in which we speak of the varying levels of ability within ASD has changed. For a number of years, individuals with IQs above 70 or 80 were labeled as "high functioning". However, recently advocates and others in the field of autism research have started to steer away from labeling the spectrum from low to high functioning. So far, there is not an agreed upon alternative term and as such, current literature presents with a variety of new, seemingly more socially sensitive, labels. The participants used for this dissertation all fall into this group, defined by an IQ greater than or equal to 70. As such, I will refer to the participants simply with 'ASD', rather than any specific categorization. When it becomes necessary to differentiate between levels of ability within the ASD population, I will refer to a More Able group of individuals with ASD (MA-ASD).

Over the course of the past couple of decades, prevalence rates have been on the rise, with the most recent statistics reporting ASD in 1 of every 88 children (CDC, 2012). Epidemiological studies have not presented a single causal factor for this rise in ASD cases diagnosed. Suggestions that environmental toxins from immunizations have played a role in this prevalence increase have been consistently unsubstantiated (Chen, Landau, Sham, and Fombonne, 2004; Richler, Bishop, Kleinke, and Lord, 2006). A more likely explanation that may account for some of the rise in prevalence rates is the expanding diagnostic criteria for ASD presented in the DSM-IV. By widening the diagnostic criteria, many More Able individuals (i.e., typically defined as IQ greater than 70) were included in the prevalence statistics, whereas before they may have either gone undiagnosed or misdiagnosed. In fact, recent studies have suggested that the percent of children identified as More Able rose from 24.6% prior to 1998 to 43.9% after 1998 (Fombonne, 2005). In addition, there has been an overwhelming increase in public awareness of the disorder with the inception of many public awareness campaigns on television, radio, internet, and billboards. This increased level of awareness may, in part, be responsible for both parents and doctors detecting potential delays earlier in development, which then may lead to an ASD diagnosis.

For lack of a specific biological marker for ASD, diagnosis of the disorder is based on behavioral observations of the individual (Autism Diagnostic Observation Schedule; ADOS: Lord et al., 2000) as well as parent-report of symptoms and behaviors, both currently and in the past (Autism Diagnostic Interview – Revised; ADI-R: Le Couteur, Lord, & Rutter, 2003). Research has shown that when used together, these two measures have been found to reliably diagnose ASD in children as young as two years old (Lord, Risi, DiLavore, Shulman, Thurm, & Pickles, 2006).

Although diagnoses can be made as early as two years of age, More Able individuals may not be diagnosed until later ages, when social expectations begin to rise. Many times, the core social and communication deficits become more apparent as children transition into preschool and kindergarten. The DSM-IV (APA, 2000) states that for a diagnosis of autism, the individual must show qualitative impairment in social interaction, as demonstrated by at least two of four criteria. The first is a marked impairment in nonverbal behaviors, such as eye contact, facial expressions, gestures, and body postures. The second involves a failure to develop peer relationships at an appropriate developmental level, and the third criterion reflects the absence of seeking to share enjoyment, interests, or accomplishments in a spontaneous manner. Lastly, there may be a marked lack of social or emotional reciprocity, which is demonstrated by the child preferring solitary activities and not participating in social play or games with peers. In addition to these social criteria, the DSM-IV also designates criteria for communication impairments. Of the four criteria, two are especially relevant to this dissertation. First, children who demonstrate adequate speech may have difficulty initiating or sustaining conversations with others. Additionally, these More Able individuals may use idiosyncratic, repetitive or stereotyped language when speaking to others. This stereotyped or idiosyncratic language is often tied to a restricted interest of abnormal intensity or focus. The presence of these restricted interests is one of the criteria in the third core symptom area in autism spectrum disorders: restricted, repetitive and stereotyped patterns of behavior, interests and activities. These restricted interests can include topics such as computers, sports, or history, and tend to dominate the conversations individuals with ASD have with others. As can be gleaned from these diagnostic criteria, individuals with ASD face an especially difficult challenge in the social world, especially with friendships.

The primary aim of this dissertation is to describe the psychometric properties of the Positive and Negative Affect Schedule (PANAS) and the Positive and Negative Affect Scale for Children (PANAS-C; Laurent et al., 1999), including evaluating the stability of the factor structure, reliability, and validity in populations of children, adolescents, and young adults with ASD. The PANAS is a 20-item self-report measure developed by Watson, Clark, and Tellegen (1988) to measure positive and negative affect, with the goal of discriminating between depression and anxiety in adults. The PANAS was created to measure affective states using a dimensional approach, in that each factor (i.e., NA, PA) represents a full spectrum of that affective state, as opposed to anchoring ends of a single bipolar scale. The analyses herein will also shed light on the underlying structure of emotion for individuals with ASD, for which there is a paucity of available literature. Additionally, I aim to determine whether internalizing symptoms (depression, anxiety) are elevated for school-aged children and adolescents (6 to 17 years) with ASD who participated in a school-based 8-week friendship intervention. In subsequent exploratory analyses, I will investigate the relations between internalizing symptom scores and loneliness, level of social engagement during free time, social network scores, and friendship quality scores. Lastly, I will investigate the prevalence and trajectories of internalizing symptoms longitudinally in a separate group of individuals with ASD, ranging in age from approximately 13 to 22 years.

Chapter 2: Methodological Study of the PANAS and PANAS-C

The PANAS is a 20-item self-report measure developed by Watson, Clark, and Tellegen (1988) to measure positive and negative affect, with the goal of discriminating between depression and anxiety in adults. The PANAS was created to measure affective states using a dimensional approach, in that each factor (i.e., NA, PA) represents a full spectrum of that affective state, as opposed to anchoring ends of a single bipolar scale. Watson, Clark, and Tellegen (1988) describe Positive Affect (PA) as reflecting feelings of enthusiasm, activeness, and alertness. A person with high PA shows a state of high energy, full concentration and pleasurable engagement. One with low PA shows lethargy and sadness, clinically described as anhedonia. Negative Affect (NA) on the other hand, is described as distressed behavior and unpleasurable engagement, such as contempt, guilt, anger, or nervousness (high NA). A person with low NA reports feeling calm and serene. Participants are asked to endorse how often, over the past few weeks, they have felt a certain way. Each of the 20 items is an adjective that represents either a negative or positive affective state (e.g., *sad, mad, happy, proud*). Watson and colleagues created this measure based on their *tripartite model of depression and anxiety* (Clark & Watson, 1991), which posits that these two internalizing disorders share a common factor of general negative affect (NA). In addition to depression and anxiety sharing this common factor of elevated NA, the tripartite model posits that the distinguishing factor between the disorders is the presence of low levels of PA (e.g., anhedonia) in depressed individuals, and elevated levels of physiological arousal in those diagnosed with anxiety (see Figure 1). Therefore, the three distinct factors of this tripartite model are (1) specific depression characterized by low PA, (2)

specific anxiety characterized by high physiological arousal, and (3) non-specific negative affect, which is reflected in both depression and anxiety.

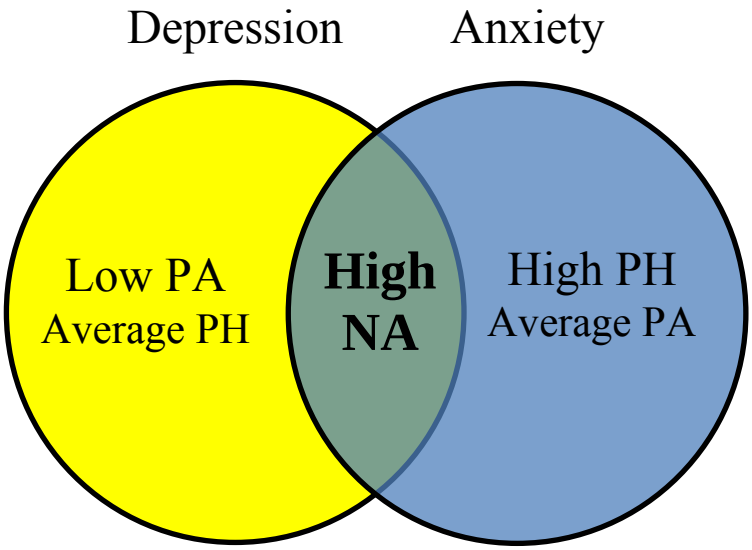


Figure 1. Tripartite model of depression and anxiety

The PANAS is able to measure two of these three components of the model. Laurent and colleagues have since created a scale that measures the physiological hyperarousal specific to anxiety (Laurent, Catanzaro, & Joiner, 2004); however, this scale was not utilized in this dissertation. The lack of this scale does not preclude the evaluation of anxiety, as the discriminating PA factor still applies in the absence of this third scale.

The tripartite model has been evaluated and consistently supported. For example, Dyck and colleagues (Dyck, Jolly, & Kramer (1994) identified two moderately negatively correlated (r = -.32) factors corresponding to NA and PA when conducting an exploratory factor analysis (EFA) on a combination of theoretically relevant items from self-report measures of anxiety and

depression in an adult psychiatric sample. Using regression analyses, it was found that the NA factor, but not PA, significantly predicted anxiety, but *both* factors significantly predicted depression. This same group of researchers showed support for the tripartite model in a separate study looking at a variety of clinical measures in a sample of adult psychiatric outpatients (Jolly, Dyck, Kramer, & Wherry, 1994). As in the previous study, the researchers pieced together items from different clinical measures that theoretically represented PA and NA (these were not the same PA and NA scales that are derived from the PANAS). Results showed that when the NA score was controlled, depression, but not anxiety, was related to the PA scores. When PA was controlled, depression and anxiety both explained a significant amount of variance in NA scores. These findings support the theoretical claim of this tripartite model, in that depression is characterized by low PA while elevated NA levels characterize both depression and anxiety.

These results were replicated by Joiner and colleagues (Joiner, Catanzaro, & Laurent, 2004), who evaluated a combination of self-report measures of depression and anxiety in a sample of child and adolescent psychiatric inpatients, ages 8 to 16 years. These results suggest that the structure of mood-related symptoms may be similar across development, as the results found in this younger sample replicate those found in the adult populations on which the tripartite model has typically been evaluated. However, it should be noted that the authors' claim of support for the tripartite model could be challenged, as the factor loadings for the theoretically based positive and negative affect items were questionable, at times. For example, the item "get mad" from the Revised Children's Manifest Anxiety Scale (RCMAS; Reynolds & Richmond, 1985) was chosen to represent negative affect, and although it loaded at .55 on the PA scale, and .04 on the NA scale, the authors included it in the NA scale. Similar decisions occurred on several items, where the authors disregarded the recommended cutoffs for factor loadings in

favor of theoretical arguments. It is important to consider that the tripartite model was created for and evaluated with an adult sample, and may not replicate as cleanly in a younger sample. An expanded discussion of the support for the tripartite model in younger samples will follow, as it relates to the PANAS child version.

In order to tap into these affective factors that had been shown to distinguish between depression and anxiety, the adult PANAS was created to measure NA and PA separately. The authors purported that these factors were independent of one another (Clark & Watson, 1991; Watson et al., 1988). While some studies have shown support for such factor independence (e.g., Terracciano et al., 2003), many others have not shown such strong support. Specifically, results have consistently shown low, but often significant, correlations between these two factors, in the magnitude of -.20 to -.30 (e.g., Berry & Hansen, 1996; Crawford & Henry, 2004; Mehrabian, 1998). However, the general consensus in the field is that these factors can be considered theoretically distinct from one another, despite their lack of complete statistical independence (Crawford & Henry, 2004; Terracciano et al., 2003; Watson et al., 1999; see Green, Goldman, & Salovey, 1993 for the contrasting viewpoint).

Numerous studies evaluating the factor structure of the PANAS have been published, and while mixed support has been shown for the independence of the NA and PA factors, the presence of a two-factor model for the PANAS has generally been supported (Watson et al., 1988; Crawford & Henry, 2004; Terracciano et al., 2003). Using exploratory factor analysis (EFA) with varimax rotation, Watson and colleagues (1988) reported two factors relating to PA and NA, which accounted for roughly two-thirds of the common variance. All items loaded cleanly on their designated factor. To expand on these findings, Crawford & Henry (2004) evaluated several models of the PANAS factor structure in an adult non-clinical sample using

confirmatory factor analysis (CFA). Of the nine models tested, the authors concluded that the best fit was a model in which the PA and NA factors, along with their errors, were allowed to correlate. While these findings support Watson and colleague's (1988) original hypothesis that the PANAS measures two factors, it does not support the notion that these two factor are independent; rather, these results show that the PANAS NA and PA scales measure two distinct, but moderately negatively correlated, factors (Crawford & Henry, 2004), a result that has been replicated many times. Terracciano and colleagues (2003) evaluated the factor structure of the PANAS in a young adult non-clinical sample, using both EFA and CFA, and found contradictory results. The EFA produced a clear replication of the Watson et al. (1988) two-factor structure, with items loading cleanly on the expected factors. Additionally, the correlation between the two factors was quite low, supporting the original claim of factor independence (r = -.09).

The CFA, on the other hand, did not clearly replicate Watson and colleague's findings, and in fact the basic two-factor model was rejected by the commonly used theory-based maximum likelihood fit indices. Acceptable fit was eventually achieved using a variety of post-hoc modifications. While the original two-factor orthogonal structure has been replicated, it is not unanimous (e.g., Green, Goldman, & Salovey, 1993), and therefore an exploratory method is called for when evaluating the factor structure of the PANAS, especially in populations in which the measure has not been previously validated.

The PANAS has been validated for use in a wide variety of older adolescent and adult populations, including college students, non-student adults, psychiatric inpatients (Watson et al., 1988; Crawford & Henry, 2004; Tuccitto et al., 2009), multiethnic adolescents (Villodas, Villodas & Roesch, 2011), community and forensic samples (Leue & Beauducel, 2011), and patients going through medical rehabilitation (Ostir, Smith, Smith & Ottenbacher, 2005). It has

also been translated and evaluated for a number of international samples (e.g., Italian: Terraciano et al., 2003; German: Leue & Beauducel, 2011). To evaluate the validity of the PANAS, both regression and correlation analyses have been run using validated measures of depression and anxiety. In a large non-clinical sample, Crawford and Henry (2004) found that PA was more strongly related to depression scores than to anxiety scores. Both PA and NA were significant predictors of variance unique to depression, with PA accounting for at least twice as much unique variance as NA. These results not only show good convergent validity, but also support for the tripartite model, in that both PA and NA are significantly related to depression, but not anxiety. Also showing good convergent validity of the PANAS, Terracciano and colleagues (2003) found that scores on a depression measure were significantly correlated with the PANAS NA scale and inversely correlated with the PA scale in a primarily adult community sample. Regarding the tripartite model, it was found that NA accounted for 31% of the variance in depression scores and 38% of the variance in anxiety scores. PA accounted for an additional 12% of variance in depression, but only 2% of the variance in anxiety—again showing support for the tripartite model on which that PANAS was based.

Joiner, Catanzaro and Laurent (1996) evaluated the validity of the PANAS with several different measures for depression and anxiety in a sample of child and adolescent psychiatric inpatients. They found significant correlations between NA and both depression (r = .53) and anxiety (r = .65) scores. The correlations between PA and depression (r = -.45) and anxiety (r = .28) were also both significant, but there was a significant difference between the strength of the correlations, in that the relationship between depression and PA was significantly larger than that of anxiety and PA, and therefore still provides support for the tripartite model in the PANAS.

Good internal consistency for each scale was originally reported for the PANAS (PA range = .86-.90, NA range = .84-.86; Watson, Clark, & Tellegen, 1988), levels that have consistently been replicated in the literature (e.g., Lonigan et al., 1999; Crawford & Henry, 2004; Ostir et al., 2005). In the original validation sample (Watson et al., 1988), 101 participants completed the PANAS twice, eight weeks apart. The authors reported that the PANAS showed good test-retest reliability. The total PA scale score was reported to have a correlation coefficient of $r = .58$ from Time 1 to Time 2, and the total NA scale score was reported at $r = .48$ between time points. Although these correlations were statistically significant, by Cronbach's (1951) standards these stability coefficients are quite low, as the cutoff for satisfactory or good test-retest reliability is .70 (Litwin, 2003). Terracciano et al. (2003) also reported test-retest statistics for the PANAS. While slightly higher than those reported by Watson and colleagues, the correlations still fell below the standard cutoff of .70 for both PA (.65) and NA (.54) scales.

Interestingly, it has been strongly suggested that it is inappropriate to use a Pearson correlation coefficient when evaluating test-retest reliability (Baumgartner, 2000; Lee et al., 1989). Baumgartner presents several reasons why the ICC (R) is preferable to r: (1) R allows for more than two scores per person, whereas r only allows for two scores per person, (2) R gives a truer estimate of test reliability because it is sensitive to more sources of error than r, and (3) R is designed for repeated measures of a test, whereas r is designed to evaluate the relation between two sets of scores. Additionally, Lee and colleagues (1989) point out that correlation coefficients measure the strength of the linear associations between scores (consistency), but not consensus (agreement) between scores across time. In light of this, Ostir and colleagues (2005) utilized the intraclass correlation coefficient (ICC) and found very good consistency in both the positive scale (ICC = .79) and the negative scale (ICC = .93) from the first to the second administration

of the PANAS. The ICC represents the proportion of variance in a set of scores that is attributable to the variance of the true score (Weir, 2005). Therefore, the ICC for the NA scale reported above shows that across time, 93% of the observed score variance is due to the true score, and 7% is due to error. These results provide strong statistical support for the temporal stability of the PANAS and its use as a reliable longitudinal measure.

While wide support has been shown for the reliability, validity, and factor structure of the PANAS, its use in an ASD population has not been investigated, and therefore warrants further attention. Further discussion regarding the applicability of the PANAS to an ASD population is below.

To address the common lack of research regarding internalizing symptomatology in younger children, Laurent and colleagues (1999) modified the PANAS to be more appropriate for younger children. The PANAS-C has been validated for use in children as young as 4th grade (Laurent et al., 1999), although it has been used with participants as young as 7 years of age (Hughes & Kendall, 2009). Based on the original PANAS, this measure was modified slightly to be more developmentally appropriate for a younger population—vocabulary was changed to be simpler (e.g., items such as mad and gloomy were included in place of blameworthy or downhearted on the NA scale) and some items were removed (e.g., irritable, hostile, inspired, enthusiastic). The final version of the PANAS-C included 30 items (15 positive, 15 negative; see Appendix B), although a shorter 27-item version has commonly been used (Laurent & Ettelson, 2001), which removes three PA items that seem to relate more to physiological hyperarousal than to positive affect (i.e., *alert*, *fearless*, *daring*). The response scale is the same as the PANAS, ranging from 1 (not at all) to 5 (a lot), with each response option anchored. Therefore, the minimum possible score is 30, while the maximum score is 150, although the total score is

not utilized for evaluation; rather, the PA and NA subscale scores are evaluated separately to screen for depression and anxiety in children and adolescents. Laurent (J. Laurent, personal communication, February 12, 2010) has established cutoff scores to which one may refer when using the PANAS-C as a screener: Using the scale used in the validation study (27-items; removing those focusing on physiological hyperarousal), those at risk for depression show NA scores greater than or equal to 37 and PA scores less than or equal to 34 (1SD below mean). Those at risk for anxiety show NA scores greater than or equal to 37 and PA scores greater than or equal to 38 (0.5 SD below mean).

In the original validation sample, Laurent and colleagues (1999) found evidence for a two-factor structure of the PANAS-C representing positive (PA) and negative affect (NA), with the expected small negative correlation between the two factors (r = -.16). Large correlations were found between the NA scale and self-report depression (r = .60) and anxiety (r = .68) scores. As would be expected in replicating the results of the original PANAS validation study (Watson et al., 1988), moderate negative correlations were reported between the PA scale and the self-report depression score (r = -.55), and between the PA scale and the self-report anxiety score (r = -.30), providing some support for the tripartite model. Internal consistency was good for both positive (α = .89) and negative (α = .92) scales, although test-retest reliability statistics were not provided. Laurent and colleagues also performed hierarchical regressions to determine the relative proportion of construct-specific and non-construct specific variance in each scale. When controlling for the depression score and the NA scale score, the partial correlation showed a small and non-significant relationship between the PA and the self-report anxiety score, supporting the theory of the tripartite model that positive affect is not significantly related to anxiety. Also in support of this theory, the regression analysis showed significant partial

correlations between NA scores and both criterion measures (self-report anxiety and depression scores) when the non-construct specific variance was controlled, and a significant negative partial correlation between the PA score and the depression score, when controlling for anxiety scores and the NA scale score. These results support the contention that the PANAS-C is able to distinguish between depression and anxiety symptomatology (good discriminant validity), whereas most measures on internalizing disorders distinguish between those with and without depression or anxiety, but have not been sensitive to the differences between these two internalizing disorders.

In the majority of studies evaluating the PANAS-C, a two-factor structure has been supported. However, some studies have reported more difficulty in finding this structure. Wilson, Gullone, and Moss (1998) used a previous version of the PANAS-C (Joiner, Catanzaro, & Laurent, 1996) with a group of nonclinical children and adolescents (8 to 15 years) and found that the common two-factor structure did not emerge until they removed nearly half of the scale's items, resulting in a final 14-item scale. This research group also tested a single factor model and found a poor fit, suggesting that in fact positive and negative affect were representing two separate unipolar dimensions, rather than opposite ends of a single bipolar scale.

The PANAS-C has been validated for use in a variety of populations, including community samples (Laurent et al., 1999; Ebesutani, Okamura, Higa-McMillan, & Chorpita, 2011), children with life-threatening medical illnesses (Kiernan, Laurent, Joiner, Catanzaro, & MacLachlan, 2001), and children with diagnosed anxiety disorders (Hughes & Kendall, 2009), but it has not been investigated for use in an ASD population.

Using the PANAS and PANAS-C in an ASD population

The rationale for using the PANAS and PANAS-C to measure internalizing symptomatology in individuals with autism spectrum disorders is three-fold. First, on a general level, the PANAS and PANAS-C are both short and relatively easy to complete, which is in line with findings from Ialongo's research group (2001). This is in contrast to measures such as the BASC and CBCL, which include extensive items evaluating a large range of behavioral symptoms (e.g., the self-report version of the BASC includes 176 items), including scales evaluating depression and anxiety symptoms. Therefore, the PANAS and PANAS-C lend themselves to being used as screeners for internalizing symptomatology in multiple contexts (e.g., schools, therapy). A second strength of the PANAS and PANAS-C is that their items do not have a one-to-one correspondence with the diagnostic criteria for depression and anxiety. Because there is significant overlap between the symptoms of depression and anxiety, symptom-oriented self-report measures are not sensitive to the differences between the types of internalizing disorders (Laurent et al., 1999). For example, items such as "I cannot make up my mind about things" (CDI, item 13) or "I do not worry about aches and pains" (CDI, item 19, reverse-coded), could represent manifestations of both depression and anxiety.

While measures such as the CDI are typically reliable in differentiating between depressed and non-depressed youth, their utility in differentiating between internalizing disorders is much less reliable. As noted above, the PANAS and PANAS-C have both been shown to reliably differentiate between depression and anxiety based on the tripartite model.

A third advantage of the PANAS and PANAS-C also relates to the lack of a one-to-one item-to-symptom correspondence. In addition to overlapping with one another, the symptoms of depression and anxiety overlap with those of autism spectrum disorders. Using the CDI as an

example, items such as “I like being with people” (item 12) and “I have plenty of friends” (item 22), are confounded with the social impairments associated with ASD, as discussed above. Based on these concerns with other measures of internalizing symptomatology, the PANAS and PANAS-C present a unique opportunity to evaluate in a simple and straight forward fashion the presence of depressive and anxiety symptoms, as characterized by positive and negative affect, without potential symptom overlaps.

While the use of the PANAS and PANAS-C in an ASD population can be supported in these ways, an argument could also be made against the effective use of these measures for individuals with autism spectrum disorders. As the core deficits of ASD include impairments in social communication, it is possible that this population may have difficulty completing a questionnaire which is comprised solely of affective descriptors. For instance, Hobson’s (1989, 2005) affective view of autism theorizes that children with ASD lack the basic ability to experience relationship-based emotions. Following this logic, if an individual is incapable of experiencing an emotion s/he would not be an effective reporter of that emotion. However, this does not necessarily negate the effective use of the PANAS and PANAS-C, as the majority of the items do not reflect inherently relationship-based emotions (e.g., jealous, loving, hurt). Rather, an individual completing the questionnaire is able to evaluate the affective descriptors without regard to social interactions, perhaps with the exception of *guilty* and *ashamed* on both measures and *lonely* on the PANAS-C. Additionally, previous research has also shown that individuals with ASD are capable of effectively evaluating their own emotions on self-report measures (Baron-Cohen, Richler, Bisarya, Gurunathan & Wheelwright, 2003; Berthoz & Hill, 2005), lending more support to the use of the PANAS and PANAS-C in this population.

Chapter 3: Internalizing Symptomatology in Children and Adolescents with ASD

Prevalence of Internalizing Disorders in the General Population and in Individuals with Autism Spectrum Disorders.

The CDC reported a morbidity rate over a 2-week period of 8% (6% of males and 10% of females) for depression in individuals 12 years of age and older (National Health and Nutrition Examination Survey data, 2007–2010). The national prevalence statistics show that about 32% of adolescents (13-18 years) in the U.S. population have experienced an anxiety disorder in their lifetime, with rates increasing with age. Regarding Major Depressive Disorder, the lifetime prevalence rate in adolescents is about 11%, with rates also increasing with age (Merikangas et al., 2010b). Kessler and colleagues (Kessler et al., 2012) reported twelve-month and 30-day prevalence rates for depression and anxiety in a large nationally representative sample of 13 to 17 year olds. Prevalence rates were computed by combining both parent- and adolescent-reports of internalizing symptoms from surveys and clinical interviews. Results showed that 8.2% of the teens met criteria for depression over the past year, and 2.6% met criteria for depression in the past 30 days. Larger prevalence rates were found for anxiety diagnoses. Specifically, 24.9% met criteria for any anxiety disorder in the past year, and 14.9% met criteria in the past 30 days.

In children (8-11 years), much lower 12 month prevalence rates have been reported, showing that .4 % of children meet criteria for any anxiety disorder, and 1.6% meet criteria for Major Depression (Merikangas et al., 2010a). It has also been reported that up to 2.5% of children in the general population experience clinical depression at some point in their lives (Birmaher et al., 1996). Limited research exists which measures depression in a very young

school-aged population, although Samm and colleagues (Samm, Varnik, Tooding, Sisask, Kolves, & von Knorring, 2008) reported that total scores on the Children's Depression Inventory (CDI; Kovacs, 1992) did not differ between a non-clinical sample of 7-year olds and 8 to 10-year olds, and that 7-year olds' item scores differed from 8 to 10 year olds in developmentally appropriate ways (i.e., abstract thinking and vocabulary). While unique for including such young participants, the study's sample of seven year olds comprised only about eight percent of the full sample, hence limiting generalizability of the findings relating to age comparisons. Additionally, the authors note that these results may not necessarily apply to clinical populations, who have more cognitive and developmental problems, making it necessary to investigate this issue in these specific populations, specifically autism spectrum disorders.

Over the past decade, it has become apparent that the prevalence of internalizing disorders, such as depression and anxiety, is elevated for individuals with Autism Spectrum Disorders (ASD; e.g., Ghaziuddin et al., 1998; Kim et al., 2000; Leyfer et al., 2006; Mattila et al., 2010). Much of this research, however, has focused on older adolescents and adults on the spectrum, and has not addressed the issue of internalizing disorders in children with ASD. Using clinical interviews and medical record reviews, Ghaziuddin et al. (1998) found that 53.3% of the adolescents and adults tested (N = 15, *M* age =15.1 years [SD =10.1], average IQ) presented with depression. These findings of elevated internalizing disorders have been supported by Leyfer and colleagues (2006), who reported that up to 24% of 10 to 14 year olds with ASD (N=109; majority of cases with average IQ) met criteria for subsyndromal and clinical levels of depression, and approximately 40% met DSM criteria for either specific phobia or OCD, based on the Autism Comorbidity Interview (ACI; Leyfer et al., 2006). A wide range of prevalence rates ranging from 11 to 84% have been reported across studies for the presence of a variety of

types of anxiety disorders in individuals with ASD (White, Oswald, Ollendick, & Scahill, 2009), rates much higher than those found in the general population. Mazefsky and colleagues (Mazefsky, Kao, & Oswald, 2011) found that 29% of their 10 to 17 year old participants with ASD and average IQ presented with comorbid subthreshold or clinical depression, and over approximately 53% presented with comorbid anxiety based on a parent interview (ACI). Interestingly, the children and adolescents (ages 10-17) did not rate themselves as depressed or anxious on the self-report measures utilized in this study, an issue that will be addressed in a subsequent section of this dissertation.

Lopata and colleagues (2008, 2010) have investigated the presence of depression and anxiety symptoms in ASD populations, including school-aged children as young as seven years. Preliminary analyses revealed no variation in symptom levels based on age; however the sample was small (N=40), and a distribution across ages was not provided, thus there may not have been the necessary power to detect group differences. Ghaziuddin et al. (1998) reported 25% of participants aged 6 to 12 years met criteria for a Major Depressive Disorder diagnosis based on diagnostic interviews and reviews of medical records, but they did not evaluate differences within this relatively broad age group, one which spans a number of developmental changes for children (e.g., cognitive ability, transition to middle school). Additionally, Sukhodolsky et al. (2008) reported that 43% of their sample (5 to 14 years) met the screening cutoff for an anxiety disorder based on parent-report measures. Other studies investigating internalizing symptoms in children with ASD included younger children, but specific attention was not paid to comparing younger versus older participants (e.g., Vickerstaff et al., 2007; Gadow et al., 2005). These studies do not provide statistics specific to the younger participants in their samples. One study evaluated parent-reported anxiety symptoms of children with ASD ranging in age from 3 to 12

years of age (Weisbrot et al., 2005), separating the 3 to 5 year olds from the 6 to 12 year olds; Results showed that parents of 3 to 5 year olds with ASD reported significantly fewer anxiety symptoms than did parents of typically developing 3 to 5 year olds. For the more heterogeneous 6 to 12 year old group, parents of children with ASD reported significantly more anxiety symptoms than did parents of typically developing children. Unfortunately, by including all 6 to 12 year olds in a single group, these authors neglected to identify the specific age at which parents began to identify greater levels of internalizing symptoms in their children.

This dissertation addressed this gap in the literature by separating the youngest elementary school-age children (6 to 7 years) from the older elementary students (8 to 11 years) and from those in middle and high school (11 to 17 years) and comparing rates of elevated internalizing symptoms between groups. Focusing on the timing of when internalizing symptoms become elevated in children with ASD will contribute a more accurate picture of the developmental trajectory of internalizing symptomatology in this population, which in turn may help to inform the most effective timing of interventions aimed at reducing depression and anxiety in children with ASD.

Measuring Internalizing Symptoms

While prevalence rates of internalizing disorders or of elevated internalizing symptomatology have been published which include children as young as 6 years of age, there exists a more basic issue of the validity of measuring these symptoms by self-report in children this young. Ialongo and colleagues (Ialongo, Edelsohn, & Kellam, 2001; Ialongo, Edelsohn, Werthamer-Larsson, Crockett, & Kellam, 1995) investigated the validity and stability of measures of depression and anxiety in a large demographically representative group of first graders and reported that the children as young as 5 or 6 years old were capable of providing

valid reports of depressed mood and feelings, as well as anxious symptoms. The authors noted that with children this age it is important to use scales with items that are simply worded and short, and that place limited demands on memory. Additionally, Ialongo and colleagues (1995, 2001) reported that stability of the measures over four months was very good; For the depression scale (CDI), all of those who fell in the upper quartile of depressive symptoms remained in the upper quartile four months later. These self-reports of anxiety (Revised-Children's Manifest Anxiety Scale (Reynolds & Richmond, 1985; RCMAS), were also relatively stable over the four month interval, especially for boys. This same research group also reported on the predictive validity of these measures administered in the first grade. Specifically, the children who were in the upper third of anxious symptoms in the first grade were about twice as likely to be in the top third of anxious symptoms in the fifth grade (Ialongo et al., 1995). Additionally, self-reports of depressed mood predicted the need for and use of mental health services (as reported by teachers), suicidal ideation (self-report), and diagnosis of a major depressive disorder by the age of 14 years. Again, these predictions were especially strong for boys (Ialongo et al., 2001). These findings provide strong evidence that internalizing symptoms can be reliably and validly measured in early-elementary aged children. While encouraging, these findings can only generalized to typically developing individuals.

Few measures of internalizing symptomatology have been validated for a population of individuals with ASD (Lainhart, 1999), although a variety of measures have been used regularly to measure symptoms of depression and anxiety. For school-aged children, the Children's Depression Inventory is commonly used. It has been found to have good sensitivity (80%) and specificity (84%) when used to identify depression in typically developing children (Kovacs & Staff, 2003). When tested on a small sample of children and adolescents (ages 10-17) with ASD,

sensitivity of the measure was significantly less (45%) than that reported for the standardization samples. Specificity was also less (77%) than what was found in the typically developing population on which the measure was standardized (Mazefsky et al., 2011). These findings raise some concern about the use of self-report measures in this population, as it is likely that the measures are underestimating the number of individuals with elevated depressive symptomatology. Consequently, many researchers are careful to use both self- and parent-report measures when evaluating internalizing symptomatology (e.g., Lopata et al., 2010). A more extensive discussion of the issues inherent in parent- versus child-report measures is presented below.

The BASC-2 is also commonly used to assess both depression and anxiety symptoms in multiple populations. While it was not created as a diagnostic tool, it has been shown to be a good screening measure for many behavioral problems and disorders, both internalizing and externalizing (Reynolds & Kamphaus, 2004). One of its strengths is the availability of forms for three different raters (self, parent, and teacher). Two studies have been published comparing the use of the BASC-2 in children and adolescents with ASD versus those who are typically developing. Using the BASC-2 Parent Rating Scales with parents of 6 to 16 year olds, Knoll (2008) was able to differentiate between the three groups in his study (HFA, LFA, TD). Specifically, the HFA group scored significantly higher on the Internalizing Composite and all its subscales (e.g., depression, anxiety) than the LFA and TD groups. Similarly, Mahan and Matson (2011) evaluated the differences on the BASC-2 Parent Rating Scales between a group of 6 to 16 year olds with ASD and a typically developing sample. While the ASD group scored significantly higher on the depression subscale, they did not show significant differences on the scores for the anxiety subscale or for the internalizing composite. Due to a small sample size,

Mahan and Matson combined the more and less able participants into a single ASD group, whereas Knoll (2008) evaluated each group separately. It is possible that the discrepant results are due to combining these two groups, who have been reported to show varying levels of internalizing symptomatology in previous studies. Taken together, the results from these studies provide support for the valid use of the BASC-2 with an ASD sample, as they replicate, in whole or part, the common findings of elevated internalizing symptoms in individuals with ASD.

Parent-Report versus Self-Report

While it has not always been the case, self-reports by adolescents are now commonly used, and there is a general acceptance of their reliable and valid use for typically developing individuals in this age group (e.g., Hastrup et al., 1992; Rebok et al., 2001), and to a more limited extent for adolescents with ASD (Shipman, Sheldrick, & Perrin, 2011). For example, in a meta-analysis of self-report measures for typically developing individuals, Achenbach and colleagues (1987) reported test-retest ICCs comparable to those of adults starting at age 10 (ICC = .60), which increased to .71 for 14 to 18 year olds. Shipman et al. (2011) showed preliminary support for the concurrent validity and internal consistency of a quality of life measure in adolescents with ASD. Interestingly, low concordance rates between parent- and self-report, which are often cited as reason to avoid using self-report measures for younger children, are just as low for adolescent-parent report as they are for child-parent reports (Eiser et al., 2001; Verrips et al., 2000; Waters et al., 2003). Achenbach and colleagues (1987) note that the consistency in reports does not necessarily imply that either rater's information should be doubted or considered invalid, falling victim to the erroneous assumption that parents are always more accurate and reliable reporters than are children themselves (Barker, Bornstein, Putnick, Hendricks, &

Suwalsky, 2007; Upton, Lawford, & Eiser, 2008). Rather, it needs to be considered that different informants validly contribute different information. The discrepancy in scores could, for example, suggest that target variables differ from one situation to another (Achenbach et al., 1987). Lewis (1997) reinforces Achenbach's claims with his contextualist model, claiming that children's behavior is situationally determined, the result of an ongoing dynamic interaction between the individual and his/her environment. In general, it is agreed that parents' views should not be used to discount the views of the children themselves (e.g., Upton et al., 2008). This assertion is supported by Riley (2004) who posits that reports from children are uniquely able to reveal the personal internal experiences of the children, and should be evaluated on their own merit rather than as a function of concurrent agreement with proxy reporters, such as parents or teachers.

While there exists an underlying assumption that individuals are the most accurate and reliable observers of their own perceptions and experiences (Bevans et al. 2010; DeCivita et al., 2005), there are times when a proxy report may be called for. Specifically, children may be limited by very young age and/or may lack the necessary language skills, cognitive abilities, or self-awareness concepts to interpret the questions (Bevans & Forrest, 2010; Rebok et al., 2001; Theunissen et al., 1998; Waters et al., 2003). For these groups of individuals, proxy reports may be the only option, although caution should be used when a proxy is the sole rater. Parents have an intimate knowledge of their child's wellbeing (Bevans et al., 2010; DeCivita et al., 2005), but still provide an outside perspective on their child's behaviors, feelings, and emotions. When parents report, researchers are gaining information on what the parent *believes* is the child's perspective, but there is no assurance that it accurately reflects their child's true perceptions. This potential discordance may compromise the validity and reliability of the data (DeCivita et al.,

2005). Interestingly, it has been found that when children have chronic conditions, parents rate their child's emotional state as worse than the child (or adolescent) reports for him/herself (Eiser & Morse, 2001; Walker & Heflinger, 1998; Shipman et al., 2011). It has also been reported that while parent reports are highly specific, they fall short on sensitivity (Angold, 1988). Achenbach et al. (1987) posit that lower levels of consistency between raters indicate that these informants should not be substituted for one another, even if correlations between the ratings are statistically significant. Again, the most effective methodology includes multiple raters in order to evaluate cross-informant agreement.

Concordance rates have been shown to vary across studies when investigating parent- and self-report measures (e.g., Johnson, Filliter, & Murphy, 2009; Birmaher et al., 1996). No consistent explanation has been given for these discrepancies, but hypotheses regarding this discrepancy in an ASD population range from a lack of insight on the part of the child regarding their own emotions (White & Roberson-Nay, 2009), a lack of appropriate language to explain emotions (vanSteensel et al., 2011), to the possibility that children with ASD express anxiety and depression differently than typically developing children and therefore do not endorse common internalizing symptoms on questionnaires (White et al., 2009). As an example of this discrepancy, Vickerstaff et al. (2006) found that the mean self-report responses on the depression subscale of the BASC-2 were in the average range for children with ASD, although mean parent and teacher ratings were reported to be significantly elevated. Shipman et al. (2011) also found relatively low concordance rates, although they were within the expected range for cross-informants (.2 to .4). Specifically, parents' reports regarding their children's quality of life were lower than the self-reports of quality of life (although both were below the population mean).

However, the issue of poor concordance is not unique to those with ASD and their parents. These discrepant results are also found in typically developing samples, and can help to shed light on this issue within an ASD population. Achenbach and colleagues (Achenbach, McConaughy, & Howell, 1987) reported that children rated their behavior more positively than did their parents, and parent-child concordance was reported at $r = .25$. In their meta-analysis, Achenbach's research group (1987) reported that parents generally reported more behavior, schooling, and relationship problems in their children, whereas the children reported experiencing more fear, anxiety, obsessions, compulsions, and covert antisocial behaviors. Across the studies evaluated, the parents and children tended to agree about overt, easily observable behaviors and symptoms, compared to more covert or private phenomena. They agreed least about affective and psychotic symptoms. Similarly, other research groups have reported that proxy reporters are best at reporting physical health or observable characteristics in their children (DeCivita et al., 2005; Eiser & Morse, 2001; Waters, Stewart-Brown, & Fitzpatrick, 2003), and show poor concordance rates on measures evaluating social-emotional domains (Verrips et al., 2000). Therefore, reporters should be chosen carefully in order to produce the most accurate data. For example, Waters and colleagues (2003) recommend that intervention studies that aim to improve mental health are best monitored by self-report. Based on research showing that parents are less effective raters of affective and emotional symptoms, there is a risk that the use of parent-reports in mental-health intervention studies could underestimate the effects of the intervention.

Correlates of Internalizing Symptomatology

Friendship and Social Engagement.

Friendship can be described as involving a "close, intimate, affective, and relatively long-term tie (6 months or longer) between children, based on reciprocal, stable interactions and companionship capacity" (Bauminger et al., 2008, p. 135). Peer friendships are basic and essential affective relationships formed throughout life, which have important influences on children's social development (Ladd, Kochenderfer, & Coleman, 1996; Nangle, Erdley, Newman, Mason, & Carpenter, 2003; Parker & Gottman, 1989). In general, friendship allows children to develop and practice prosocial behaviors (e.g., companionship, mutual caring, empathy; Bauminger et al., 2008) and provides children with a sense of belonging and self-worth (Bagwell et al., 1998). Three dimensions of friendship have been shown to differentiate friends from non-friends, namely companionship, intimacy-trust, and closeness-affection (Bukowski, Newcomb, and Hartup, 1996; Parker & Gottman, 1989). Research focusing on the *quantity* of friends has shown that having at least one friend can play a protective role against peer victimization and overall adjustment for children and adolescents (Hartup & Stevens, 1997; Waldrip, Malcom, & Jensen-Campbell, 2008), and against anxiety and depressive symptoms (Furman, 1989). Furthermore, having a high *quality* friendship can serve as a protective factor against bullies (Bollmer, Milich, Harris, & Maras, 2005), as well as loneliness and social rejection (Burgess, 2006; Nangle et al., 2003; Parker & Asher, 1993; Parker, Rubin, Price, & DeRosier, 1995). While good quality friendships predict wellbeing in children and adolescents (Ladd et al., 1996), poor friendship quality has been found to be a precursor to internalizing symptomatology (Bagwell, Bender, & Andreassi, Kinoshita, Montarello, & Muller, 2005; Nezlek, Imbrie, & Shean, 1994).

It has often been assumed that children with autism spectrum disorders are incapable of making and maintaining quality friendships with their same-age peers. This assumption is based on social-emotional deficits associated with ASD, which some believe result from a theory of mind deficit (e.g., Tager-Flusberg, 2001). This social-cognitive view of ASD purports that children with ASD struggle to understand that other people have feelings, thoughts, and desires separate from their own (Baron-Cohen, 1991; Wellman, 2011). This, in turn, results in difficulties with reciprocity, empathy, and prosocial behaviors such as caring, comforting, and listening to others, characteristics which are essential to high quality friendships (Bauminger et al., 2008). In contrast to the theory of mind view of autism, Hobson's (1989, 2005) affective view of autism theorizes that children with ASD lack the basic ability to experience relationship-based emotions as a result of a core deficit in intersubjective sharing. This lack of intersubjective sharing for individuals with ASD may result in limited experiences with same-aged peers and thus an inability to understand what it means to have or to be a friend. This transactional relationship between social interactions and internalizing symptoms over time is represented well by Kellam and colleagues' Developmental Epidemiological Framework (Kellam, 1990; Kellam & Rebok, 1992). In this framework, psychological wellbeing is seen as both a consequence of, and an antecedent to, adaptation to developmental tasks. Kellam posits that failure to adapt to the social and cognitive demands of a certain developmental stage often result in negative feedback by those surrounding the individual (parents, friends, teachers). This negative feedback may prove stressful to the child and thus result in a decrease in psychological wellbeing, primarily reflected in depressive and anxiety symptoms. Lewinsohn (1974) proposed a similar theory in which depression results from a reduced amount of positive reinforcement, or alternately, a poor match between reinforcers and a person's behavior. The quantity of positive reinforcement can

affect one's emotional experiences, which in turn can feed back to decrease the probability of engaging in activities that are likely to result in positive reinforcement. Based on the social difficulties inherent in ASD, one can see how a feedback loop such as this may result in elevated internalizing symptoms. With each failed effort to interject themselves into their social environments, the negative feedback/lack of positive reinforcement results in a reduced probability that the child will make subsequent efforts to socialize.

Despite multiple theoretical explanations for why friendships may be extremely difficult for individuals with ASD, research has shown that children with ASD, in fact, report having friends. However, the quality of these friendships is often of lower quality in comparison to friendships between typically developing children, and the relationships are sometimes not reciprocated (Bauminger & Kasari, 2000; Bauminger et al., 2003, 2008; Chamberlain, Kasari, & Rotheram-Fuller, 2007; Orsmond, Krauss, & Seltzer, 2004). While perhaps not ideal, these findings suggest that these children possess at least a basic ability to interact and connect to other children (Locke, Ishijima, Kasari, & London, 2010). For example, Bauminger et al. (2008) found that children with ASD perceived their friendship qualities as lower on the dimensions of help, intimacy, and closeness, when compared to typically developing children. Locke and colleagues (2010) reported that adolescents with ASD had significantly poorer friendship quality on the dimensions of companionship and helpfulness, as compared with their typically developing classmates, but did not differ from their peers on the dimensions of security, conflict, or closeness. Again, vital to these research findings is that children and adolescents with ASD do indeed identify having best friends with whom they share meaningful relationships. In support of this, research has shown that children and adolescents with ASD have a social desire for

involvement with friends (Bauminger & Kasari, 2000; Bauminger et al., 2008) and therefore do not have a "basic desire for aloneness" as Kanner (1943, p.5) once proposed.

Loneliness, while not the focus of this dissertation, is intertwined with internalizing symptom and friendship constructs. For instance, loneliness has been found to fully mediate the relation between friendship variables (i.e., quality and quantity of friendships) and depression (Nangle et al., 2003) in typically developing third through sixth graders. Additionally, Bauminger & Kasari (2000) reported that children with ASD demonstrated an understanding of friendship, but they did not use this understanding to reduce feelings of loneliness in the way typically developing children did. Namely, typically developing children make a connection between the definition of a friend as a companion, and what it means when a friend is absent. This closeness in typical friendships reduces feelings of loneliness. Children with ASD in this sample did not seem to be able to connect the two concepts, suggesting a lack of understanding of the emotional aspect of loneliness and friendship. Because research has shown the interrelated nature of the construct of loneliness with both friendship and internalizing symptoms, it was important to measure loneliness in order to partial out the variance unique to this construct when evaluating the relation between friendship and internalizing symptoms.

It is well established that having a friend, and more specifically, sharing in a quality friendship, plays a protective role against a variety of negative outcomes, including internalizing symptoms. It has also been well established that while children and adolescents with autism spectrum disorders are capable of making friends, the quality of those friendships is lacking. As the rates of internalizing symptoms have been reported to be elevated in this ASD population, it begs the question of whether this lack of quality friendships is related to these elevated clinical symptoms. Succinctly put, "Given the developmental importance of friendship as a source of

growth in relationship skills in typical development, we would expect that friendship in children with HFASD [high functioning ASD] also facilitates social development" (Bauminger et al., 2008, p. 149).

In response to the importance of friendship in healthy social development, a number of research groups have created interventions to address the social skills of children and adolescents with ASD (e.g., Kasari, Rotheram-Fuller, Locke, & Gulsrud, 2012), with the hopes of avoiding the all-too-common social isolation and rejection seen in students with ASD (Humphrey & Symes, 2010). Mixed results exist as to the effectiveness of interventions targeting social skills for students with autism spectrum disorders. Hwang and Hughes (2000) reported positive changes in social behaviors across the studies cited in their literature review, stating that social skills programming for children with ASD showed "considerable promise for increasing social and communicative skills" (p. 340). Rogers (2000) reported similar results in her review of social skills interventions, stating that children with ASD were responsive to a wide variety of social skills intervention strategies. On the other hand, Bellini et al. (2007) in a large meta-analysis concluded that school-based social skills interventions were minimally effective for children with ASD, showing low generalization and only moderate maintenance effects. These results were consistent across each type of intervention (e.g., peer-mediated, environmental modifications, child-specific). Due to the limitations on the use of the data from the current intervention study, focus is not directed at evaluating the effectiveness of the intervention. Rather, this sample provides a convenience sample with which affect variables, internalizing scales, and social skill variables can be evaluated in a population of individuals with ASD.

Dissertation Aims and Hypotheses

The primary aim of this dissertation is to evaluate the factor structure, reliability, and validity of the PANAS and PANAS-C in a population of children, adolescents, and young adults with autism spectrum disorders. Based on previous literature, **it is hypothesized that the reliability analyses and factor solutions will produce two primary factors which represent Positive and Negative Affect for both the PANAS (longitudinal sample) and the PANAS-C (friendship intervention sample)**. Based on the findings from these reliability and factor analyses, suggestions will be made to remove items that show poor coherence or do not load significantly on the designated factor. While a number of items have been found to be problematic across multiple studies (e.g., Laurent & Ettelson, 2001), no hypotheses are proposed regarding specific items in this dissertation. This decision was based on the fact that these measures have never been evaluated in an ASD population, and thus it would be unwise to make any a priori predictions. Subsequent factor analyses will be run to evaluate the structure of the revised measures.

It is predicted that these revised affect scales will support the tripartite model, with NA correlating significantly and positively with both depression and anxiety measure scores, and PA correlating significantly and negatively with depression scale scores, but not with anxiety scale scores. Evaluation of the tripartite model will double as a test of convergent validity, which is expected to be good for these samples. However, **it is expected that the associations will be weaker for the cross-informant analyses.** Support is also expected to be shown for the tripartite model through multiple hierarchical regression analyses. **Both NA and PA scores are expected to predict significant unique portions of the variance in depression**

scores, while only NA is expected to predict a significant amount of variance in the anxiety scores. These predictions apply to both parent- and self-report data, and if supported they will add to existing literature supporting the unipolar structure of unique dimensions of positive and negative affect.

As previous studies have shown support for the reliable use of self-report measures in ASD populations (Hillier et al., 2011; Sebastian et al., 2009), specifically in relation to emotion (Berthoz & Hill, 2005), **it is predicted that the PANAS and PANAS-C will show good internal consistency for the ASD samples** evaluated herein. That being said, based on research showing that very young school-aged children may struggle more with self-report measures (Rebok et al., 2001), **specific attention will be paid to individuals under the age of 8 years.** The combination of their young age and the use of parent-report as the only measure used for convergent validity make these predictions tenuous; however, the results will shed light on the effectiveness of the PANAS-C in a very young ASD population as well as elucidate whether the unipolar structure of affect is relevant for this age group.

In addition to evaluating the PANAS and PANAS-C, prevalence rates of internalizing symptomatology will be computed based on scores from both parent- and self-report measures. **It is expected that participants from all age groups will show elevated levels of depressive and anxious symptoms compared to published rates for the general population.** It is also expected that the rates of elevated internalizing symptoms for the current samples will approximate those which have been published using ASD populations.

Due to the relatively small number of participants in each of the samples utilized for this dissertation, the options for complex inferential statistical analyses were limited. However, these are rare and unique datasets that warrant deeper investigation; therefore, following analyses

evaluating the factor structure, reliability, and validity of the PANAS and PANAS-C, a series of supplemental exploratory analyses will be carried out to evaluate the relations between adaptive and social variables and internalizing symptoms.

Based on the literature discussed above**, it is expected that better social skills (e.g., friendship quality, social engagement) will be associated with lower levels of internalizing symptoms.** Specifically, for the friendship intervention sample, it is predicted that the positive social and friendship variables will correlate positively with the PA scale scores and negatively with the NA scale scores. In contrast, it is expected that the negatively-valenced social and friendship variables will correlate positively with the NA scale scores and negatively with the PA scale scores.

The longitudinal sample presents the unique opportunity to track the levels of negative and positive affect over time. **Trajectory analyses will help to reveal any patterns that exist within this group of more able individuals with ASD.** No predictions are being made relating to this analysis, as little research exists to elucidate potential patterns of change. Overall, it is expected that poorer social skills will be associated with higher levels of NA and lower levels of PA.

Chapter 4: Methods

Participants

Data for this dissertation were drawn from two separate sources. A school-aged group was selected from a recent multi-site study comprised of individuals with ASD, ranging in age from 6 to 17 years. A second group was selected from an ongoing longitudinal study and included participants ranging in age from approximately 12 to 22 years of age. Details for each of these samples follow.

Friendship intervention study.

Participants were drawn from a larger multi-site study investigating the effectiveness of two in-school social skills intervention programs for children and adolescents with ASD. For this dissertation, data were collected from a sample of 99 children and adolescents with autism spectrum disorders. Inclusion criteria for the larger study included (1) a chronological age between 6 and 17 years in grades 1 through 12, (3) a full scale IQ of 70 or above, (3) a clinical diagnosis of an ASD, including Autistic Disorder, Asperger syndrome, or Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS), and (4) and full inclusion in general education at least 80% of the school day. Exclusion criteria included diagnoses of significant sensory or motor impairment (e.g., blindness, severe cerebral palsy) that would preclude completion of the standard assessment battery. For the purposes of this dissertation, participants were required to have PANAS-C data for at least one time point.

Participants were recruited from three sites: University of Michigan Autism and Communication Disorders Center (UMACC), University of California, Los Angeles (UCLA), and Seattle Children's Hospital (Seattle). Participants at all sites were recruited primarily through the local public elementary, middle, and high schools. Permission was initially granted at the district level, at which point research staff contacted principals at specific schools to inquire about their interest in participating in the study. Flyers were provided to each school. Research staff requested that flyers be sent home to parents of children who were likely to qualify for the study (i.e., either had previous diagnoses of ASD or were suspected to have ASD diagnoses). Advertisements were also placed in the newspaper and on the radio, and recruitment teams attended local events such as the Autism Walk to recruit participants. If interested in participating, parents contacted the research staff, at which point an initial screening questionnaire was administered to determine eligibility. If the screener was passed, an intake assessment was scheduled to further determine eligibility.

Mean chronological age for the 99 participants was 11.13 years (SD = 3.67 years; range = 6 years, 0 months - 17 years, 5 months). Mean full scale IQ was 97.36 (SD = 17.77; range = 64-159). All but five individuals had a full scale IQ of 70 or higher (M = 99.08, SD = 16.59). Exceptions were made to include three participants with a full scale IQ of 67, and two individuals with a full scale IQ of 64. These exceptions were made by clinicians who felt that these students would benefit from the intervention study, and that the intelligence test did not adequately represent the child's or adolescent's true ability. Males comprised 86% of the sample. Race and ethnicity of the sample included 49.5% Caucasian, 4% African American, 17.2% Asian, 8.1% Hispanic/Latino, 11.1% of the sample self-identified as "Other" or Bi-/Multi-racial, and 10.1% did not provide information about their race/ethnicity. As would be expected

due to the geographic location of each site, the sites differed significantly from one another on the distribution of participants' race/ethnicity ($\chi^2(8) = 27.4$, $p = .001$); participants across sites did not differ significantly from one another on FSIQ scores ($F(2) = 2.69$, $p > .05$) or on the distribution of males and females ($\chi^2(2) = .353$, $p > .05$). The ASD diagnoses of all participants were supported by ADOS and SCQ scores (M=21.9, SD=6.3). Approximately 77% of the sample received an autism classification from the ADOS, and 23% received an autism spectrum classification.

Longitudinal study.

Analyses were conducted on data from 41 individuals participating in ongoing longitudinal studies who were prospectively studied from the time they were referred for evaluation for possible autism before 36 months of age. Participants were recruited from consecutive referrals to four regional state-funded autism centers in North Carolina, from a private university hospital in Chicago, and at the University of Michigan Autism and Communication Disorders Center (UMACC). A parent or guardian provided informed consent in accordance with institutional review boards of the University of North Carolina, Chapel Hill, the University of Chicago, and the University of Michigan. Participants were assessed in face-to-face evaluations at approximately ages 2, 5, 9, and 18 years. Data from the age 9 and 18 visits will be utilized in this dissertation. Beginning approximately 10 years after the initial face-to-face assessment, packets including parent- and self-report measures were sent home to families every three to six months. The average age at the first *wave* of data collection was 12.77 years (SD =.87 years). The primary focus of this paper is on Waves 17 through 24 of data collection, which encompass participants ranging in age from approximately 13 to 22 years (M=19.27 years [SD = 1.57]);

however, data from earlier waves were also utilized as correlates of later outcomes (e.g., ADI-R or ADOS scores at age 9).

Overall selection criteria included a best estimate diagnosis on the autism spectrum at either age 9 or age 18, FSIQ of 70 or above at age 9 or 18, and full data on at least one PANAS measure between waves 11 and 24. Five participants moved from a PDD diagnosis at age 9 to typically developing diagnosis at age 18. One individual moved from an age 9 PDD diagnosis to a non-spectrum developmentally delayed diagnosis at age 18. Finally, one participant was diagnosed as non-spectrum developmentally delayed at age 9, but diagnosed with autism at age 18. More specific inclusion criteria were applied for subsequent analyses. For the psychometric analyses of the PANAS, data from all 41 individuals were used, resulting in 226 observations. Table 1 presents demographic data for all 41 participants together.

Table 1

Demographic Data for Longitudinal Sample

	M (SD) or %	Range
Age in Years	16.08 (1.73)	12.83 to 21.75
Sex	90.2	
FSIQ	103.25 (18.06)	71 to 130
Diagnosis at age 9		
Autism	40.6	
PDD	56.3	
Non-spectrum	3.1	
Diagnosis at age 18		
Typically Developing	13.9	
Autism	52.8	
Asperger's	2.8	
PDD	27.8	
Non-spectrum	2.8	
Race/Ethnicity		
White/Caucasian	82.9	
Black/African American	14.6	
Asian/Pacific Islander	2.4	
Parent Education		
Graduate/Professional	37.5	
4-year college	25.0	
Some college	30.0	
High School/GED	5.0	
Associate degree	2.5	
Parent Income		
Less than $20K	4.9	
$21K-35K	9.8	
$51K-65K	2.4	
$66K-80K	2.4	
$81K -100K	12.2	
$101K-130K	4.9	
$131K-160K	7.3	
Over $161K	12.2	
VABS Socialization Std Score	79.95 (18.89)	45 to 119
VABS Comm. Std Score	88.00 (13.96)	56 to 113
VABS Daily Living Std Score	81.02 (15.35)	43 to 115
VABS Composite Score	80.29 (15.09)	51 to 119

Note. FSIQ = full scale IQ; VABS = Vineland Adaptive Behavior Scales. Age is reported for first available wave of data collection. FSIQ and VABS are reported for most recent follow-up (around the age of 18 years). FSIQ and VABS scores for seven individuals are reported from earlier evaluations at age 9. $N = 41$, except for Parent Education ($n = 40$), and VABS scores ($n = 39$).

Procedures

Friendship intervention study.

If the participant met the inclusion criteria for the study based on the intake questionnaire over the phone, the family was scheduled for a clinic visit. Target participants with autism and their parents were asked to come to the clinic (i.e., UMACC, UCLA, Seattle) for their initial intake assessments. At the intake appointment, participants and their parents first read and signed consent forms approved by the Institutional Review Board and any questions about the study were addressed. The appointments were scheduled for three hours and took place in typical clinic evaluation rooms with appropriately sized tables and chairs. Some rooms had one-way mirrors through which parents could observe if the participant agreed; otherwise, parents completed their questionnaires in a separate clinic room while their child completed the intelligence tests, the ADOS, and the self-report questionnaires. An assessment team, independent of the intervention program, conducted all the entry assessments. The ADOS and IQ test were administered first to allow investigators time to score the measures before the end of the appointment. Staff members were trained to research reliability on the ADOS, reaching 80% agreement on both algorithm scores and the codes throughout the protocol. The staff members who administered the ADOS were not directly involved in the intervention groups and were blind to group assignment. The ADOS portion of each assessment was videotaped, if consent was granted. A staff member was available for questions about the self-report questionnaires. Study eligibility was established before completion of the intake appointment.

It is important to note that there are two distinct, but similar studies encompassed in this section of the dissertation. The first study recruited participants in elementary school from first to

fifth grade. The second study recruited older students in both middle- and high-school, with a maximum age of 17 years. Both studies had the primary goal of evaluating two social skills interventions for students with high functioning autism spectrum disorders; however, several of the measures included in each study varied due to developmental appropriateness and what was permitted by the local institutional review board (see Appendix A for details). Additionally, the behavioral observation measure for the younger students (POPE; Kasari, Locke, Gulsrud, & Rotheram-Fuller, 2011) was modified to be more developmentally appropriate for the older students (TOPI). More detail is provided below.

For elementary students, if participants (targets) qualified for the study and consented to participate in the in-school intervention, the study staff obtained consent from the classroom teacher and subsequently gathered consent to administer questionnaires to the target child's classmates. For participants in grades 6 through 12, no measures were collected in the classroom. During this elementary-school classroom visit, sociometric ratings and the Friendship Questionnaires were collected in the target students' classrooms. For students in grades 6 through 12, revised sociometric ratings were completed during the first small group meeting for those students consenting to be in the in-school intervention.

Behavioral Observations were completed on the playground during lunchtime recess for elementary-aged students and in the lunch room for middle- and high-school students. These environments varied based on the school. Staff members who completed these ratings made an effort to be as inconspicuous as possible, so as to avoid influencing the students' behavior. Staff members who were also group leaders did not observe students from their own groups.

Longitudinal study.

A standard research protocol was followed for all participants at ages 9 and 18. At the face-to-face assessments, parents of participants completed the ADI-R and the Vineland Adaptive Behavior Scales (VABS; Sparrow, Balla, & Cicchetti, 1984; VABS-II, Sparrow, Cicchetti, & Balla, 2005). This was followed by a child evaluation during which psychometric tests and the ADOS were completed. Clinical diagnoses were made by a psychologist or psychiatrist after all data was reviewed. Again, for this dissertation data from the age 9 and age 18 visits will be analyzed.

Starting about 10 years after the initial face-to-face assessment, packets including parent- and self-report measures were sent to families every three to six months. Pertinent to this dissertation, these packets included questionnaires related internalizing symptoms, behavioral symptoms, quality of life, as well as positive and negative life events. The PANAS was not included in these packets until the 11th wave of data collection, after which it was not collected again until Wave 17. The primary focus of this paper is on Waves 17 through 24 of data collection, which encompass participants with PANAS data ranging in age from approximately 13 to 23 years (M=19.27 years [SD = 1.57]); however, data from earlier waves were also utilized as predictors of later outcomes (e.g., ADI-R or ADOS scores at age 9).

Measures

Friendship intervention study.

Although the focus of the large multi-site study utilized in this dissertation was the comparison of two unique friendship/social skills interventions, in the analyses of this dissertation, the two groups of children and adolescents receiving these interventions are merged

into a single group that received a social skill intervention. Though it is not the primary purpose of this dissertation to evaluate the effectiveness of the social skills interventions administered, using data from this study permits consideration of both concurrent and predictive relationships between internalizing symptoms pre- and post-intervention for students with ASD. Results have not yet been published regarding whether group differences exist between these two intervention types, but based on preliminary analyses, there were not significant differences between the outcomes for these children in the two different intervention studies.

Participant characteristics.

All participants completed the *Autism Diagnostic Observation Schedule* (ADOS; Lord et al., 2000) and the *Stanford-Binet Intelligence Scales, Fifth Edition* (SB-5; Roid, 2003) during their intake assessments to establish eligibility for the study. Additionally, in Year 2 of the study, UCLA and Seattle sites administered the *Social Communication Questionnaire* (SCQ; Rutter, Bailey, & Lord, 2003), a short ASD screener, to ensure accurate ASD diagnoses.

Internalizing symptoms.

The primary measure of interest in this dissertation is the *Positive and Negative Affect Schedule-Child* (PANAS-C**;** Laurent, Catanzaro, Joiner, Rudolph, Potter, et al., 1999). This measure is comprised of 30 adjectives reflecting both positive and negative affective states (e.g., happy, sad, proud, guilty; see Appendix B). Participants were asked to rate the extent to which they had felt that emotion over the past two weeks from 1 (not at all) to 5 (a lot). A total score was computed for positive and negative items separately.

The depression and anxiety subscales of the *Behavior Assessment System for Children 2nd Edition* (BASC-2; Reynolds & Kamphaus, 2004) were also used to evaluate internalizing symptoms in addition to the *PANAS-C*. The BASC is a multidimensional measure of children's

behavior that contains items assessing externalizing problems, internalizing problems, school problems, and adaptive skills. The BASC is appropriate for use with individuals between the ages of 2 and 18 years. The present study used the BASC parent-rating scale for children ages 6 through 18, and the BASC self-report scale for adolescents ages 11 through 17. The psychometric properties of the BASC are excellent.

Students completed Asher, Hymel, & Renshaw's *Loneliness Scale* (1984), which is labeled as "Questionnaire". This self-report measure consists of a series of 16 statements such as "I feel left out of things at school," or "I get along with my classmates." Students mark a 1-to-5 Likert scale indicating the frequency with which they feel the specified statement, ranging from "never" to "always." Some statements are reverse coded so that higher scores always indicate more loneliness. A total loneliness score is obtained by summing all items. This measure has frequently been used with ASD populations.

To measure anxiety in the teen sample, the participants completed the MASC. The MASC is a psychometrically sound instrument designed to assess anxiety symptoms across multiple dimensions. It is a 45-item self-report measure of anxiety for children 8 to 18 years of age. The MASC consists of four basic anxiety scales that assess the major dimensions of anxiety: Physical Symptoms, Social Anxiety, Harm Avoidance, and Separation/ Panic. It also provides a Total Anxiety score and an Anxiety Disorder Index. The Physical Symptoms scale includes items related to physiological arousal and has two subscales: Somatic Symptoms and Tension. The Harm Avoidance scale contains the subscales of Perfectionism (doing everything exactly right) and Anxious Coping (checking to make sure things are safe). The Social Anxiety scale relates to fear and worry of social interaction and social evaluations and contains two subscales:

Humiliation Fears and Performance Fears. Internal consistency of the scales and subscales ranges from .7 to .8 (Stallings & March, 1995).

Social engagement and friendship measures.

Playground and cafeteria behavioral observations were conducted twice at each time point throughout the entire study (baseline, half-way through the intervention at week 4, post-intervention, and follow-up for a total of 8 observations) to assess interaction quality and quantity with peers. This coding system was created by Kasari and colleagues (Kasari et al., 2011) and was adapted from Sigman and Ruskin (1999) and the Howes Peer Play Scale (1980; 1987). Kasari and her colleagues have used this observation scale to evaluate the interactions of children with autism in several studies (e.g., Kasari et al., 2005; Kasari et al., 2011). In the Playground Observation of Peer Engagement (POPE), peer interactions on the playground were coded using an interval-observation schedule of every 40 seconds (with 20 second coding intervals) for a total of 10 to 15 minutes per observation. Interactive levels or states were noted during each coding interval, and included Solitary, Observer, Parallel, Parallel Aware, Joint Engagement, and Games. The proportion of coding intervals determines the predominant states of engagement. Thus, if a child is rated as engaged with another child - joint engagement - for 10 of 20 intervals, the child's score on this variable is .50. Coders were trained to be reliable using a criterion of Kappa greater than .85 on playground observations. For the purposes of this dissertation, a computed score of percent of time spent in joint engagement was used for analyses. For elementary-aged students, raters used the *POPE* protocol. For the middle- and high-school students, raters used the Teen Observation of Peer Interaction (*TOPI*) protocol. Both protocol used the same coding scheme described above.

In the *Friendship Survey* (Kasari et al., 2011; Cairns & Cairns, 1994), participants were

asked to identify who they liked to hang out with (friends) and who they did not like to hang out with (rejects) in their classroom. This free recall list of friends determined the participant's number of friendships. The number of friendships and social network status have been found to be moderately correlated. From the list generated, participants were asked to star their best friend. Additionally, participants were asked: 'Are there kids in your class who like to hang out together? Who are they?' To respond to this question, participants were guided to list each group of friends in the classroom, making sure to include students of the opposite sex, and also themselves. These lists serve to create the social network, which represents the social structure of the entire classroom. This methodology is based on reports from Cairns and Cairns (1994). Four levels of *social network centrality* (i.e., prominence of a participant in the overall classroom social structure) are possible: isolated (0), peripheral (1), secondary (2), and nuclear (3; based on Farmer & Farmer, 1996).

The Friendship Qualities Scale (FQS; Bukowski et al. 1994) is a 23-item self-report measure assessing children's perception of friendship quality through brief scenarios relating to a 'best friend'. An example of an item is "If I have a problem at school or at home, I can talk to my friend about it." Items are rated on a 5-point scale ranging from not true at all (1) to very true (5). The measure produces five subscales: Companionship, Intimacy, Trust, Help, and Closeness. The FQS subscales have presented good internal consistency (α between .71 and .86 in Bukowski et al. 1994, and .57–.86 in Bauminger et al., 2008). For individuals with ASD, this is the most common measure used to evaluate friendship quality.

The parent-report *Quality of Play Questionnaire* (QPQ; Frankel & Mintz, 2011) is a measure of the quality of the last play date and the frequency of play dates. The QPQ consists of 26 items administered to parents to assess the frequency of play dates with peers over the

previous month, the types of activities in which the children engaged and the level of conflict during these get-togethers. The last two items ask parents to report the number of invited (at another child's home) and hosted (at the participant's home) play dates the child had over the previous month. It has been used in several studies to evaluate the quality of play for individuals with ASD (Frankel et al., 2011). This measure was completed only for the elementary school-aged sample.

Interactions with friends for the adolescent and teen sample were evaluated with the Index of Peer Relations (IPR; Hudson, Nurius, Daley, & Newsome, 1990). The IPR is a 25-item self-report measure that evaluates the degree, severity or magnitude of problems in relationships with peers. Participants rated their peer relations (e.g., "I get along well with my peers," "My peers treat me badly," "My peers really seem to respect me," "My peers don't seem to even notice me" etc.) on a scale of 1 to 5 with 1 representing 'rarely' and 5 representing 'most of the time'. Possible scores range from 0 to 100, with an established cutoff of 35 points discriminating between individuals with and without peer relations problems. The IPR has demonstrated excellent reliability and validity (Hudson et al. 1990), with reliability alpha coefficients of over .90 and support for the construct, discriminant, and factorial validity of the IPR (Klein et al. 1990). This measure has been used successfully with ASD populations (Hillier et al., 2007).

Longitudinal study.

Participant characteristics.

All participants were administered a standard research protocol at their 9- and 18-year visits, which included the administration of the Autism Diagnostic Interview – Revised (Le Couteur, Lord, & Rutter, 2003), a standardized, semi-structured interview of parents and

caregivers that gathers a developmental history specific to ASD features, followed by the Vineland Adaptive Behavior Scales (VABS), 1st or 2nd edition (Sparrow, Balla, & Cicchetti, 1984; Sparrow, Cicchetti, & Balla, 2005), a standardized parent/caregiver interview of adaptive functioning across social, communication, daily living, and motor skills domains. Next, a child assessment took place, which included psychometric testing and the ADOS. A developmental hierarchy of cognitive measures was used; specifically, the Differential Ability Scales (Elliot, 1990), the Wechsler Intelligence Scale for Children-III (Wechsler, 1991), and the Wechsler Abbreviated Scale of Intelligence (Wechsler, 1999) were most frequently used to determine IQ scores.

Internalizing measures.

Two of the measures that were used to evaluate internalizing symptoms in the Friendship Intervention study were also used in the Longitudinal study. Specifically, the Asher Loneliness Questionnaire and the Children's Depression Inventory were used in both studies. Descriptions of these measures can be found below. In addition to these measures the Child and Adult Behavior Checklists (CBCL, Achenbach, 2001/ABCL, Achenbach & Rescorla, 2003), the Beck Depression Inventory (BDI-II; Beck, Steer, & Brown, 1996), and the Adult Manifest Anxiety Scale-Adult Version (AMAS-A; Lowe & Reynolds, 2004) were used.

The CBCL and the ABCL are parent-report measures used to assess psychopathology in the general child and adult populations with a three-level rating scale ('not true', 'somewhat or sometimes true,' and 'very true'). The profiles for scoring the CBCL/ABCL include normed scales for adaptive functioning (e.g., Friendships), empirically based syndromes (i.e., depression, anxiety), Internalizing, Externalizing, and Total Problems. In addition, the CBCL/ABCL profiles feature DSM-oriented scales consisting of items that experts identified as being very consistent

with DSM-IV categories (e.g., Depressive problems, Avoidant Personality Problems, Antisocial Personality Problems). The profiles display scale scores in relation to norms for each gender at ages 6 to 18 for the CBCL and for age3s 18 to 59 for the ABCL, based on national probability samples. Both measures have been proven to be both reliable and valid in populations with low IQs with alphas ranging from .69 to .95 for the eight syndrome scales, and concurrent and convergent validity being good (Teeneij & Koot, 2007).

The Beck Depression Inventory (Beck et al., 1996) is one of the most widely used instruments for measuring depression in adolescents and adults. It is a 21-item self-report measure evaluating the incidence and severity of depressive symptoms. A value of 0 to 3 is assigned for each answer and the total score determines severity. The measure has shown good convergent validity, high test-retest reliability, and high internal consistency.

The Adult Manifest Anxiety Scale-Adult is a 36-item self-report measure designed to screen for depression in adults. It is an upward extension of the Revised Children's Manifest Anxiety Scale (RCMAS), which has commonly been used in research in ASD populations (Mazefsky et al. 2011). The respondent answers yes or no to each item on three subscales (worry/oversensitivity, social concerns/stress, physiological anxiety), and the yes responses are summed to obtain scale scores and a total score, with higher scores suggesting higher levels of anxiety (Reynolds, Richmond & Lowe, 2003). The AMAS-A has been shown to have good reliability as well as factorial and construct validity. A cutoff score of 65 is suggested by the authors to identify those at risk for anxiety disorders.

Measures used to differentiate groups.

The Life Events Checklist (LEC), created by Johnson and McCutcheon (1980), is a questionnaire that measures the impact of both positive and negative life events over the past 12 months. The questionnaire contains 46 life event items and has space for the informant to list events specific to the participant. The participant's parent specifies whether or not a specific life event has taken place within the previous year, rates the event as either having a good or bad impact on the participant, and provides the degree of the impact on a four-point scale (i.e., no effect [0] to great effect [3]). The LEC has been used in both clinical work and research studies over the past 40 years to measure the impact of life events on stress levels, and as a predictor of depression (Rucklidge, 2006; Kashani, Dandoy, Vaidya, Soltys, & Reid, 1990). This measure has also been used to predict depressive symptoms in individuals with ASD (Ghaziuddin, Alessi, & Greden, 1995).

The Quality of Life Questionnaire (QoL.Q), developed by Schalock and Keith (1993), is a 40-item questionnaire designed to assess the overall quality of life of an individual with intellectual disability. Although the participants in the current sample are not classified as having intellectual disabilities, this scale is nonetheless relevant to a population with ASD, many of whom have lower levels of independence and higher levels of support, both socially and in the workplace. The items on this scale are rated on a 4 point scale, and are divided into four subscales: satisfaction with life (Satisfaction – items 1–10), satisfaction with issues of education, training or work (Competence/Productivity – items 11–20), the degree of autonomy and the ability to make decisions or exercise personal control (Empowerment/Independence – items 21–30), and the participation in activities and social organizations, such as the opportunities for establishing interpersonal relationships (Social Belonging – items 31–40). In the validation

study, internal consistency alpha was approximately .90, inter-rater reliability ranged from .69 to .83 and test-retest reliability ranged from .82 to .96.

Statistical Analyses

Missing Data

Very little missing data existed for the PANAS in the Longitudinal sample. However, while the friendship intervention participants were encouraged to answer every question on the PANAS-C, a number of individuals did not complete all 30 items on the scale. Because the total scores for the subscales could not be computed accurately without all data present, the missing data points were imputed. No more than 25% of the data were imputed for any single item. Multiple imputation was computed in SAS (v9.3) using IVEware (Imputation and Variance Estimation Software; Raghunathan, Solenberger, & Hoewyk, 2002), and five separate data sets were created. IVEware uses a multivariate sequential regression approach for obtaining the imputed values. The regression models can be linear regression, poisson regression, or logistic regression; the analyses in this dissertation used linear regression. Missing item scores were only imputed if they occurred within a valid administration of the PANAS-C. Because multiple imputation mimics the existing internal structure of the dataset, imputing entire missing scales (rather than items) would be inappropriate, and would risk artificially inflating the original structure of the data. For example, a participant who did not complete the PANAS-C at Time 2 would not have the scores for the entire scale imputed, but an individual who left the items *blue* and *disgusted* blank at Time 2 would have imputed values computed for those items.

A breakdown of the percent of missing data, and thus percent of imputed data, for each item of the PANAS-C can be found in Appendix C. Overall, 6.4% of the PANAS-C items were

imputed. At the time of this dissertation, the IVEware statistical package could not accommodate factor analysis. Therefore, the decision was made to analyze just one of the five imputed data sets. While this was not ideal, the added benefit of increasing the sample size by creating a greater number of full PANAS-C administrations outweighed the risk of misrepresenting the data with a single set of the imputed values.

To ensure that the imputed dataset used for the final analyses was consistent with the original dataset (containing missing values) and other imputed datasets (of which five were created), a sensitivity check evaluating the central tendency and dispersion statistics in three datasets were compared: (1) the original dataset, (2) the imputed dataset used for analyses, and (3) a randomly chosen imputed dataset from the remaining four created by IVEware. Additionally, factor and reliability analyses of the two imputed datasets were compared to verify that the results replicated one another. Both datasets analyzed showed the same results. Refer to Appendix D for a comparison of specific central tendency and dispersion data as well as scree and factor plots for the final PANAS-C analyses.

Psychometric analyses

The analysis of the PANAS and PANAS-C occurred in several steps. First, internal consistency analyses were run to compute Cronbach's alpha and corrected item-total correlations for the full PA and NA scales. For items on the same subscale, inter-item correlations between .30 and .70 are often recommended (Ferketich, 1991). An item can be considered "weak" if it has a corrected item-total correlation less than .30 (Lounsbury, Gibson, & Saudargas, 2006).

Next, separate factor analyses were run on the positive and negative affect scales to evaluate the utility of each item in the scale. Each factor structure was evaluated using Principal Axis Factor (PAF) analysis with a Promax (oblique) rotation. The benefit of PAF over Principal

Components Analysis (PCA) is that PAF assumes measurement error, which is useful and important when using self-report to evaluate young children and those with disabilities. Promax rotation is useful when there is a lack of independence between factors, as has been shown with the PANAS and PANAS-C. The Promax rotation provides average structure coefficients in place of factor loadings, but the cutoffs established for factor loadings are still applicable. In general, factor loadings of .45 and higher are considered fair, loadings over .55 are considered good, those over .63 are considered very good, and excellent factor loadings are greater than .70 (Comrey & Lee, 1992). Although many researchers have used cutoff scores in the range of .3 to .4 for factor loadings when deciding which items to exclude from a scale (e.g., Nunnally & Bernstein, 1994; Ebesutani et al., 2001; Laurent et al., 1999), according to Gorsuch (1983), "a salient loading is one that is sufficiently high to assume that a relationship exists between the variable and the factor…and can aid in interpreting the factor and vice versa" (p. 208).

Based on recommendations from Gorsuch (1988), a slightly more conservative cutoff of .45 was used to judge the factor loadings for the Longitudinal sample and for the 11 to 17 year olds in the Friendship Intervention sample, due to the small sample size. The cutoff for the factor loadings for the elementary-school-aged children in the Friendship Intervention sample was set at .4 for two reasons. These two issues may contribute to more variable factor structures for the PA and NA scales for the younger children; therefore, making the cutoff criteria less stringent will allow the scale to be generalized more broadly to future samples of children with ASD. First, some research has reported young children to be less reliable self-reporters than adolescents and adults (e.g., Edelbrock et al., 1985; Rebok et al., 2001).

Second, literacy level varies greatly from grade 1 to grade 5, which may have resulted in difficulty or confusion with the measure. The reading level of the PANAS-C is considered to be

at a fourth grade level (Laurent et al., 1999). Therefore, several words may have been too complex for the younger individuals in the sample. This decision was supported by Rebok et al. (2001), who evaluated a downward extension of the Child Health and Illness Profile-Adolescent Edition (CHIP-AE; Starfield et al., 1995) for children. A number of items on the revised CHIP are similar to those that appear on the PANAS-C: *irritable*, *proud*, *nervous*, *worried*, *temper*. The authors reported that 6 year olds had a poor understanding of 25.3% of the terms tested on their health survey, 7 year olds understood 19% of the terms poorly, and 8 to 11 year olds showed poor understanding of only 3.5% of the terms tested.

Overall, the mean number of items poorly understood differed significantly by age group, with 8 to 11 year olds poorly understanding significantly fewer terms than 6 to 7 year olds. After evaluating each scale separately and identifying problematic items that could be eliminated, a PAF was run on the entire scale to determine whether the two distinct factors remained.

Temporal stability of the PANAS scales was measured with both a Pearson product-moment correlation (*r*) and the intraclass correlation (ICC). While *r* is often reported for test-retest reliability, it has been argued that this practice is not appropriate, primarily because it cannot detect systematic error. Rather, opponents of using *r* to evaluate temporal stability propose the use of the ICC, which takes both the between- and within-subjects variation into account (Baumgartner, 2000; Weir, 2005). The ICC represents the proportion of variance in a set of scores that is attributable to the variance of the true score (Weir, 2005). The ICC can be interpreted as follows: 0-0.2 indicates poor agreement, 0.3-0.4 indicates fair agreement, 0.5-0.6 indicates moderate agreement, 0.7-0.8 indicates strong agreement, and >0.8 indicates almost perfect agreement (Portney & Watkins, 2000). For the Longitudinal sample, an ICC was computed for each pair of adjacent waves (e.g., 19-20, 20-21), as well as for all waves combined.

Although there were three timepoints of data collection for the Friendship Intervention sample, only Entry (Time 1) and Exit (Time 2) data were used to evaluate test-retest reliability, because so few participants completed the PANAS at Time 3 (n =18) due to the start of summer vacation.

To evaluate convergent validity, the PA and NA scales were compared with existing self- and parent-report measures of anxiety and depression using simple correlations. Following the correlation analyses, hierarchical multiple regressions were run to investigate the unique contribution of each affect scale to predicting depression or anxiety scale scores, after partialling out variance associated with the non-target internalizing scale and the opposite affect scale (i.e., accounting for overlap due to comorbidity). For example, to evaluate the unique contribution of PA to predicting anxiety scores, NA and depression scale scores were entered in the first block and the PA score was entered in the second block, with the anxiety total score entered as the criterion variable. These regression analyses were used to investigate the validity of the tripartite model of anxiety and depression proposed by Watson et al. (1988) that was utilized in the creation of the original PANAS.

Exploratory Analyses

Following psychometric analyses and evaluation of the tripartite model in each of the samples, groups were compared on a number of internalizing and social variables to discover whether they could be discriminated from one another. Due to the small number of participants in each of the samples utilized for this dissertation, and the need to break the younger sample up even further to accommodate different structural fits of the PANAS-C, the options for inferential statistical analyses were limited. However, with such unique datasets as these, deeper investigation of group differences and the associations between variables of interest were warranted. While interesting and a potentially good launching point for future research, the

results of these analyses are so tenuous that they have been placed in the Appendix. Description of the specific analytic strategies used can also be found in Appendix E.

Chapter 5: Results

PANAS Analyses

Levels of Internalizing Symptomatology

Based on previous literature, it was hypothesized that the prevalence of elevated internalizing symptoms would be greater for the ASD samples used in this dissertation than the prevalence rates reported in the published norms for the general population. Table 3 presents a summary of the full versions of the PANAS and other internalizing measures used in the subsequent analyses. Data is presented for the percent of participants meeting cutoffs for 'at risk' status, as well as those who met the cutoff criteria for being in the 'clinical range'. This language is drawn from the CBCL, which characterizes those who have T-scores between 65 and 70 as 'at risk' and those with T-scores above 70 as in the 'clinical range' (syndrome scales and DSM-oriented scales; Internalizing Problems: 60 to 64 = 'at risk', 65 and greater = 'clinical range'). Similarly, T-scores greater than 65 on the MASC are classified as 'anxious'. For the BDI-II, scores of 20 to 28 are considered 'moderate depression', while scores of 29 to 63 are considered 'severe' depression. Neither the AMAS-A nor the PANAS have standardized norms published; however, for the purposes of this dissertation, *z*-scores were computed in order to evaluate the number of individuals who fell one and two standard deviations away from the means published in the validation studies (AMAS-A: Lowe & Reynolds, 2004; PANAS: Watson et al., 1988). For the AMAS-A and NA scale, the percentages presented are 1 and 2 standard deviations *above* the validated means, whereas the percentages for the PA scale represent 1 and 2 standard deviations

below the validated means. Data are presented for three age groups, representing early adolescence (12 to 15 years), mid-adolescence (16 to 18 years), and young adulthood (19 to 23 years). Due to the longitudinal nature of the study (measures collected every 3 to 4 months), some participants are represented more than once in an age grouping. Table 2 summarizes these data. For example, in Group 2 nine individuals completed the PANAS twice between the ages of 16 and 18 years; two participants completed eight PANAS' between the ages of 19 and 23 years.

Table 2

Number of Participants with x *Number of PANAS Administrations across Age Groups*

	# Individuals per Age Group		
# PANAS'	Group 1 12-15 yrs	Group 2 16-18 yrs	Group 3 19-23 yrs
0	14	2	4
1	14	7	6
2	3	9	3
3	1	7	2
4	0	2	4
5	0	3	5
6	0	2	4
7	0	0	2
8	0	0	2

Note. This table only includes participants with more than one PANAS administration (n = 32).

Table 3
Descriptive Statistics for Internalizing Measures Across Age Groups in Longitudinal Sample

	Mean (SD) Range *n*			% 'At Risk'			% 'Clinical Range'		
	12-15 yrs	16-18 yrs	19-23 yrs	12-15 yrs	16-18 yrs	19-23 yrs	12-15 yrs	16-18 yrs	19-23 yrs
PA	31.61 (6.49) 18-43 28	33.56 (7.41) 18-47 84	32.36 (9.59) 12-51 112	17.9	14.3	13.4	3.6	1.2	2.7
NA	17.32 (5.55) 9-31 28	19.25 (6.57) 9-39 84	18.24 (6.44) 9-39 114	10.7	15.5	12.3	3.6	0.0	3.5
CBCL Anxious/Depressed	60.50 (11.69) 50-89 22	58.93 (7.81) 50-74 44	60.67 (9.69) 50-84 60	13.6	27.3	21.7	18.2	4.5	10.0
CBCL Internalizing	56.45 (13.52) 33-82 22	56.70 (10.51) 34-70 44	61.25 (11.13) 33-85 60	4.5	15.9	20.0	27.3	34.1	38.3
CBCL Withdrawn/Depressed	59.09 (8.12) 50-82 22	59.73 (5.39) 50-97 44	66.22(11.60) 50-94 60	18.2	18.2	23.3	4.5	9.1	31.7
CBCL Somatic concerns	55.45 (8.67) 50-78 22	53.93 (5.39) 50-72 44	54.28 (7.26) 50-80 60	0.0	0.0	6.7	13.6	2.3	6.7
BDI-II Total		18.13 (11.46) 0-43 15	9.26 (8.28) 0-34 57		33.3	5.3		13.3	3.5
AMAS Worry		9.12 (3.84) 1-14 26	8.14 (3.92) 1-14 26		53.8	53.8		7.7	7.7
AMAS Social Stress		4.00 (2.19)	3.19 (2.03)		38.5	26.9		0.0	0.0

	0-7 26	0-7 26				
AMAS Phys Anx	4.35 (2.74) 0-9 26	3.06 (2.35) 0-9 26	50.0	30.8	7.7	3.8
AMAS Total	17.46 (8.00) 2-29 26	14.39 (6.96) 1-27 26	38.5	38.5	19.2	7.7

Note. Long = PA = positive affect; NA = negative affect; BDI-II = Beck Depression Inventory (2nd ed.); AMAS = Adult Manifest Anxiety Scale; CBCL = Child Behavior Checklist. For BDI-II scores, "at risk" = "moderate depression": 20-28 pts, and "clinical range" = "severe depression": 29-63 pts. For PANAS and AMAS scores, "at risk" = 1SD above validation means and "clinical range" = 2+SD above validation means (Lowe & Reynolds, 2004). *M* PANAS-PA for validation sample =32.0 (SD =7.0); *M* NA = 19.5 (7.0). AMAS-A validation sample: *M* Worry: 5.46 (3.86), *M* Physical Anxiety = 2.56 (2.29), *M* Stress = 3.00 (2.09), and *M* Total = 11.01 (6.78).

The mean PA and NA scale scores across all three age groups were nearly equivalent to the validation sample means (M_{PA} = 32 [SD=7.0], M_{NA} = 19.5 [SD=7.0]; Watson et al., 1988). While the mean scores for most of the scales were in the average range, all three age groups evaluated showed a portion of participants with elevated levels of internalizing symptoms. This was especially clear for the AMAS-A scales in the 16 to 18 year old group and for the oldest group on the CBCL Withdrawn/Depressed scale, for which even the means exceeded established 'at-risk' cutoffs.

Across most measures, the data show the greatest elevation in internalizing symptoms in the second age group (16-18 years), followed by the 19 to 23 year olds, with the lowest percentage of participants exceeding cutoffs in the 12 to 15 year old group. While cross-sectional in nature, this rise in prevalence with age (from ages 12 to 15 to ages 16 to 23) is consistent with CDC reports. The statistics reported from the CDC state that over any 2-week period of time, 8% of individuals 12 years of age and older report the presence of depression (National Health and Nutrition Examination Survey data, 2007–2010).

In contrast, this sample of individuals with ASD showed prevalence rates in the 'clinical range' three to five times greater, ranging from 27% to 38%. Of particular note is the high percentage of the sample 'at risk' for all types of anxiety on the AMAS-A (see Figure 3). Also of interest are the increasing numbers of individuals who met criteria for the 'clinical range' on the Withdrawn/Depressed and Internalizing Problems subscales of the CBCL (parent-report; see Figure 2), and the decreasing portion of participants who met these cutoffs on the BDI-II (self-report, see Figure 3.

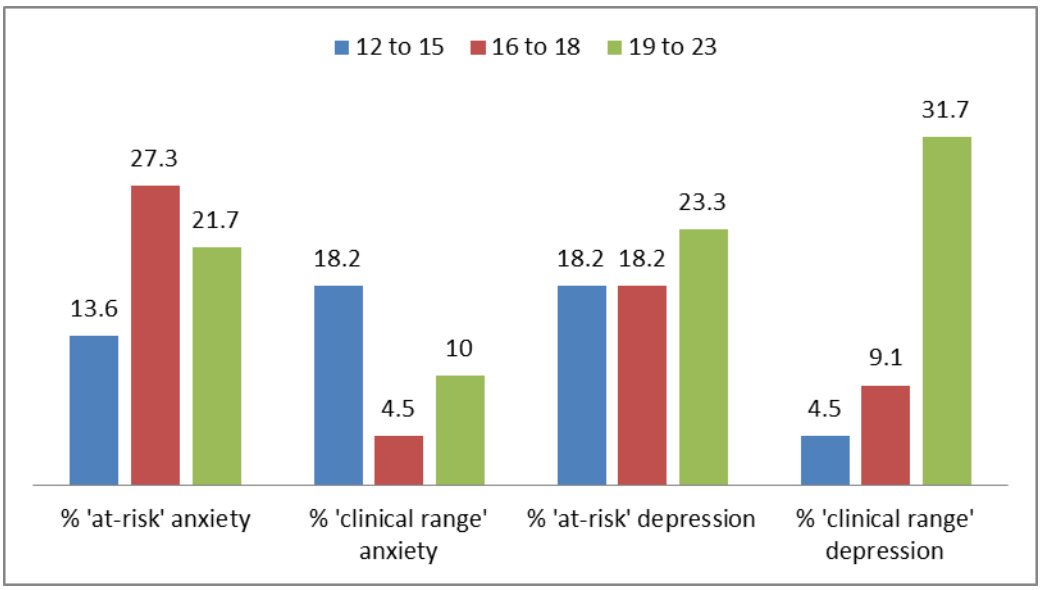


Figure 2. Levels of internalizing symptoms for each age group in longitudinal sample using parent-report BASC-2.

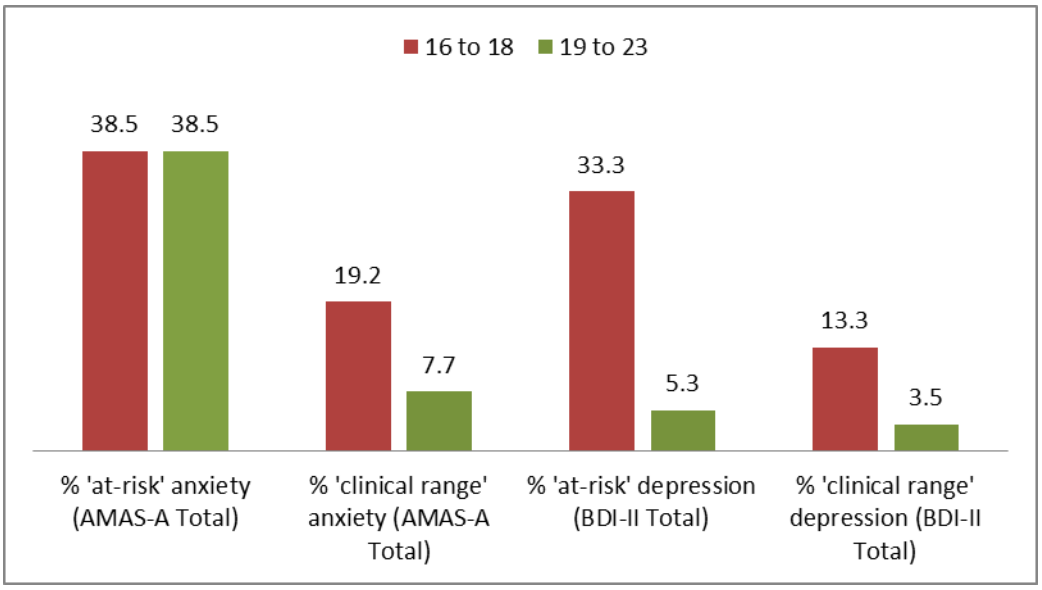


Figure 3. Levels of internalizing symptoms for two older age groups in longitudinal sample using self-report measures.

Evaluating the Psychometric Properties of the PANAS

The PANAS was completed by 41 individuals over the course of nine waves of data collection, resulting in 226 observations. Ten individuals completed the PANAS at just a single wave of data collection. Table 4 reports the number of PANAS administrations at each wave.

Table 4
Number of PANAS administrations at each wave of data collection

Wave	Number PANAS'
11	33
17	29
18	12
19	26
20	28
21	27
22	26
23	25
24	20

Note. PANAS = Positive and Negative Affect Schedule

Positive affect scale

Initial analyses of the PANAS included tests of internal consistency. All items on the PA scale exceeded the cutoff of .3 for the corrected item-total correlations. Internal consistency was good for the PA scale ($\alpha = .92$). Additional reliability statistics (e.g., inter-item correlations, corrected item-total correlations) are summarized in Table 5.

The PAF for the positive affect scale showed all 10 items loading on a single factor (See Table 5) with an eigenvalue of 5.23, which explained slightly over half of the variance in the items. The scree plot supported extracting a single factor (see Figure 4). As such, this unrotated

first factor was evaluated on an item-by-item basis. All items met the cutoff of .45, ranging from .61 (alert) to .84 (enthusiastic). In addition to the high internal consistency, strong corrected item-total correlations ranging from .58 (alert) to .80 (enthusiastic), and an inter-item correlation of .52 were also seen.

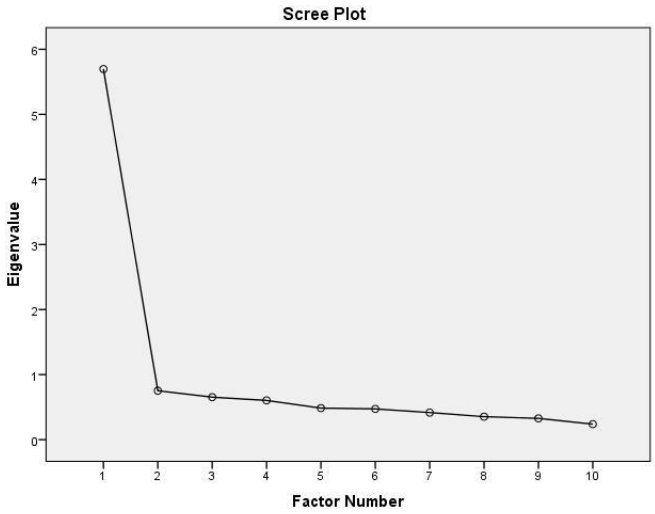


Figure 4. Scree plot of PAF for 10-item PA scale for longitudinal sample.

Negative affect scale

Internal consistency was good for the NA scale (α = .86). All items on the NA scale exceeded the cutoff of .3 for the corrected item-total correlations; however, the item *ashamed* had the lowest corrected item total correlation (r = .38), and was thus considered somewhat questionable in terms of its contribution to the negative affect scale. Cronbach's alpha was not affected by removing the item *ashamed* from the NA scale (α = .86). Refer to Table 5 for full reliability results.

First PAF.

Table 5 shows the factor loadings for the NA scale. When the model was unspecified, the PAF resulted in three factors; however, only one factor had an eigenvalue greater than one after

the oblique rotation. Additionally, the scree plot showed a clear single factor (see Figure 5); therefore, the PAF was re-run specifying a one-factor extraction. With the exception of the item *ashamed*, all items exceeded the .45 cutoff score for factor loadings. Although the corrected item-total correlation was above the .3 cutoff for the item *ashamed* (.38), it was substantially less associated with the total scale score and performed poorly in the PAF. Subsequently, this item was removed from scale, resulting in a 9-item NA scale: *upset, nervous, guilty, scared, jittery, afraid, distressed, irritable,* and *hostile*.

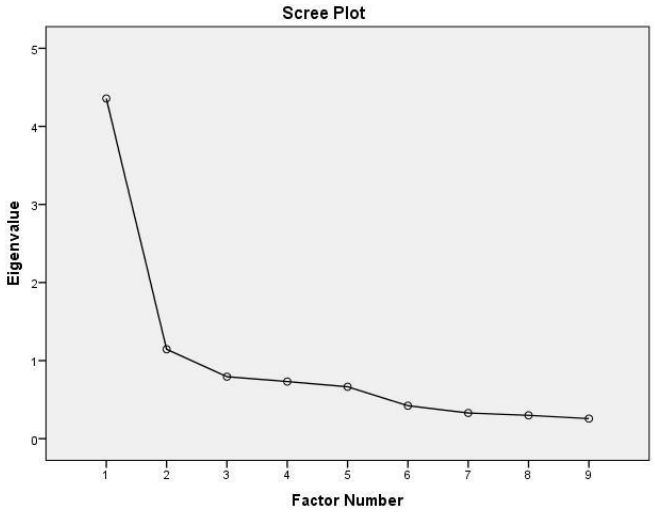


Figure 5. Scree plot of PAF for 10-item NA scale for longitudinal sample.

Second PAF.

A second reliability analysis and one-factor PAF were then conducted to evaluate the new NA scale (see Table 5). All corrected item-total correlations were above the cutoff of .3, ranging from .4 (*guilty*) to .72 (*upset*). Cronbach's alpha remained high (α = .86). Each item loaded robustly on the NA factor, ranging from .51 (*hostile*) to .78 (*upset*). The 9-item NA factor accounted for 42.4% of the variance in the items, with an eigenvalue of 3.82.

Table 5
Item-Total Correlation and Principal-Axis Factoring Analyses (Promax Rotation) for the PA and NA Scales

	Item-total correlations		Principal Axis Factoring					
			First PAF			Second PAF	Final Two-Factor Solution	
Scale	Full scale	Revised Scale	Factor 1	Factor 2	Factor 3	Single Factor	Factor 1	Factor 2
PA								
Interested	.71		.75				.74	-.06
Excited	.68		.72				.72	-.04
Strong	.62		.64				.64	-.09
Enthusiastic	.80		.84				.84	-.20
Proud	.72		.76				.76	-.16
Alert	.58		.61				.61	-.03
Inspired	.66		.70				.69	-.09
Determined	.71		.75				.75	-.10
Attentive	.71		.75				.74	-.03
Active	.67		.70				.70	-.06
α	.92							
Eigenvalue			5.23				5.43	
NA								
Distressed	.64	.67	.78	.41	.28	.73	-.01	.72
Upset	.72	.72	.74	..59	.36	.78	-.10	.78
Guilty	.50	.47	.45	..33	.66	.51	-.07	.49
Scared	.63	.63	.68	.35	.57	.69	-.11	.68
Hostile	.46	.48	.38	..81	.29	.51	-.14	.49
Irritable	.51	.54	.48	.77	.21	.51	-.13	.56
Ashamed	.38		.34	.19	.78	.41		
Nervous	.65	.66	.79	.34	.41	.72	.04	.73
Jittery	.51	.52	.55	.32	.34	.56	.08	.55
Afraid	.66	.67	.71	.43	.44	.73	-.22	.73
α	.86	.86						
Eigenvalue			4.00	.86	.68	3.82		3.59

Note. N = 224. The structure matrix is provided for the NA scale in the first PAF analysis. For the PA scale and the second PAF on the NA scale, one factor was extracted; therefore the unrotated factor structures are presented. PA = Positive Affect; NA = Negative Affect.

PAF on 19-item PANAS

After establishing which PA and NA items would be retained, a PAF was run on the remaining 19 items of the PANAS. The unspecified PAF identified three factors, although only two factors had eigenvalues greater than one after the rotation, factors two and three were highly correlated and essentially duplicates of one another, and the scree plot showed clearly that two factors were appropriate (see Figure 6). Therefore, the PAF was re-run specifying extraction of

two factors (See Table 5). The first factor produced an eigenvalue of 5.43 and explained 28.6% of the variance in the PA items, while the second factor produced an eigenvalue of 3.59 and explained 18.9% of the variance in the NA items. All items loaded robustly on the expected factor and in a negligible fashion on the other factor. Supporting the claim of relative factor independence by Watson et al. (1988), the PA and NA factors were weakly correlated (r = -.12).

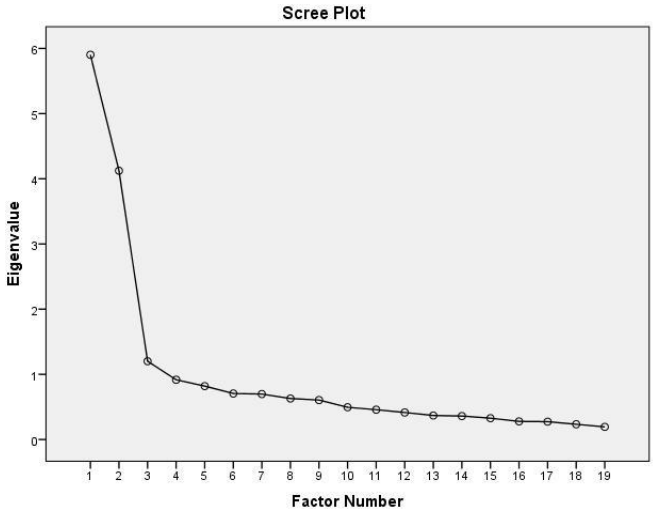


Figure 6. Scree plot of PAF for revised 19-item PANAS-C for longitudinal sample.

Test-retest reliability

There were typically three months between waves of data collection. The PANAS was not collected in waves 12 through 16; therefore two years' time elapsed between waves 11 and 17 when the PANAS was completed by participants. Results are presented in Table 6 for each pair of adjacent waves (e.g., 18-19, 19-20). Temporal stability over a longer period of time was evaluated by computing the ICC for all nine waves together (n=6) and in a smaller grouping consisting of waves 19 to 23 (n = 18) which represented the waves with the largest sample sizes 9 (n >25). See Figure 7 for boxplots of the PANAS NA scores for waves 19 through 23. The Pearson product-moment correlations and ICCs did not differ substantially from one another.

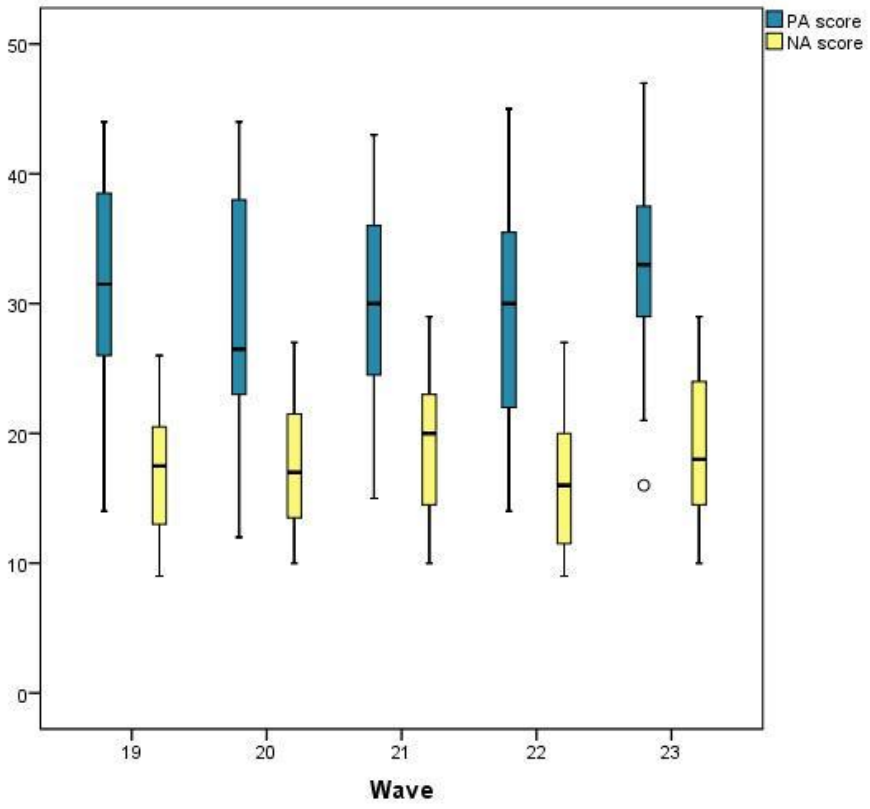


Figure 7. Boxplot for PA and NA scale scores for waves 19 to 23 in longitudinal sample.

In general, the NA scale showed fair to moderate test-retest reliability, with ICCs ranging from .45 to .63. There were two exceptions to this trend; first, there was poor agreement on the NA scale between waves 17 and 18 (4 months between assessments), and second, there was almost perfect agreement on the NA scale between waves 23 and 24 (6 months between assessments; see Table 6). The ICC for all Waves combined was .40 (p <.001), suggesting that only 40% of the variance in the NA scores could be attributed to the variance of the true score across time. When only considering waves with sample sizes of 25 or greater (waves 19 to 23), the ICC increased to .50, showing moderate stability across time.

Table 6
Intraclass Correlation Coefficients for PA and NA scales on adjacent waves of data collection

		10-item PA scale		9-item NA scale	
Wave-pairs	*n*	ICC	*r*	ICC	*r*
11-17	24	.79	.79**	.60	.60**
17-18	10	.76	.79**	.27	.32
18-19	11	.66	.67*	.54	.67*
19-20	25	.67	.67**	.52	.52**
20-21	24	.60	.60**	.45	.45*
21-22	21	.74	.74**	.48	.48*
22-23	16	.79	.80**	.63	.63**
23-24	23	.80	.80**	.81	.82**
Wave groups					
11-24	10	.73	—	.41	—
19-23	20	.74	—	.50	—

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

The ICC for the PA scale for all waves combined was .73, and ranged from .60 to .80 across waves (see Table 6). This reflects strong agreement over time, with 73% of the variance in the PA score attributed to the true score. See Figure 7 for boxplots of PA scale scores for waves 19 through 23.

Summary of the factor analysis for the longitudinal sample.

The PA scale showed high reliability by including all 10 items and demonstrated strong loadings on a single PA factor. The NA scale also showed high reliability and all items except *ashamed* were retained, resulting in a 9-item NA scale. When the PAF was run with all 19 items, two clear factors emerged with items loading robustly on the expected factors. The NA scale showed fair to moderate temporal stability, whereas the PA scale showed strong temporal stability.

Scale validation

Based on existing theory that anxiety and depression share the underlying construct of negative affect (Watson et al., 1988), it was expected that the NA scale would show significant positive correlations with measures of both depression and anxiety symptoms. Alternatively, it was expected that the PA scale would show a significant negative correlation with depression measures, but a non- significant negative association with anxiety measures. These hypothesized relationships are consistent with the tripartite model of anxiety and depression proposed by Watson et al. (1988) in the creation of the PANAS.

Correlation analyses.

The results are summarized in Table 7. For the purposes of scale validation, waves 19 through 23 were evaluated because they represented the timepoints when the greatest numbers of internalizing symptom measures were collected. The correlation table is divided in two sections. Correlations presented under the diagonal represent cases who had full data on all four measures (n = 20; PANAS, CBCL, BDI, AMAS) at a single wave. Correlations above the diagonal consist of cases who had full data on the PANAS and CBCL at a single wave (n = 30). Participants were included only once in each analysis in order to avoid issues of collinearity.

Correlation analyses with self- and parent-report measures.

When all four measures were evaluated together, the correlations were generally in line with predictions, although some correlations did not reach significance (but were in the expected direction). The NA scale was positively, but modestly, correlated with the BDI total score (r = .27, *n.s.*), and significantly positively correlated with the AMAS-A total anxiety score (r = .51) as well as with its subscales (see Table 7). The PA scale was significantly negatively correlated with the AMAS-A total anxiety score (r = -.61, p <.01) and its subscales. A significant negative

association was revealed between the PA scale score and the BDI total score (r = -.51). The CBCL scores did not show comparably robust correlations with the PANAS subscales. While all correlations were in the expected direction, and several approached significance, only the correlation between the PA scale and CBCL Internalizing Composite was significant (r = -.45, p < .05).

Correlation analyses with PANAS and parent-report measure.

To investigate whether a slightly larger sample size would clarify the relation between the PANAS and the CBCL, a second correlation analysis was run (n = 30; see above diagonal on Table 7). As expected, the NA scale was significantly and positively correlated with both anxiety and depression scales from the CBCL, and the PA scale was significantly and negatively correlated with the depression-related scale (i.e., Withdrawn) but not significantly correlated with the anxiety-related scale (DSM Anxiety). Two scales on the CBCL combine depression and anxiety symptoms (Anxious/Depressed, Internalizing Composite), and were therefore more difficult to interpret in this correlation analyses. In line with the tripartite model, each of these scales (Anxious/Depressed, Internalizing Composite) was significantly positively correlated with the NA scale and negatively correlated with the PA scale, but the correlation was significant between the NA scale and the Internalizing Composite and non-significant between the NA scale and the Anxious/Depressed scale.

Table 7

Correlations Between PANAS and Internalizing Measures

	1	2	3	4	5	6	7	8	9	10	11
1. PA	—							-.30[a]	-.63[**]	-.51[**]	-.32[b]
2. NA	-.25	—						.61[**]	.27[a]	.59[**]	.55[**]
3. BDI Total T score	-.51[*]	.27	—								
AMAS Scale T-scores											
4. Worry	-.48[*]	.31	.44[*]	—							
5. Social Concerns	-.48[*]	.57[**]	.41[b]	.68[**]	—						
6. Physiological Anxiety	-.64[**]	.55[*]	.71[**]	.56[*]	.74[**]	—					
7. Total	-.61[**]	.51[*]	.59[**]	.90[**]	.89[**]	.84[**]	—				
CBCL Scale T-scores											
8. Anxiety/Depression	-.19	.35[a]	.02	.19	.33[a]	.32[a]	.30	—	.45[*]	.85[**]	.87[**]
9. Withdrawn/Depressed	-.42[b]	.11	.15	.35[a]	-.07	.14	.20	.23	—	.75[**]	.29[a]
10. Internalizing	-.45[*]	.29	.12	.33[a]	.19	.32[a]	.33[a]	.80[**]	.73[**]	—	.67[**]
11. Anxiety	-.21	.37[a]	-.07	.13	.36[a]	.28	.27	.94[**]	.14	.70[**]	—

Note. Participants with full cases of PANAS, BDI, AMAS, and CBCL appear under the diagonal ($n = 20$). Participants who have full data for PANAS and CBCL appear above the diagonal (n = 30). PANAS = Positive and Negative Affect Schedule; BDI = Beck Depression Inventory; AMAS = Adult Manifest Anxiety Scale. [a] $p \leq .18$, [b] $p \leq .10$, * $p \leq .05$, ** $p \leq .01$

Regression analyses.

Following the correlation analyses, two sets of hierarchical multiple regressions were run to investigate the unique contribution of each affect scale to predicting depression (BDI-II, CBCL-Withdrawn) or anxiety (AMAS-A, CBCL-Anxiety) scale scores, after partialling out variance associated with the non-target internalizing scale and the opposite affect scale. Because the measures were collected at different waves of data collection, two groups of analyses were created to capitalize on the greatest number of subjects with each measure of interest. The first set of regressions analyzed the PANAS, BDI, and AMAS-A. The second half of Table 8presents results of the regression analyses for the PANAS and CBCL Anxiety and Withdrawn subscales.

In Table 8, both the unstandardized beta weights and the squared part correlations for each measure at each block are presented. The squared part correlation can be interpreted as the proportion of criterion variance associated uniquely with the predictor.

Regression analyses using PANAS and self-report measures.

Results were partially consistent with predictions in the first set of regressions. NA, but not PA scores significantly predicted the total score on the AMAS-A (PA score approached significance), which is consistent with the tripartite model. However, while it was expected that both NA and PA would account for significant unique portions of the variance in the depression score, the regression analysis revealed that neither NA nor PA uniquely contributed to predicting the BDI-II score (see Table 8).

The issue of comorbidity and symptom overlap on measures of internalizing symptoms was apparent between the BDI and AMAS with the BDI accounting for 22% of the variance in the AMAS scores, and the AMAS explaining 28% of unique variance in the BDI score. The strength of this relationship was attenuated when the PA scale scores were added into the regression equation. This issue did not arise with the CBCL scales. A list of items from each scale for all internalizing symptom measures can be found in Appendix B.

Regression analyses using PANAS and parent-report measure.

In the second set of regression analyses, the tripartite model was supported when NA, but not PA, significantly predicted the CBCL Anxiety score. Similar to the first regression analysis, when predicting the CBCL Withdrawn scale score, it was expected that both NA and PA would explain significant portions of unique variance; however, the PA scale score was identified as the sole significant predictor of the depression score, explaining 32% of the variance in the CBCL Withdrawn syndrome scale score.

Summary of correlation and regression analyses of revised PANAS.

Overall, these results show support for the tripartite model in that the NA scores, but not PA scores, accounted for unique portions of the variance in the anxiety scores. However, contrary to the theory, NA scores predicted close to zero percent of the variance in depression scores. Showing mixed support for the theory, PA scores inconsistently predicted depression scores by explaining a significant portion of variance in the CBCL Withdrawn scores, but a non-significant portion of the BDI Total scores.

Table 8
Hierarchical Multiple Regression Examining Squared Part Correlations and Beta Weights of PA and NA Measures with Existing Anxiety and Depression Measures

			Block 1		Block 2		
Criterion	Non-target measure		Non-target	NA	Non-target	NA	PA
AMAS Total	BDI Total	$Part^2$	.22	.14	.06	.13	.08
		β	.43**	.63*	.27	.60*	-.32 [a]
BDI Total	AMAS Total	$Part^2$	.28	.00	.08	.00	.06
		β	.73**	-.08	.49	.00	-.34
	Non-target measure		Non-target	NA	Non-target	NA	PA
CBCL Anxiety	CBCL Withdrawn	$Part^2$	.02	.24	.00	.22	.02
		β	.10	.62**	.03	.60**	-.16
CBCL Withdrawn	CBCL Anxiety	$Part^2$	.03	.02	.00	.01	.32
		β	.30	.29	.06	.19	-.84***

Note. [a] $p \leq .10$; * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$

PANAS-C Analyses

Level of internalizing symptomatology

Before evaluating the psychometric properties of the PANAS-C, the prevalence of elevated internalizing symptoms was computed using the original sample, rather than the

imputed dataset. While the imputed dataset was shown to represent the original dataset well, a pure measurement of prevalence in this sample was desired. As was hypothesized for the longitudinal sample, it was predicted that the prevalence of elevated internalizing symptoms would be greater for the ASD samples used in this dissertation than what is reported in the published norms and prevalence rates for the general population. The following tables present a summary of the scores on the version of the PANAS-C used in the validation study (12-item PA scale [items *alert, fearless, daring* removed; 15-item NA scale) and other internalizing measures used in the subsequent analyses, for both Time 1 (Table 9) and Time 2 (Table 10). Descriptive statistics are provided for each of the measures and their subscales. Data is also presented for the percent of participants meeting cutoffs for an 'at risk' status, as well as those who met the cutoff criteria for being in the 'clinical range'. This language is drawn from the BASC, which characterizes those who have T-scores between 60 and 69 as 'at risk' and those with T-scores of 70 and above in the 'clinical range'. Similarly, T-scores greater than 65 on the MASC are classified as 'anxious' and those with T-scores higher than 65 on the CDI are considered as potentially clinically depressed. In Tables 9 and 10, these cutoffs for the MASC and CDI are reflected in the 'at risk' column, as only one level of risk is established for these measures. The PANAS-C does not have standardized norms published; however, for the purposes of this dissertation, *z*-scores were computed in order to evaluate the number of individuals who fell one and two standard deviations away from the means published in the validation studies (PANAS-C: Laurent et al., 1999). For the NA scale the percentages presented are 1 and 2 standard deviations *above* the validation sample mean, whereas the percentages for the PA scale represent 1 and 2 standard deviations *below* the validation sample mean. Data are presented for three age groups. The first age group represents the youngest participants (6 to 7 years), the second group

represents elementary school-aged participants 8 years and older, and the last group represents middle- and high-school-aged participants.

Table 9
Descriptive Statistics for Internalizing Measures at Time 1 for the Friendship Intervention Sample

	Mean (SD) Range *N*			% 'At Risk'			% 'Clinical Range'		
	<8 yrs	8-11 yrs	12-17 yrs	<8 Yrs	8-11 yrs	12-17 yrs	<8 yrs	8-11 yrs	12-17 yrs
PA	47.08 (7.83) 34-60 12	45.55 (9.11) 15-60 29	42.21 (10.45) 20-60 34	0.0	3.4	20.6	0.0	3.4	2.9
NA	29.92 (12.96) 7-48 20	29.0 (12.70) 7-69 28	27.85 (8.55) 13-46 34	20.0	14.3	11.8	0.0	7.1	0.0
PR BASC- Anx	55.05 (13.44) 31-80 20	54.06 (10.40) 30-83 35	57.89 (11.78) 38-81 19	15.0	20.0	15.8	15.0	8.6	26.3
PR BASC-Dep	54.00 (9.96) 39-77 20	59.80 (13.59) 41-101 35	59.79 (9.77) 47-83 19	20.0	17.1	36.8	5.0	25.7	10.5
PR BASC-Internalizing Comp.	55.35 (13.76) 35-84 20	56.06 (12.58) 33-82 35	55.37 (8.25) 42-69 19	15.0	20.0	36.8	20.0	17.1	0.0
SR BASC-Anx			46.35 (10.16) 28-67 26			7.7			0.0
SR BASC-Dep			54.11 (12.20) 40-79 27			11.1			14.8
SR BASC-Internalizing Comp			48.52 (11.35) 33-77 27			18.5			3.7
CDI Total T			48.33 (8.50) 35-71 36			5.6			

CDI Neg Mood T	47.89 (7.40) 37-66 36	2.8
CDI Interpersonal Prob T	48.81 (5.86) 42-63 36	0.0
CDI Ineffectiveness T	47.67 (7.08) 38-64 36	0.0
CDI Anhedonia T	50.47 (9.32) 37-71 36	8.3
CDI Neg Self-Esteem T	48.17 (8.73) 39-70 36	5.6
MASC Total T	55.0 (10.82) 33-76 34	17.6
MASC Physical Total T	49.71 (8.38) 34-64 34	0.0
MASC Harm Avoidance Total T	52.59 (11.09) 25-75 34	5.9
MASC Social Total T	55.15 (11.17) 35-76 34	20.6
MASC Separation Panic T	61.50 (12.93) 39-90 34	32.4

Note. Statistics were run on original dataset, not imputed dataset. Therefore, sample sizes vary based on missing data for the PANAS-C subscales. PA = positive affect; NA = negative affect; PR = parent-report; SR = self-report; BASC = Behavioral Assessment System for children (2nd ed.); CDI= Children's Depression Inventory; MASC = Manifest Anxiety Scale for Children.

Time 1 descriptives and prevalence rates.

Mean scores for the NA scale were very similar to those reported for the validation sample (*M* = 26.97 [SD=10.58]; Laurent et al., 1999). The 15-item NA scale showed elevated scores in the 'at risk' range spanning from 11.8% (12 to 17 year olds) to 20% (6 to 7 year olds). The means for the 12-item PA scale were generally similar to that from the validation study (*M* = 43.4 [SD = 9.81]), and showed negligible numbers of participants with scores outside the average range, with the exception of the 12 to 17 year olds (20% fell 1 SD below the validated PA mean). Overall, mean scores fell within the normal range for the internalizing scales (see Table 9). Parents, as expected, rated their children higher than the children rated themselves; this was especially apparent on the BASC Anxiety subscale (see Figure 8).

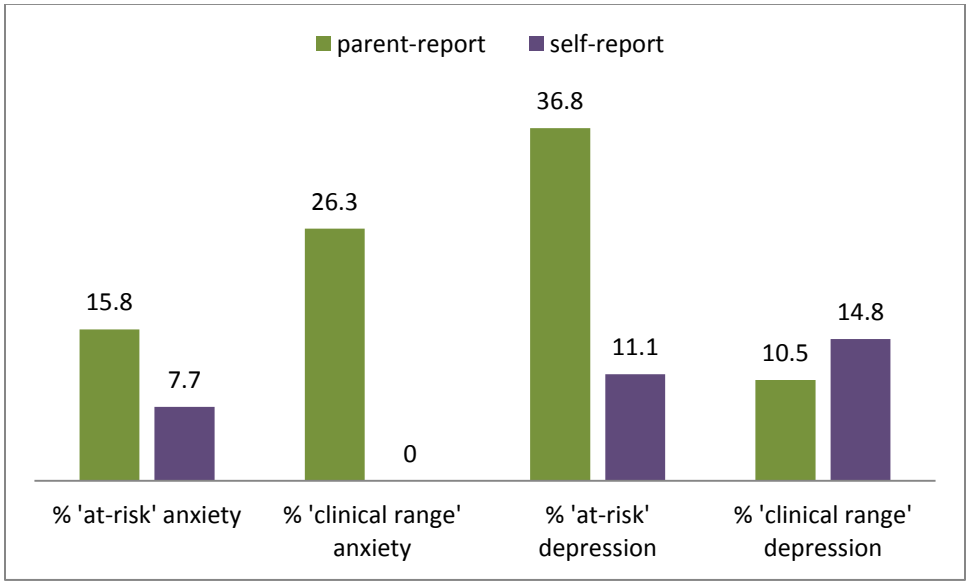


Figure 8. Prevalence rates based on parent versus self-report BASC-2 scores for Time 1 in longitudinal sample.

In general, the rates of elevated scores were highest for the 12 to 17 year olds. Interestingly, very few of the teens fell in the 'at risk' range for the self-report CDI (5.6% on CDI Total T), but the scores on the self-report BASC showed 11.1% above the cutoff for being

'at risk' for depression and 14.8% exceeding the cutoff for the 'clinical range' of depression. The opposite pattern was seen with self-reported anxiety levels for the teens. A substantial portion of the participants met cutoffs for the 'at risk' range on several self-report MASC subscales, with the highest proportion of elevated scores on the Separation Anxiety subscale, followed by the Social subscale. While these self-reported levels of anxiety were quite high, the proportion of individuals exceeding the cutoff for 'at risk' status on the self-report BASC Anxiety scale was low, and none of the participants met the cutoff for anxiety in the 'clinical range' on the BASC.

Time 2 descriptives and prevalence rates.

At Time 2, the means for the 12-item PA scale decreased slightly for the 6 to 7 year olds and 8 to 11 year olds, but showed a negligible increase for the 12 to 17 year old group, indicating a decrease in positive affect from Time 1 to Time 2 for the youngest two groups and a stable level of NA for the oldest group. The sample sizes for each age group dropped rather drastically between Time 1 and Time 2 for the PA scale (due primarily to missing items on the PANAS-C which prevented the computation of scale scores); therefore percentages should be evaluated with special attention to group size. The percent of individuals with elevated NA scores (within 1 SD of the validated mean) ranged from 14 to 30% (see Table 10). Parents reported the highest percent of 'at risk' status for the 8 to 11 year olds on all BASC subscales. Again, substantial differences were seen between parent-report and self-report measures for BASC anxiety and depression subscales for the oldest age group (see Figure 9).

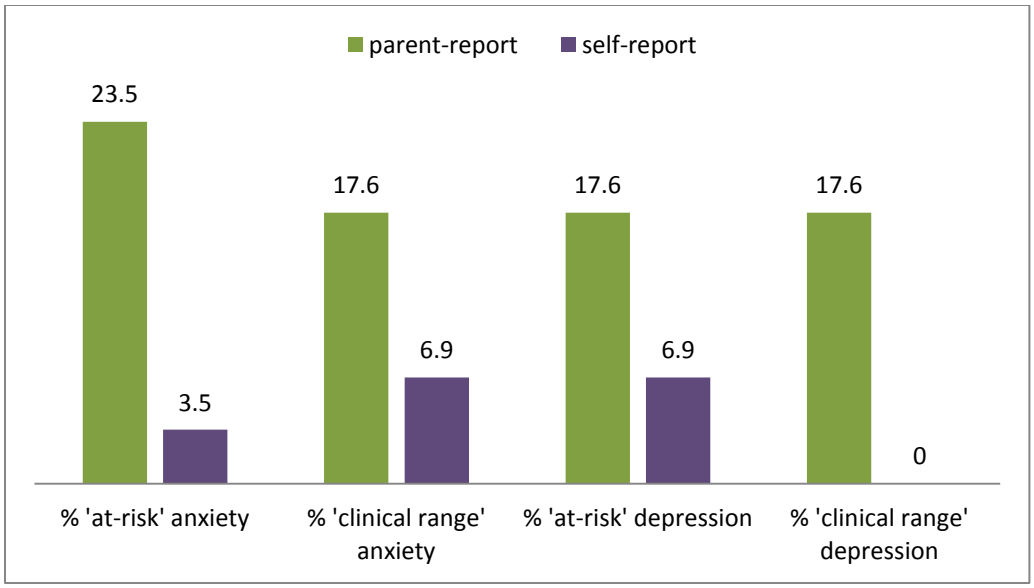


Figure 9. Prevalence rates based on parent versus self-report BASC-2 scores for Time 2 in longitudinal sample.

Similar to the levels of elevated depression symptoms on the self-report BASC, few individuals met 'at risk' cutoffs for the CDI scores. The percent of participants falling in the 'at risk' range on the MASC was quite high in Time 2 for the Social Anxiety Total and Separation Anxiety/Panic subscales; however the sample size was small (n = 9), so these levels should be interpreted with caution.

Table 10
Descriptive Statistics for Internalizing Measures at Time 2 for the Friendship Intervention Sample

	Mean (SD) Range *n*			% 'At Risk'			% 'Clinical Range'		
	<8 yrs	8-11 yrs	12-17 yrs	<8 yrs	8-11 yrs	12-17 yrs	<8 yrs	8-11 yrs	12-17 yrs
PA	38.38 (13.03) 12-51 8	40.27 (14.11) 17-57 15	44.33 (9.82) 20-60 24	12.5	20.0	8.4	12.5	13.3	4.2
NA	30.46 (12.54) 7-47 13	28.24 (9.93) 18-55 21	27.07 (10.82) 7-48 29	30.8	14.3	13.8	0.0	7.7	0.0
PR BASC- Anx	54.38 (11.65) 29-73 13	53.87 (10.60) 30-67 15	56.82 (11.07) 40-79 17	23.1	33.3	23.5	7.7	0.0	17.6
PR BASC-Dep	53.08 (9.84) 39-75 13	59.80 (14.05) 37-89 15	59.06 (11.47) 43-83 17	7.7	26.7	17.6	15.4	20.0	17.6
PR BASC-Internalizing Comp	54.54 (13.88) 32-76 13	53.93 (12.18) 31-69 15	53.88 (8.82) 40-77 17	7.7	40.0	5.9	23.1	0.0	5.9
SR BASC-Anx			48.28 (9.99) 34-78 29			3.5			6.9
SR BASC-Dep			46.52 (8.61) 32-64 29			6.9			0.0
SR BASC-Internalizing Comp			47.14 (8.46) 32-71 29			3.5			3.5

CDI Total T	47.63 (7.68) 37-65 27	3.7
CDI Neg Mood T	45.93 (7.21) 38-64 27	0.0
CDI Interpersonal Prob T	50.22 (6.74) 43-64 27	0.0
CDI Ineffectiveness T	47.63 (8.42) 38-74 27	3.7
CDI Anhedonia T	49.00 (9.74) 37-83 27	3.7
CDI Neg Self-Esteem T	47.78 (8.16) 39-65 27	7.4
MASC Total T	54.78 (9.09) 44-72 9	11.1
MASC Physical Total T	47.67 (7.60) 37-59 9	0.0
MASC Harm Avoidance Total T	53.11 (7.39) 44-66 9	11.1
MASC Social Total T	56.89 (13.27) 42-74 9	44.4
MASC Separation Panic T	59.00 (6.18) 50-67 9	22.2

Note. Statistics were run on original dataset, not imputed dataset. Therefore, sample sizes vary based on missing data for the PANAS-C subscales. PA = positive affect; NA = negative affect; PR = parent-report; SR = self-report; BASC = Behavioral Assessment System for children (2nd ed.); CDI= Children's Depression Inventory; MASC = Manifest Anxiety Scale for Children.

Overall prevalence rates, combining Time 1 and Time 2.

While there were some changes from Time 1 to Time 2 on the PANAS-C and internalizing measures, the sample sizes were relatively small and no consistent pattern emerged which would necessitate keeping the timepoints separate (see Figure 10). Therefore, data were averaged across both timepoints to evaluate the prevalence of elevated scores on the internalizing measures. Figure 10 includes four charts, the first three of which show the prevalence rates for parent-report anxiety and depression symptoms for each age group separately at Time 1 and Time 2. The fourth chart represents the prevalence rates averaged over the two timepoints for each age group for the parent-report BASC internalizing scale scores. For the averaged data, a general trend was seen for an increase in the percentage of individuals meeting cutoff criteria for being 'at risk' for depression; however, 8 to 11 year olds showed the greatest proportion of participants in the 'at risk' range for anxiety.

When combining the 'at risk' and 'clinical range' categories, a trend appeared showing a lower prevalence of elevated depressive symptoms for the 6 to 7 year olds (24.1%) compared to the older two groups (44.8% and 41.3%, respectively). These rates represent much higher levels of elevated depression symptoms than what would be expected in the general population based on parent-report (e.g. 2.6% 30-day prevalence; Kessler et al., 2012), but more closely approximate rates of elevated depression symptoms (e.g., 44%; Strang et al., 2012) seen in ASD populations.

Regarding elevated anxiety symptoms, the younger two groups showed essentially equivalent prevalence rates (30.5% and 31%, respectively), which were lower than that of the 11 to 17 year olds (41.7%). The rates are substantially higher than what would be expected in the general adolescent population (30-day prevalence = 14.9%; Kessler et al., 2012), and are more in

line with what has been reported for child and adolescent ASD populations (e.g., 56%; Strang et al., 2012). From these results, it appears that parents begin to recognize and report the presence of depression symptoms earlier than they recognize symptoms of anxiety. Because self-report measures were not collected for the younger two age groups, it was not possible to evaluate whether participants' internalizing scores replicated these trends.

When self-report teen data were averaged over timepoint and risk level, 9.1% were shown to have elevated levels of anxiety symptoms and 16.1% were shown to have elevated levels of depression symptoms, showing large discrepancies between parent- and child-reports of anxiety and depression symptoms. Apart from the parent-child discrepancy, these levels of elevated self-report internalizing symptoms are higher than what would be expected for the general population (12-month prevalence rates of 0.8% for anxiety and 3.8% for depression in 12-15 year olds; Merikangas et al., 2008), but are substantially lower than rates previously reported for internalizing symptoms based on self-report measures in youngsters with ASD (e.g., 46.7%; Gillot et al., 2001).

Summary of prevalence rates for friendship intervention sample.

Overall, elevated levels of both depression and anxiety were seen for all three age groups. The 6 to 7 year old group showed a lower prevalence of depressive symptoms than the older two groups, whereas the 11 to 17 year old group showed substantially higher rates of elevated anxiety scores than the younger two groups. Large discrepancies were seen between the parent- and self-report measures of internalizing symptoms for the 11 to 17 year olds.

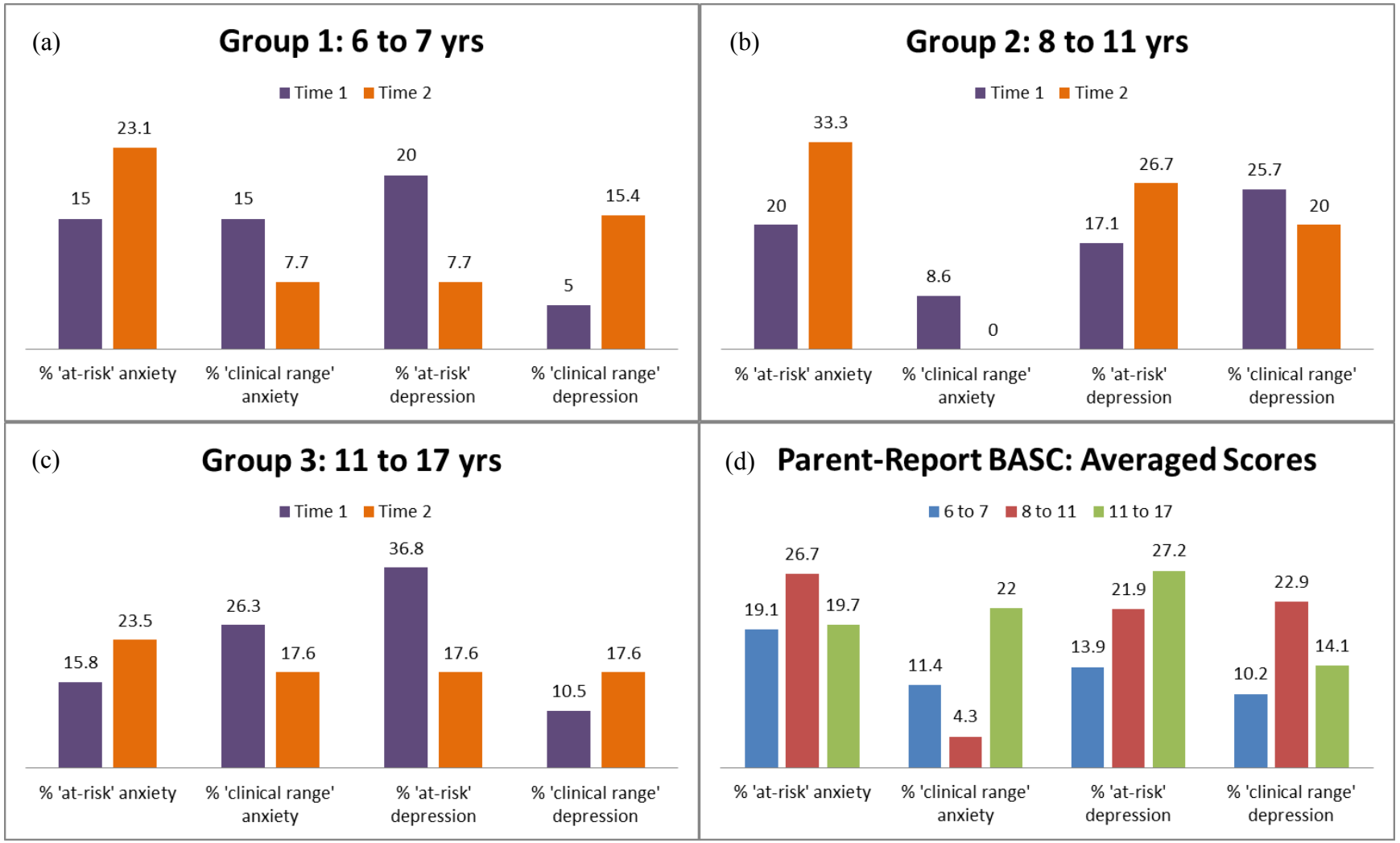


Figure 10. (a-c) Prevalence rates for all three age groups on parent-report internalizing symptoms at Time 1 and Time 2. (b) Prevalence rates averaged across timepoint for all age groups in the friendship intervention sample.

Evaluating the Psychometric Properties of the PANAS-C

A total of 99 individuals completed at least one PANAS-C over the course of this study, for a total of 188 cases. As with the PANAS analyses, reliability analyses were run prior to each factor structure for the PANAS-C being evaluated using Principal Axis Factor (PAF) analysis with a Promax (oblique) rotation.

Next, temporal stability of the PANAS-C scales was measured with both a Pearson product-moment correlation (*r*) and the intraclass correlation (ICC). As presented previously, according to the standards reported by Portney & Watkins (2000), the ICC can be interpreted as follows: 0-0.2 indicates poor agreement, 0.3-0.4 indicates fair agreement, 0.5-0.6 indicates moderate agreement, 0.7-0.8 indicates strong agreement, and >0.8 indicates almost perfect agreement. Overall, 63 participants completed the PANAS-C at both timepoints.

After evaluating each scale separately, calculating the temporal stability (i.e., test-retest reliability) of the revised scales, and eliminating problematic items, a final PAF was run on the entire scale to determine whether two robust and distinct factors were extracted.

After initial analyses, it became clear that individuals in different age groups were demonstrating unique factor structures on the PANAS-C, and fitting a single factor structure to all individuals aged 6 to 17 years was not effective or appropriate. As a result, all analyses were divided into three age groups: (1) under 8 years, (2) 8 through 11 years (5^{th} grade), and (3) 11 through 17 years (grades 6-12). Each age group will be discussed separately in the following sections.

Group 1: Under 8 years of age.

Twenty-one individuals, contributing 39 PANAS' over the course of the three timepoints (Entry, Exit, Follow-up) were evaluated in this section (*M* age = 6.89 years, SD = .55). Eight participants completed the PANAS-C at both Entry and Exit timepoints.

Positive affect scale.

Original PA scale.

Internal consistency for the 15-item PA scale was relatively low (α = .66), with eight of the 15 PA items having corrected item-total correlations of less than the .3 cutoff (see Table 11). The unspecified PAF was unable to converge when extracting factors based on eigenvalues greater than one. The PAF was thus run extracting a single factor, resulting in an eigenvalue of 2.5, and explaining only 16.9% of the variance in the items. Each of the eight poorly performing items was removed from the analyses one at a time, and reliability estimates and factor loadings from each PAF were evaluated at each step until all corrected item-total correlations and factor loadings were above the cutoffs. This stepwise analysis resulted in the exclusion of 10 items, in the following order: *fearless, alert, calm, strong, interested, active, daring, energetic, joyful,* and *lively*. The remaining five items comprised the revised PA scale: *excited, happy, cheerful, proud,* and *delighted.*

Table 11
Corrected Item-Total Correlations and Principal-Axis Factoring Analyses for the PA Scale

	Corrected Item-total Correlations		Principal Axis Factoring	
Scale	Full scale	Revised Scale	One-factor PAF	Final PAF
PA				
Interested	.30		.29	
Alert	.05		.00	
Excited	.46	.55	.54	.59
Happy	.28	.46	.53	.57
Strong	.20		.23	
Energetic	.37		.31	
Calm	.17		.21	
Cheerful	.58	.57	.82	.73
Active	.24		.17	

Proud	.38	.59	.58	.73
Joyful	.35		.38	
Fearless	-.07		.03	
Delighted	.39	.40	.44	.46
Daring	.24		.29	
Lively	.32		.42	
α	.66	.75		
Eigenvalue			.25	1.94

Note. N = 39. One factor was extracted; therefore the unrotated factor structures are presented. PA = Positive Affect.

Revised PA scale.

The revised 5-item PA scale resulted in substantial improvement in both the reliability estimates and the factor structure (see Table 12). Specifically, Cronbach's alpha increased to .75, inter-item correlations rose from .12 to .38, and the corrected item-total correlations ranged from .40 (*delighted*) to .59 (*proud*). One factor clearly emerged, based on the scree plot (see Figure 11) and a single factor with an eigenvalue greater than one (1.94) that explained 38.9% of the variance in the PA items. Factor loadings ranged from .46 (*delighted*) to .73 (*proud*, *cheerful*).

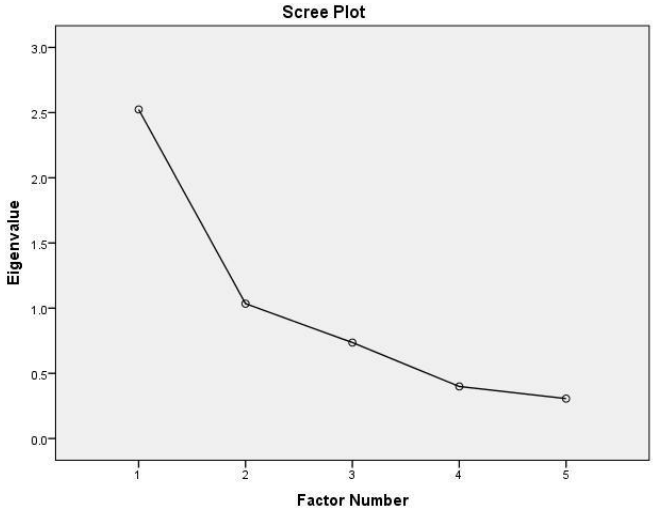


Figure 11. Scree plot of PAF for 5-item PA scale for 6 to 7 year old group in friendship intervention sample.

Negative affect scale.

First PAF (unspecified).

Internal consistency of the 15-item NA scale was acceptable (α = .75), but the inter-item correlations were quite low (r = .17) and many corrected item-total correlations were also very low. Specifically, four items did not meet the .3 cutoff (i.e., *blue, ashamed, nervous, afraid*). The initial unspecified PAF was run on the 15-item NA scale, extracting for factors with eigenvalues greater than or equal to one. Six factors were extracted, with the first factor accounting for the majority of the variance in the items (20.9%), and only three factors retained eigenvalues over one after the rotation (3.14, 1.52, 1.15, respectively). The scree plot was ambiguous, showing a definite first factor and less clear subsequent factors (see Figure 12). The majority of the items showed significant cross-loadings, with single items dominating the second through sixth factors (i.e., *afraid* [.78], *nervous* [.54], *ashamed* [.48], and *blue* [.58], respectively; no item loaded above the cutoff on the 6th factor).

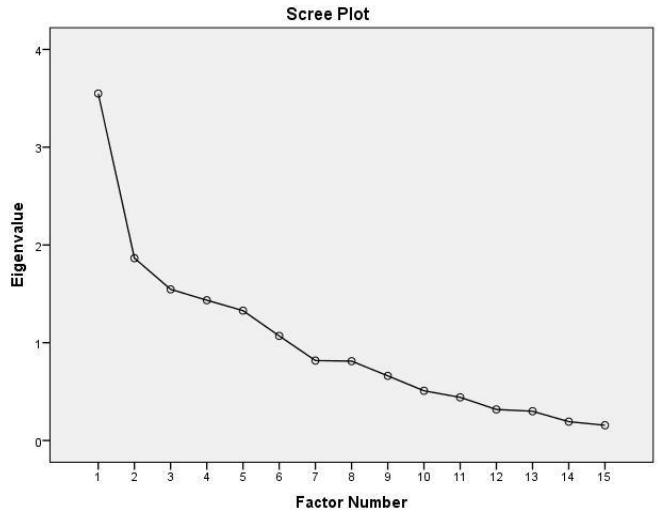


Figure 12. Scree plot of PAF for 15-item PA scale for 6 to 7 year old group in friendship intervention sample.

Second PAF (two-factor).

Next, a PAF extracting two factors was run. Two distinct factors emerged amongst several of the NA items. A number of items did not load strongly on either factor (i.e., *ashamed, nervous, jittery, blue*), and two items cross-loaded on each factor (i.e., *upset* and *mad*). These low-loading items also showed poor corrected item-total correlations (r = .18, r = .21, r = .33, r = .19, respectively). *Upset* and *mad* showed stronger corrected item-total correlations (r = .55 and r = .46, respectively), but their cross-loading suggested that they did not uniquely represent one of the two NA factors. Based on these analyses, these six items were removed, resulting in a 9-item NA scale (i.e., *sad, guilty, disgusted, gloomy, frightened, scared, afraid, miserable, lonely*).

PAF on revised 9-item NA scale.

A PAF extracting two factors with Promax rotation was executed on the 9-item NA scale next. Eigenvalues for both factors were greater than one (2.55 and 1.82, respectively), and together the factors explained nearly half of the variance in the items (28.28 and 20.24, respectively). The scree plot showed two clear factors (see Figure 13). Table 12 summarizes the results of the PAF.

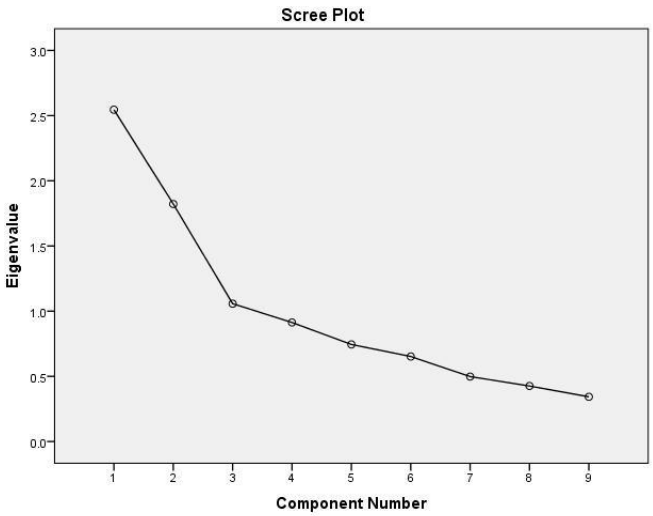


Figure 13. Scree plot of PAF for revised 9-item NA scale for 6 to 7 year olds in the friendship intervention sample.

The first factor, *NA-Sadness*, was comprised of four items: *sad, guilty, disgusted, gloomy*. The second factor was best represented as *NA-Fear*, and included five items: *frightened, scared, miserable, afraid, lonely*. Each item loaded strongly on its designated factor and weakly on the other factor. The factors were weakly correlated with one another (r = .14; see Figure 14). Internal consistency for each scale was acceptable. Cronbach's alpha for *NA-Sadness* was .66, the average inter-item correlation was .33, and corrected item-total correlations ranged from .37 (*sad*) to .59 (*disgusted*). The NA-Sadness factor explained 36.1% of the variance in the items (eigenvalue = 1.45), and factor loadings were robust, ranging from .44 (*sad*) to .85 (*disgusted*). Alpha for NA-Fear was .69, the mean inter-item correlation was .31, and corrected item-total correlations ranged from .37 (*lonely*) to .57 (*afraid*). The NA-Fear factor explained 45.1% of the variance in the items (eigenvalue =2.25). Factor loadings for the 5-items ranged from .58 (*lonely*) to .78 (*afraid).*

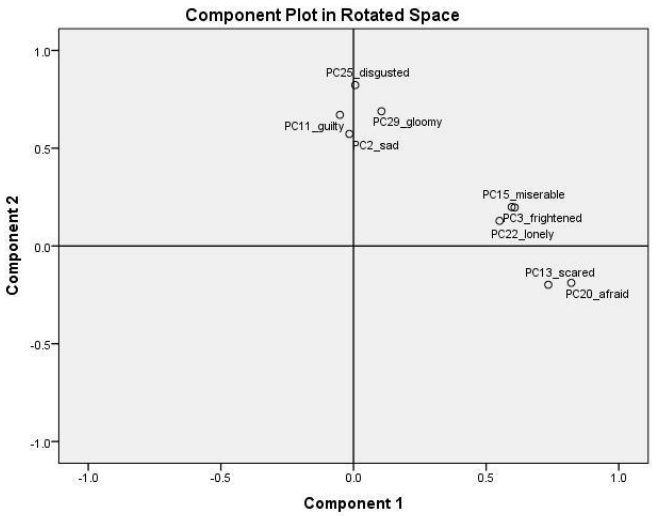


Figure 14. Items in rotated factor space for 9-item NA scale for 6 to 7 year olds in friendship intervention study.

Table 12

Item-Total Correlation and Principal-Axis Factoring Analyses (Promax Rotation) for the NA Scale

				Principal Axis Factoring						
	Corr. Item-total correlations			First PAF			PAF for NA scales separately		Two-Factor NA solution	
Scale	Full scale	Revised Scale		Factor 1	Factor 2	Factor 3	NA Sad	NA Fear	NA Sad	NA Fear
		Sad	Fear							
Disgusted	.44	.59		.53	-.42	-.15	.85		.12	**.82**
Blue	.19			.20	-.05	-.09				
Gloomy	.30	.42		.40	-.26	-.34	.52		.20	**.70**
Scared	.35		.46	.42	.44	.21		.69	**.71**	-.09
Miserable	.38		.42	.51	.28	-.51		.64	**.63**	.28
Jittery	.33			.38	-.17	.02				
Afraid	.27		.57	.42	.78	.15		.79	**.79**	-.07
Lonely	.38		.37	.44	.20	-.19		.58	**.57**	.21
Mad	.46			.61	.00	-.27				
Sad	.37	.37		.41	-.34	.30	.44		.07	**.57**
Frightened	.55		.43	.60	.17	.01		.65	**.64**	.28
Ashamed	.18			.20	-.03	.15				
Upset	.55			.72	-.19	.41				
Nervous	.21			.23	.02	.54				
Guilty	.32	.39		.43	-.38	.01	.51		.04	**.66**
α	.75	.66	.69							
Eigenvalue				3.14	1.52	1.15	1.45	2.25	1.82	2.55

Note. $n = 39$. PA = Positive Affect; NA = Negative Affect.

PAF on 14-item PANAS-C.

Three-factor PAF.

Unexpectedly, when the revised 14-item PANAS-C was subjected to a PAF with Promax rotation, extracting three factors (i.e., PA, NA-Sadness, NA-Fear), a fairly strong negative correlation (r = -.47) was revealed between the first (PA) and second (NA-Sadness) factors. Results are summarized in Table 13. PA items loaded positively on Factor 1 and negatively on Factor 2, and vice versa, which suggests that these items may be measuring the same underlying construct. Specifically, this suggests that positive affect and negative affect (as represented by sadness) lay along a single spectrum of emotion, rather than being unique, independent constructs.

Two-factor PAF.

To test this hypothesis, a PAF was conducted with the same 14 items, extracting two factors. The results supported the hypothesis that happiness/sadness can be represented with a single factor. When plotted, the NA-Sadness items and PA items fell at opposite ends of Factor 1 (see Figure 15).

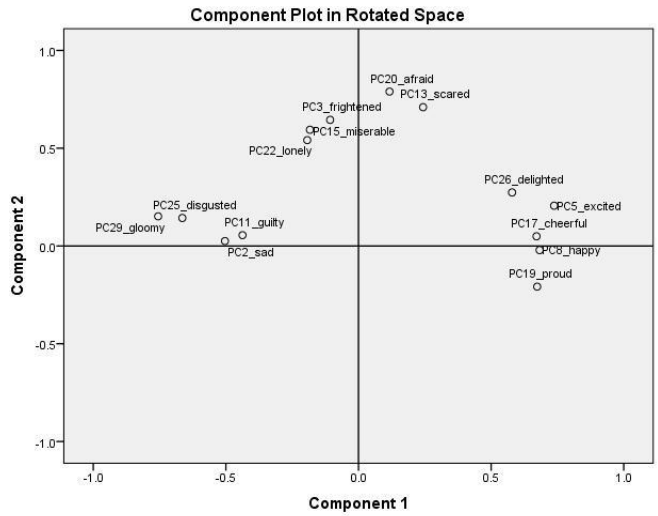


Figure 15. Items in rotated factor space for final 14-item revised PANAS-C for 6 to 7 year olds in friendship intervention study.

The first factor (Happy/Sad) explained 27.9% of the variance in the items, while the second factor (NA-Fear) explained an additional 16.9% of the variance in the items. The scree plot supported a two factor solution (see Figure 16), as did the factor loadings (see Table 13). The NA-Sadness items were negatively correlated with Factor 1, while the PA items were positively correlated with Factor 1. The five items on Factor 2 showed robust, positive loadings representing NA-Fear. All items exceeded the cut off of .4. The two factors were negligibly correlated (r = -.06).

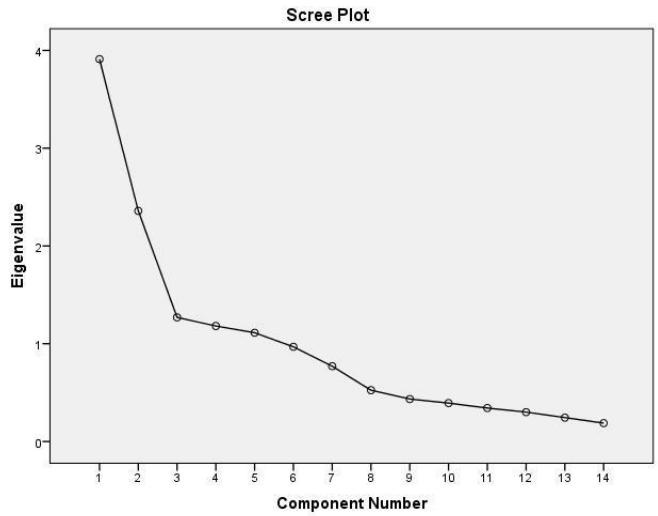


Figure 16. Scree plot of PAF for final revised 14-item PANAS-C for 6 to 7 year olds in friendship intervention sample.

Table 13
Principal-Axis Factoring Analysis (Promax Rotation) for the Final 14-item PANAS-C Scale

	Principal Axis Factoring				
	Three-Factor Solution			Two-Factor Solution	
Scale	Factor 1 PA	Factor 2 NA Sad	Factor 3 NA Fear	Factor 1 PA Happy/Sad	Factor 2 NA Fear
NA- Fear					
Frightened	-.08	.17	.66	-.15	**.65**
Scared	.21	-.13	.71	.20	**.70**
Afraid	-.08	-.21	.77	.07	**.78**
Miserable	-.28	.09	.59	-.22	**.61**
Lonely	-.18	.21	.56	-.23	**.55**
NA- Sadness					
Disgusted	-.55	.60	.18	**-.67**	.18
Gloomy	-.71	.60	.18	**-.77**	.20
Guilty	-.19	.58	.11	**-.44**	.08
Sad	-.16	.72	.10	**-.51**	.06
PA					
Excited	.51	-.74	.15	**.73**	.16
Happy	.61	-.56	-.05	**.68**	-.06
Cheerful	.88	-.25	.07	**.67**	.01
Proud	.83	-.33	-.20	**.69**	-.25
Delighted	.36	-.61	-.20	**.56**	.24

Eigenvalue	3.91	2.36	1.27	3.91	2.36

Note. N = 39. PA = Positive Affect; NA = Negative Affect.

Reliability and consistency of the PA-Happy/Sad factor

In order to evaluate the reliability of the PA-Happy/Sad factor, the NA-Sadness items were reverse coded and the nine items were summed. Internal consistency was good (α = .82), mean inter-item correlations were acceptable (*r* = .34), and corrected item-total correlations ranged from .42 (*sad*) to .63 (*gloomy*). A PAF using the reverse scored NA-Sadness items along with the PA items was conducted to verify that the factor structure remained stable when evaluated on its own. A single factor representing this Happy/Sad factor (eigenvalue = 3.74) explained 41.6% of the variance in the items (see Figure 17 for scree plot). Factor loadings ranged from .44 (*guilty*) to .77 (*gloomy*).

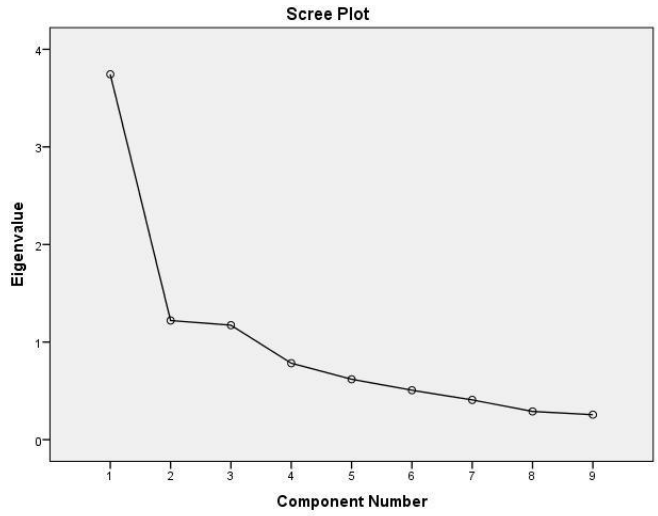


Figure 17. Scree plot of the PAF for the NA-Happy/Sad factor for 6 to 7 year olds in the friendship intervention sample.

Summary of factor analysis for 6 to 7 year olds in friendship intervention sample.

The original 15-item PA scale performed poorly, eventuating in 10 items being removed due to poor corrected item-total correlations and factor loadings. A final 5-item PA scale resulted with good internal consistency and fair to good factor loadings. Two clear factors emerged from the NA scale: NA- (4 items) and NA-Fear (5 items). The factors were weakly correlated with one another and factor loadings were robust for each factor. Internal consistency was acceptable for each scale. Overall, in this sample of individuals with ASD who are under the age of 8 years, the PANAS-C is best represented by a two-factor structure. However, in contrast to previous findings of unique unipolar factors for NA and PA, the first factor represents a continuum of emotion from sadness to happiness. When the NA items are reverse-coded, this factor essentially represents PA. The second factor represents a narrower construct of negative affect than the standard PANAS-C, primarily fear. The two factors were negligibly correlated with one another.

Test-retest reliability.

The number of participants under 8 years of age who completed PANAS' at both Entry and Exit timepoints was very low (n = 8). Therefore, caution should be used in generalizing these results for temporal stability of the PANAS-C for children with ASD under 8 years of age. Initial test-retest results showed an uninterpretable ICC for the NA-Fear scale (ICC = -.22). To investigate further the poor temporal stability, Time 1 and Time 2 data were plotted against each other, and a slight negative relation was revealed (r = -.27; see Figure 18). Next, reliability analyses were run separately for the NA-Fear scale at each timepoint. Internal consistency for the 5-item scale was high at Time 1 (α = .86), with a high mean inter-item correlation (r = .56). However, Cronbach's alpha was very low for the NA-Fear scale at Time 2 (α = .47). This low reliability was caused by negative inter-item correlations between several items. Specifically,

miserable and *lonely* seemed to be minimally and negatively related to the other three items (*scared, afraid, frightened*; e.g., r = -.30 between *scared* and *lonely*, r = -.42 between *afraid* and *miserable*) on this scale. In summary, it appears that this NA-Fear scale does not show adequate temporal stability in this sample of young children with ASD; but replication with larger samples is warranted to evaluate the presence of this specific fear-based negative affect scale in other samples of young children with ASD.

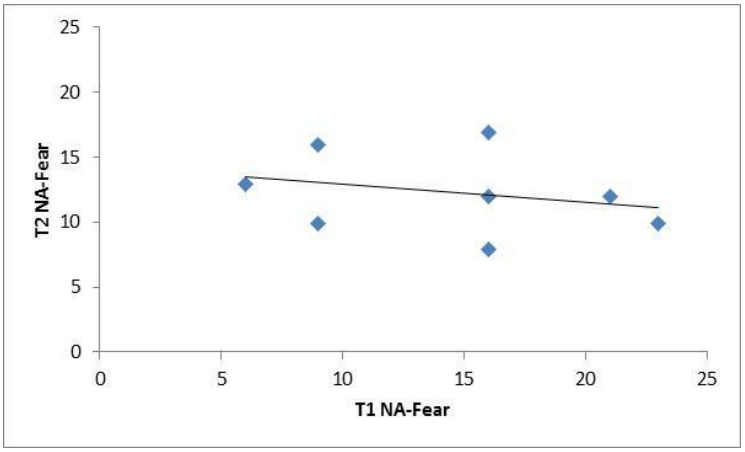


Figure 18. Time 1 versus Time 2 scores on NA-Fear scale for 6 to 7 year olds in the friendship intervention sample.

In contrast to the NA-Fear scale, the test-retest reliability for the 9-item Happy/Sad scale was good (α = .81; p <.01). The Pearson Product moment correlation was equivalent to the ICC (p <.05). The ICC for the Happy/Sad scale shows that over a two month period, 81% of the observed score variance is due to the true score, and 19% is due to error. These results provide strong statistical support for the temporal stability of the Happy/Sad scale of the revised PANAS-C for this sample of young children with ASD.

Scale validation.

Correlation analyses.

To test whether these newly established NA and PA scales performed in line with the theory behind the tripartite model of depression and anxiety, several analyses were run evaluating relations between variables at Time 1 (Entry), Time 2 (Exit), and Time 1 versus Time 2. Simple Pearson-product moment correlations were computed between the PANAS-C subscales (Happy/Sad and NA-Fear) and the parent-report BASC internalizing scales. Note that this age group did not complete self-report measures, so data is only analyzed for the parent-report BASC. Modest correlations, in the magnitude of .2 or .3, were expected due to the cross-informant nature of these reports (Achenbach, McConaughy, & Howell, 1987).

Table 14 summarizes the results. Neither the PA nor the NA scale scores correlated significantly with the parent-reported BASC anxiety or depression T-scores at any timepoint. Interestingly, the magnitude of the correlations between the parent-report BASC depression scores and the PANAS-C scales were in the expected range, but the direction of the correlation between the depression scores and the PA-Happy/Sad scale scores was in the opposite direction of what would be expected. Specifically, it was expected that a negative correlation would emerge between depression scores and the PA Happy/Sad scale scores, but instead the results showed that parent report of depression symptoms in their children increased as the child's self-report of positive affect increased. The revised PA and NA scale scores correlated with the parent-report BASC anxiety scores at a negligible magnitude at Time 1.

At Time 2, the correlations were larger between the PANAS and BASC scores, but still failed to reach significance. Associations between the PA-Happy/Sad scale and the BASC scores replicated the unexpected positive direction seen at Time 1. Interestingly, the largest correlations

emerged across timepoints between the Time 1 PANAS Happy/Sad scale and T2 BASC scores. The stability of the scales can also be seen in Table 14, with a large significant correlation between Time 1 and Time 2 for the PA-Happy/Sad scale and a low negative correlation between the NA-Fear scales.

Table 14

Group 1: Correlations Between Revised PANAS-C Subscales and Internalizing Measures

	Time 1		**Time 2**	
	PA Happy/Sad	NA-Fear	PA Happy/Sad	NA-Fear
Time 1 Measures				
PA scale	—			
NA scale	-.21	—		
PR BASC Anxiety	.12	-.08		
PR BASC Depression	.32	.23		
Time 2 Measures				
PA scale	.81*	.09	—	
NA scale	.53	-.27	-.06	—
PR BASC Anxiety	.60	-.35	.28	.24
PR BASC Depression	.53	.10	.47	.14

Note. $n = 16$ (T1 PANAS); $n = 20$ (T1 BASC); $n = 15$ (T1 PANAS & T1 BASC); $n = 13$ (T2 PANAS); $n = 13$ (T2 BASC); $n = 12$ (T2 PANAS & T2 BASC); $n = 8$ (T1 PANAS & T2 BASC); PANAS-C = Positive and Negative Affect Scale for Children. BASC = Behavior Assessment Scale for Children, 2nd ed.
* $p \leq .05$

Regression analyses.

Based on the theory that depression and anxiety share a common underlying construct of negative affect, it was expected that NA-Fear scores would explain a significant unique portion of the variance in both anxiety and depression scores. On the other hand, regressions were used to test whether PA-Happy/Sad scores would explain a significant portion of the variance in depression scores, but not in anxiety scores. These expectations are consistent with the tripartite

model. The regression analyses mimicked the results from the correlation analyses (see Table 15). Contrary to predictions, neither NA-Fear nor PA-Happy/Sad scores explained significant portions of variance in parent-reported BASC depression or anxiety T-scores. As might be expected based on the high comorbidity between depression and anxiety, scores for each internalizing disorder were highly predictive of scores on the contrasting scale.

Table 15

Group 1: Hierarchical Multiple Regression Examining Squared Part Correlations and Beta Weights of PA and NA Measures with Existing Anxiety and Depression Measures

			Block 1		Block 2		
Criterion	Non-target measure		Non-target	NA	Non-target	NA	PA
PR BASC Anxiety	PR BASC Depression	$Part^2$	.35	.08	31	.09	.08
		β	.84*	-.66	.90*	-.72	-.23
PR BASC Depression	PR BASC Anxiety	$Part^2$	.37	.05	37	.06	.01
		β	.44*	.60	.42*	.65	.39

Note. * $p \leq .05$. PR BASC = Parent-Report Behavioral Assessment System for Children; NA = negative affect scale; PA = positive affect scale

Group 2: Ages 8 to 11 years.

Contributing data to this section were 36 individuals ranging in age from 8 to 11 years (M = 9.14 , SD = 1.06). Over the course of the three timepoints, 65 PANAS' were collected from these individuals. Twenty-one participants completed the PANAS at Entry (T1) and Exit (T2) timepoints.

Positive affect scale.

First PAF (unspecified).

Internal consistency for the 15-item PA scale was good (α = .84), with a mean inter-item correlation of .27. The corrected item-total correlations ranged from .14 (*alert*) to .67 (*cheerful*). Three items did not meet the .3 cutoff for item-total correlations (*alert* = .14, *fearless* = .23, *calm* = .28). The initial unspecified PAF extracted five factors, two of which had eigenvalues greater than one after the Promax rotation. However, the scree plot indicated that a single factor was appropriate (see Figure 19), and the cross-loadings across the factors also suggested that one factor was most appropriate.

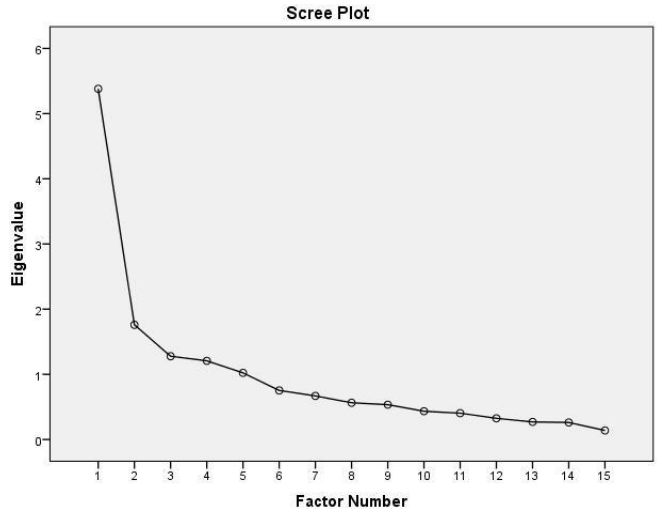


Figure 19. Scree plot of unspecified PAF for PA scale for 8 to 11 year olds in the friendship intervention sample.

Second PAF (one-factor).

When the PAF was re-run with a single factor extracted, 31.2% of the variance was explained in the items (eigenvalue = 4.68). A number of items did not meet the .4 cutoff for factor loadings: *alert* (.11), *fearless* (.20), *calm* (.32), *strong* (.34), *interested* (.35), *energetic* (.38), and *daring*

(.39). For these poor items, the corrected inter-item correlations were all less than .4. Considering the results of these analyses, all seven poorly performing items were excluded from the PA scale.

PAF on revised 8-item PA scale.

The final scale consisted of eight items: *excited, happy, cheerful, active, proud, joyful, delighted,* and *lively* (see Table 16). A single factor explained 50.2% of the variance in the PA items (eigenvalue = 4.02). The scree plot clearly supported this one-factor solution (see Figure 20), as did the factor loadings. Each item loaded robustly on the PA factor, ranging from .65 (*lively*) to .76 (*delighted*). Internal consistency increased to .89, with the mean inter-item correlation of .50, and corrected item-total correlations ranged from .61 (*lively*) to .71 (*delighted*).

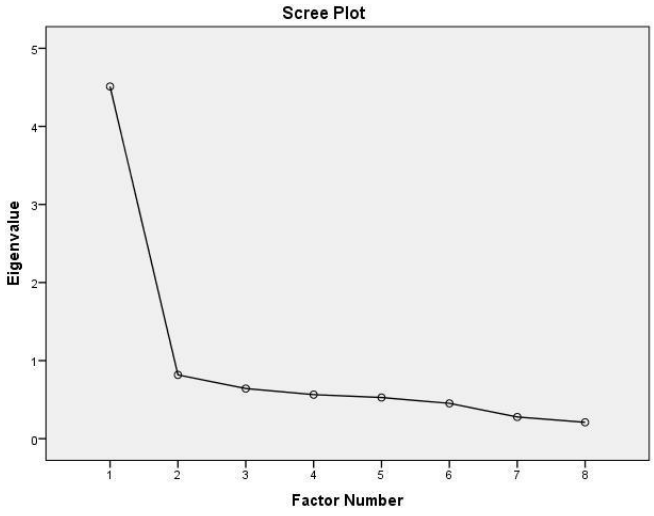


Figure 20. Scree plot of PAF for revised 8-item PA scale for 8 to 11 year olds in friendship intervention sample.

Table 16

Group 2: Item-Total Correlation and Principal-Axis Factoring Analyses (Promax Rotation) for the Revised PANAS-C

	Corr. Item-total correlations		Principal Axis Factoring				
			First PAF		Second PAF	Final Two-Factor solution	
Scale	Full scale	Final Revised Scale	Factor 1	Factor 2	Unrotated Factor	NA	PA
NA							
Sad	.49	.53	.59	.24	.59	.59	-.12
Frightened	.60	.64	.65	.45	.68	.70	-.12
Ashamed	.59	.62	.69	.34	.67	.65	-.44
Upset	.48	.55	.63	.23	.58	.57	-.31
Nervous	.28		.24	.12			
Guilty	.28		.23	.22			
Scared	.71	.72	.80	.21	.79	.81	-.13
Miserable	.63	.63	.66	.55	.67	.64	-.30
Jittery	.29		.20	.32			
Afraid	.70	.74	.80	.30	.81	.81	-.11
Lonely	.63	.53	.53	.67	.58	.59	-.33
Mad	.45	.50	.57	.06	.54	.55	-.17
Disgusted	.45	.44	.47	.25	.48	.49	-.01
Blue	.45		.29	.94			
Gloomy	.46	.41	.43	.58	.44	.42	-.18
α	.86	.87					
Eigenvalue			4.98	1.44	4.36		
PA							
Interested	.30		.26	.46			
Alert	.14		.05	.09			
Excited	.64	.64	.50	.76	.68	.04	.72
Happy	.55	.63	.83	.44	.67	-.29	.67
Strong	.33		.30	.28			
Energetic	.39		.18	.38			
Calm	.28		.24	.20			
Cheerful	.67	.69	.67	.77	.74	-.16	.74
Active	.65	.64	.55	.59	.67	-.16	.67
Proud	.66	.68	.58	.77	.73	-.23	.74
Joyful	.59	.70	.83	.65	.76	-.39	.77
Fearless	.23		-.05	.25			
Delighted	.71	.71	.63	.72	.76	-.24	.73
Daring	.38		.33	.29			
Lively	.60	.61	.66	.49	.65	-.22	.64
α	.84	.89					
Eigenvalue			4.87	1.07	4.02	5.63	3.06

Note. n = 65. PA = Positive Affect; NA = Negative Affect.

Negative affect scale.

First PAF (unspecified).

Internal consistency for the 15-item NA scale was high (α = .86), with an average inter-item correlation of .29, and corrected item-total correlations ranging from .28 (*nervous*) to .71 (*scared*). Three items did not meet the .3 cutoff: *nervous* (.28), *guilty* (.28), and *jittery* (.29). An unspecified PAF with Promax rotation resulted in five factors being extracted, only two of which had eigenvalues above one (4.98, 1.44). The scree plot indicated a single factor (see Figure 21), and factors 3 through 5 were dominated by the three items that did not meet the corrected item-total correlation. Factors 1 and 2 showed many cross-loadings, but the second factor was heavily dominated by the item blue. The loadings for the first two factors of this first PAF are presented in Table 16.

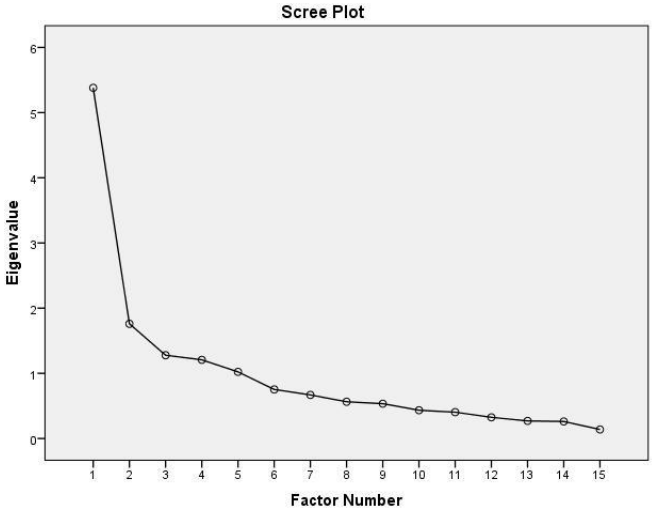


Figure 21. Scree plot for unspecified PAF of NA scale for 8 to 11 year olds in friendship intervention sample.

Second PAF (unspecified).

A second unspecified PAF was carried out, after removing the items *nervous, guilty,* and *jittery.* This PAF extracted two factors, with the item *blue* again dominating the second factor. Following guidelines by Gorsuch (1997) that a meaningful factor should have at least three items loading on it with an absolute value or .40 or greater, this one-item factor was viewed as "trivial". Based on the poor performance of this item, it was also eliminated from the NA scale.

PAF on revised 11-item NA scale.

The final NA scale consisted of 11 items: *sad, frightened, ashamed, upset, scared, miserable, afraid, lonely, mad, disgusted,* and *gloomy* (see Table 16). Internal consistency was high (.87), with a mean inter-item correlation of .38, and corrected item-total correlations ranging from .41 (*gloomy*) to .74 (*afraid*). The final PAF on the 11-item NA scale resulted in a single factor explaining 39.6% of the variance in the items (eigenvalue = 4.36). All items exceeded the cutoff for factor loadings, ranging from .44 (*gloomy*) to .81 (*afraid*).

PAF on 19-item PANAS-C.

When all 19 items were included in the PAF with Promax rotation, two clear factors were extracted (see Figure 22), representing PA and NA, respectively. The first factor explained 29.7% of the variance in the items (eigenvalue = 5.63), and the second factor explained 16.1% of the variance in the items (eigenvalue = 3.06).

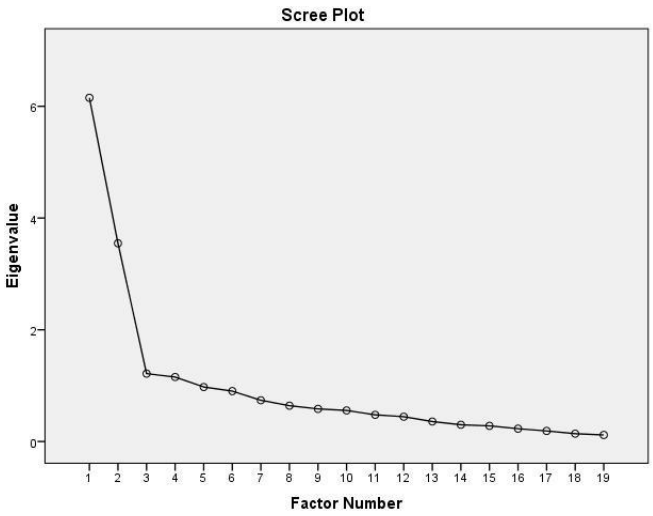


Figure 22. Scree plot for revised 19-item PANAS-C for 8 to 11 year olds in friendship intervention sample.

All NA items met the .4 cutoff on the first factor (e.g., *gloomy* = .42, *afraid* = .81), and loaded weakly and negatively on the second factor. All PA items loaded robustly on the second factor (e.g., *lively* = .64, *joyful* = .77), and weakly on the first factor. The two factors were negatively correlated (r = -.29), and the factor plot in rotated factor space showed two clearly distinct factors (see Figure 23).

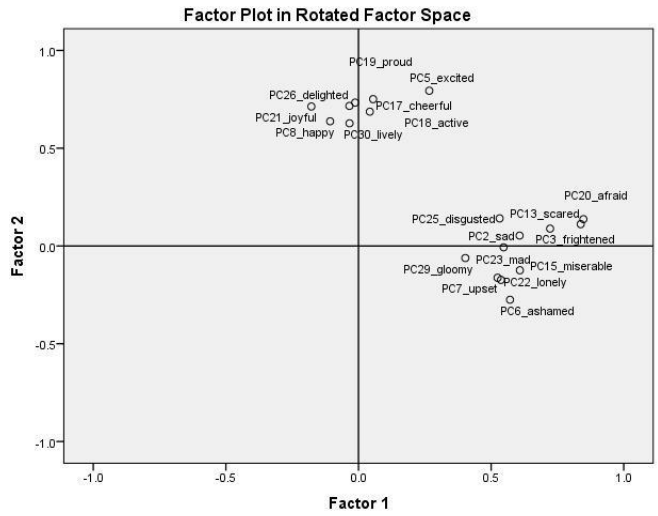


Figure 23. Items in rotated factor space for revised 19-item PANAS-C for 8 to 11 year olds in friendship intervention sample.

Test-retest reliability.

The ICC for the NA scale for those 8 to 11 years of age was uninterpretable (ICC = -.13; $n = 21$). When the scores from both timepoints were plotted against each other, several potential outliers were identified who had drastic differences in their scores between Time 1 and Time 2. In order to identify the outliers, the absolute values of the difference scores were used to create a boxplot, which verified the existence of four extreme outliers, identified with red markers in Figure 24. The difference scores for the outliers ranged from 28 to 38 points. These four individuals were removed from this set of analyses in order to get a more accurate picture of the temporal stability of the measure. After excluding the outliers, 17 participants remained who had PANAS-C data at both timepoints. When the four outliers were removed from the analysis, the ICC and Pearson Product moment correlation increased to .64 ($p < .01$), reflecting moderate agreement over time. This statistic implies that 64% of the observed score variance over time is due to the true score, and 36% is due to error. These results provide moderate support for the

temporal stability of the NA-Fear scale of the revised PANAS-C for this sample of young children with ASD.

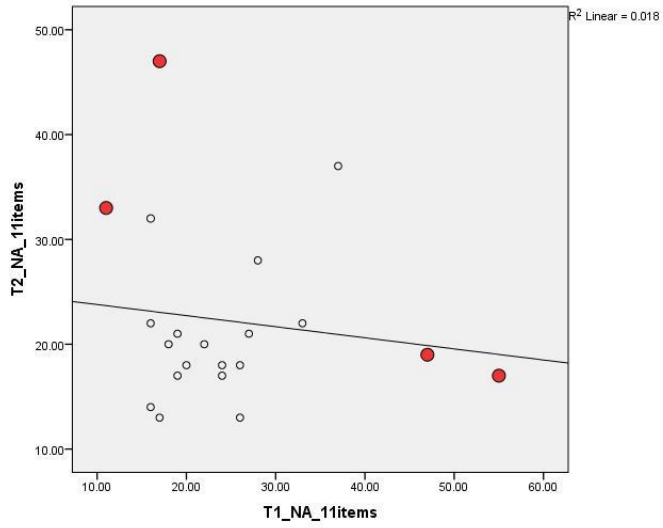


Figure 24. Time 1 versus Time 2 NA scale scores for 8 to 11 year olds in friendship intervention sample, showing extreme outliers in red.

Test-retest reliability for the 8-item PA scale was moderate (ICC = .61, r = .62, $p<.01$). A boxplot identified one extreme outlier, which was subsequently removed from the sample to compute the ICC. The intraclass correlation increased to .73 after these outliers were removed, which represents marginally strong agreement for the PA scale across the eight weeks between PANAS-C administrations. The scatterplot in Figure 25 shows Time 1 plotted against Time 2 with a line representing the fit of all 21 data points. The outlier is marked in red.

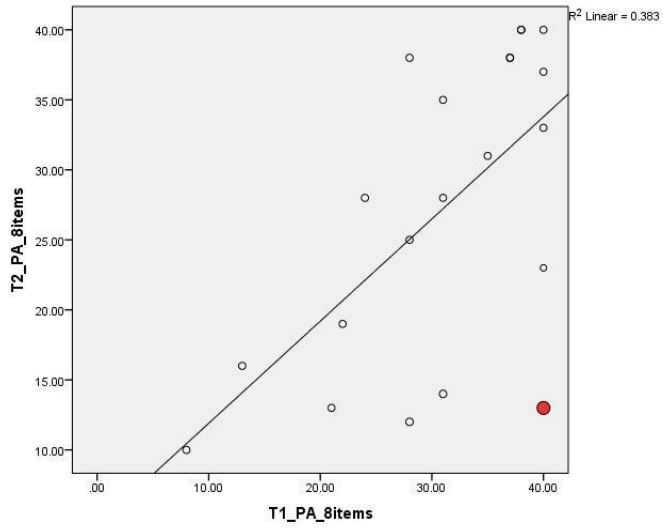


Figure 25. Time 1 versus Time 2 PA scale scores for 8 to 11 year olds in friendship intervention sample, showing one extreme outlier in red.

Summary of factor analysis for 8 to 11 year olds in friendship intervention sample.

Seven PA items performed poorly in the factor analysis and were removed from the scale. This resulted in an 8-item PA scale with robust loadings and high internal consistency. A final 11-item NA scale was created, which showed high internal consistency and fair to excellent factor loadings. On the final revised 19-item PANAS-C, two clear factors emerged showing robust loadings on the expected PA and NA factors, which were weakly and negatively correlated with one another. With several outliers removed, temporal stability was moderate for the NA scale and strong for the PA scale.

Scale validation.

Correlation analyses.

Initial correlation analyses showed significant associations between both the NA and PA scales with the parent-report BASC Depression and Anxiety subscale T scores (see Table 17).

Modest correlations, on the magnitude of .2 or .3, were expected due to the cross-informant nature of these reports (Achenbach, McConaughy, & Howell, 1987). The results are consistent with expectations, except for the significant correlation between the PA scale scores and the Anxiety scores at Time 1. However, when regression analyses were run controlling for comorbidity, these associations were no longer significant (see Table 18). This is likely due to the robust correlation between the Anxiety and Depression subscales of the parent-report BASC ($r = .61$, $p < .01$).

Table 17

Group 2: Correlations Between Revised PANAS-C Subscales and Internalizing Measures

	Time 1		**Time 2**	
	PA 8 items	NA 11 items	PA 8 items	NA 11 items
Time 1 Measures				
PA scale	—			
NA scale	-.40*	—		
PR BASC Anxiety	-.33*	.48**		
PR BASC Depression	-.40*	.44**		
Time 2 Measures				
PA scale	.62**	-.13	—	
NA scale	.20	-.13	-.25	—
PR BASC Anxiety	-.05	.45	.25	.23
PR BASC Depression	-.29	.43	.13	-.35

Note. $n = 35$ (T1 PANAS); $n = 35$ (T1 BASC); $n = 34$ (T1 PANAS & T1 BASC); $n = 22$ (T2 PANAS); $n = 15$ (T2 BASC); $n = 15$ (T2 PANAS & T2 BASC); $n = 14$ (T1 PANAS & T2 BASC); PANAS-C = Positive and Negative Affect Scale for Children. BASC = Behavior Assessment Scale for Children, 2nd ed.
* $p \leq .05$, ** $p \leq .01$.

Regression analyses.

The hierarchical regression analyses showed little support for the tripartite model. Similar to the findings from the youngest age group, the non-target measures (i.e., non-target = anxiety score when depression score is the criterion, and vice versa) accounted for a large portion of the variance in the criterion measures (see Table 18). This is contrary to predictions that NA scores would explain a significant portion of variance in both depression and anxiety scores, and PA scores would explain a significant portion of variance in depression scores, but not in anxiety scores.

Table 18

Group 2: Hierarchical Multiple Regression Examining Squared Part Correlations and Beta Weights of PA and NA Measures with Existing Anxiety and Depression Measures

			Block 1		Block 2		
Criterion	Non-target measure		Non-target	NA	Non-target	NA	PA
PR BASC Anxiety	PR BASC Depression	$Part^2$	.20	.05	.18	.05	.00
		β	.38**	.28[a]	.37**	.27	-.06
PR BASC Depression	PR BASC Anxiety	$Part^2$	.21	.03	.18	.01	.03
		β	.68**	.27	.64**	.19	-.33

Note. [a] $p \leq .10$, * $p \leq .05$, ** $p \leq .01$. PR BASC = Parent-Report Behavioral Assessment System for Children; NA = negative affect scale; PA = positive affect scale

Group 3: Ages 11 to 17

Data for this section were collected for participants in grades 6 through 12 (*M* age = 14.98 years, *SD* = 1.78, Range = 11.3 to 17.92 years). Forty-two individuals contributed PANAS' across the three timepoints, resulting in a total of 84 cases. Thirty-four individuals completed the PANAS-C at Entry (T1) and Exit (T2) timepoints. For consistency's sake, the factor loading cutoff of .45 was used, because this group was closer in age to the Longitudinal sample than to the other Friendship intervention groups.

Positive affect scale.

First PAF (unspecified).

Internal consistency for the 15-item PA scale was high (α = .90), with an average inter-item correlation of .38, and corrected item-total correlations ranging from .34 (*alert*) to .74 (*strong*). The initial unspecified PAF with Promax rotation resulted in three factors, with a single factor retaining an eigenvalue greater than one after the rotation (6.14) and the scree plot demonstrating a clear single factor (see Figure 26).

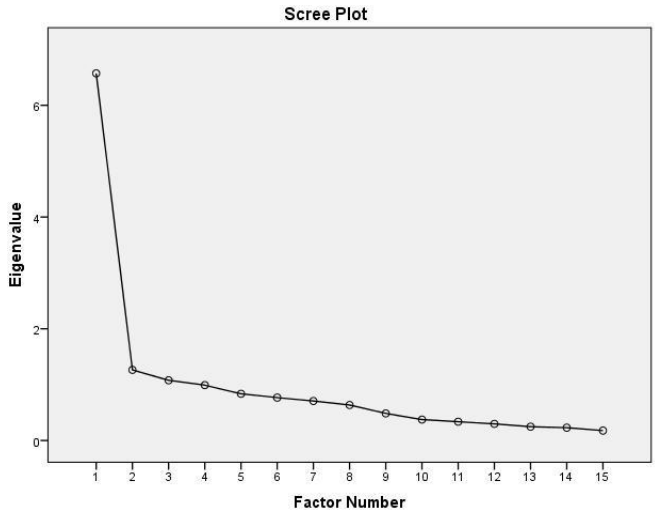


Figure 26. Scree plot of PAF for unspecified 15-item PA scale for 11 to 17 year olds in the friendship intervention sample.

Second PAF (one-factor).

The next PAF was run extracting a single factor, which explained 40.2% of the variance in the items (eigenvalue = 6.03). The items *alert* and *interested* did not meet the factor loading cutoff and were thus removed from the scale.

PAF on revised 13-item PA scale.

This resulted in a 13-item PA scale: *excited, happy, strong, energetic, calm, cheerful, active, proud, joyful, fearless, delighted, daring*, and *lively* that retained high internal consistency ($\alpha = .91$), demonstrated a good mean inter-item correlation ($r = .43$), and showed good corrected item-total correlations ranging from .46 (*calm*) to .74 (*strong*). The PA factor explained 44.0% of the variance in the items (eigenvalue = 5.72) and items loaded robustly on the single factor (e.g., *fearless* =.50, *joyful* = .78). Table 19 summarizes these results.

Table 19

Group 3: Item-Total Correlation and Principal-Axis Factoring Analyses (Promax Rotation) for the Revised PANAS-C

Scale	Corr. Item-total correlations		Principal Axis Factoring						
			First PAF			Second PAF		Third PAF	
	Full scale	Final Revised Scale	Factor 1	Factor 2	Factor 3	Factor 1	Factor 2	Unrotated Factor	Final Solution
NA									
Sad	.52	.52	.43	.27	.23	.46	.45	.53	.57
Frightened	.45	.45	.24	.28	.20	.33	.50	.48	.50
Ashamed	.45	.45	.51	.65	.24	.57	.35	.55	.50
Upset	.50	.50	.90	.34	.27	.68	.26	.55	.56
Nervous	.51	.51	.61	.34	.62	.78	.23	.58	.57
Guilty			.17	.67	.32	.39	.30	.42	
Scared	.49	.49	.38	.26	.66	.59	.29	.52	.53
Miserable	.57	.57	.54	.60	.04	.51	.58	.65	.64
Jittery			.33	.26	.15	.32	.27	.35	
Afraid	.42	.42	.23	.38	.85	.55	.26	.48	.46
Lonely	.47	.47	.24	.58	.18	.37	.54	.53	.52
Mad	.53	.53	.59	.33	.12	.45	.50	.56	.58
Disgusted	.42	.42	.15	.33	.13	.19	.67	.45	.45
Blue	.46	.46	.18	.36	.04	.18	.75	.48	.49
Gloomy	.52	.52	.40	.64	.05	.43	.60	.60	.58
A	.84	.84							
Eigenvalue			4.32	1.42	1.01	4.14	1.24	4.05	3.75
PA									
Interested		.42	.43					.44	
Alert		.34	.24					.35	
Excited	.68	.69	.65					.73	.72
Happy	.56	.55	.69					.59	.60

Strong	.74	.74	.61	.77	.77
Energetic	.53	.53	.54	.56	.56
Calm	.47	.48	.51	.51	.51
Cheerful	.70	.69	.84	.74	.75
Active	.63	.64	.52	.67	.67
Proud	.72	.72	.64	.76	.76
Joyful	.74	.71	.79	.76	.78
Fearless	.49	.47	.42	.49	.50
Delighted	.65	.65	.71	.69	.69
Daring	.51	.53	.43	.54	.53
Lively	.67	.68	.69	.71	.70
A	.91	.90			
Eigenvalue			6.14	6.03	5.72

Note. $n = 84$. PA = Positive Affect; NA = Negative Affect.

Negative affect scale.

First PAF (unspecified).

Internal consistency was good for the 15-item NA scale (α = .84). The scale demonstrated an average inter-item correlation of .27. Two items did not meet the cutoff for the corrected item-total correlation: *jittery* (.32) and *guilty* (.36). The unspecified PAF resulted in five factors being extracted, three of which had eigenvalues greater than one after the Promax rotation. The scree plot was ambiguous, supporting a potential second factor (see Figure 27).

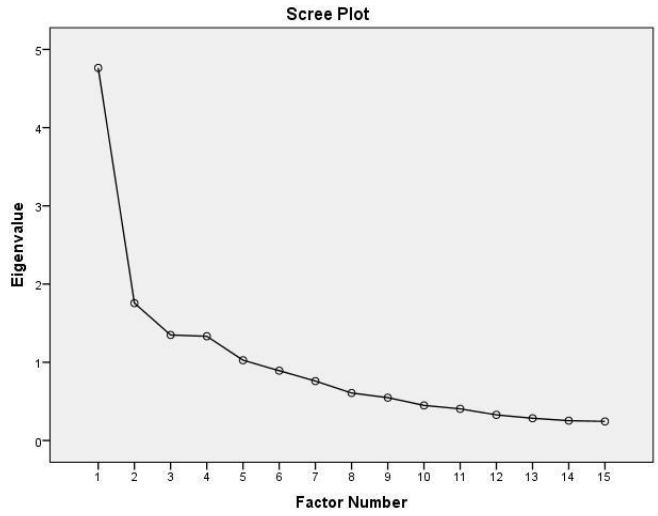


Figure 27. Scree plot of PAF for unspecified 15-item NA scale for 11 to 17 year olds in friendship intervention sample.

An evaluation of the structure matrix revealed that the third through fifth factors did not represent theoretically meaningful constructs. The second factor contained items representing internally-valenced negative affect (e.g., *ashamed*, *guilty*), which were retained for further analysis.

Second PAF (two-factor).

Therefore a second PAF with Promax rotation was run extracting two factors to evaluate the possibility of a hierarchical NA factor structure. While some items loaded strongly on one factor and weakly on another (e.g., *nervous*: F1 = .78, F2 = .23; *blue*: F1 = .18, F2 = .75), the factors did not represent meaningful and unique constructs, and the second factor only explained slightly over 8% of the variance in the items.

Third PAF (one-factor).

Therefore, a PAF extracting a single factor was run. This single NA factor explained 27.0% of the variance in the items (eigenvalue = 4.05). The items *jittery* and *guilty* did not meet the factor loading cutoff, and were thus removed from the scale. This resulted in a final NA scale with 13 items: *sad, frightened, ashamed, upset, nervous, scared, miserable, afraid, lonely, mad, disgusted, blue,* and *gloomy*. Internal consistency remained the same as the initial consistency estimate ($\alpha = .84$), with an average inter-item correlation of .29, and acceptable corrected item-total correlations ranging from .42 (*afraid*) to .57 (*miserable*).

PAF on 26-item PANAS-C

A final PAF using Promax rotation resulted in two clear factors representing PA and NA, respectively. Table 20 summarizes the results. All PA items loaded above the .4 cutoff on Factor 1 (range = .48 [*fearless*] to .78 [*strong*]), and showed low, negative loadings on Factor 2. All NA items had acceptable loadings on Factor 2 (range = .46 [*disgusted*] to .62 [*miserable*]), and low, negative loadings on Factor 1. The NA and PA factors showed a small negative correlation ($r = -.22$), with their distinctness seen clearly in the rotated factor space (see Figure 28).

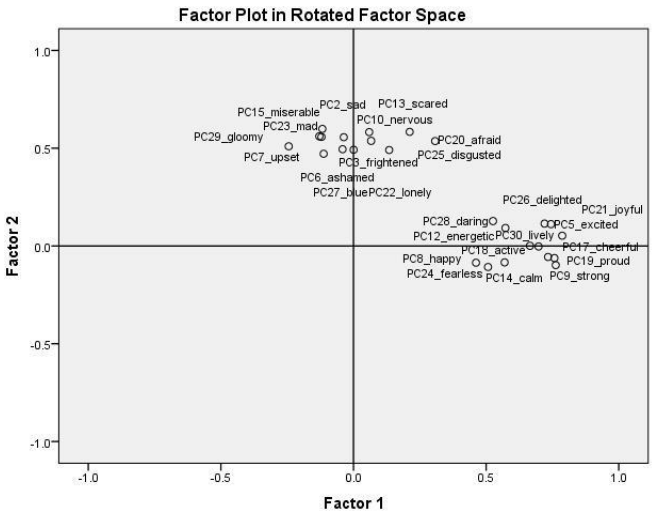


Figure 28. Items in rotated factor space for revised 19-item PANAS-C for 8 to 11 year olds in friendship intervention sample.

Table 20

Group 3: Principal-Axis Factoring Analysis (Promax Rotation) for the Final 26-item PANAS-C Scale

Scale	Two-Factor Solution	
	Factor 1 PA	Factor 2 NA
NA		
Sad	-.16	.56
Frightened	-.11	.49
Ashamed	-.22	.50
Upset	-.36	.56
Nervous	-.07	.57
Scared	.08	.54
Miserable	-.25	.62
Afraid	.19	.47
Lonely	-.05	.52
Mad	-.24	.58
Disgusted	.03	.46
Blue	-.15	.50
Gloomy	-.25	.59
PA		
Excited	.72	-.05
Happy	.59	-.21
Strong	.78	-.27
Energetic	.55	-.03
Calm	.53	-.22
Cheerful	.75	-.22
Active	.67	-.15

Proud	.77	-.23
Joyful	.78	-.12
Fearless	.48	-.19
Delighted	.70	-.04
Daring	.50	.01
Lively	.70	-.16
Eigenvalue	6.42	3.43

Note. n = 84. PA = Positive Affect; NA = Negative Affect.

Test-retest reliability.

Moderate agreement was found between the first and second timepoints on the 13-item NA scale for the teen sample (ICC, r =.54, p < .001). No extreme outliers were identified in the boxplots of the difference scores; therefore, all 34 individuals were retained.

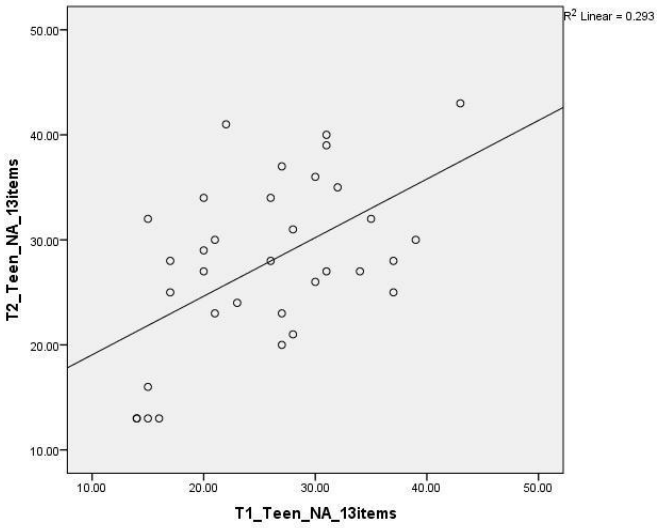


Figure 29. Time 1 versus Time 2 for revised 13-item NA scale scores for 11 to 17 year olds in friendship intervention sample.

Reliability analyses for the 13-item PA scale revealed moderate agreement between Entry and Exit timepoints (ICC, r = .54, p < .001). However, one possible outlier was identified on the scatterplot (see Figure 30), which was verified as an extreme outlier on the boxplot. This individual was thus removed from the ICC analysis. The temporal stability of the PA scale

increased to .87 ($p < .001$), showing strong agreement between the PANAS-C administrations for the 33 individuals in this sample.

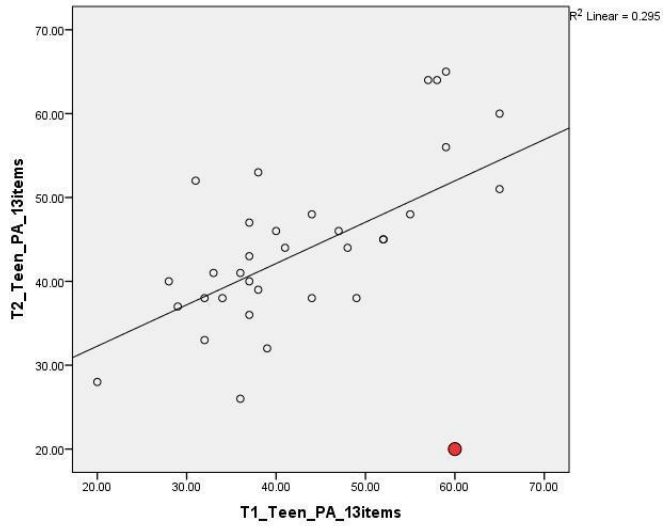


Figure 30. Time 1 versus Time 2 PA scale scores for 11 to 17 year olds in friendship intervention sample, showing one extreme outlier in red.

Summary of factor analysis for 11 to 17 yr olds in the friendship intervention sample.

Two items were eliminated from the PA scale due to poor performance. This resulted in a 13-item PA scale that showed high internal consistency and robust factor loadings. Initial evaluation of the NA factor structure revealed the possibility of a hierarchical structure of NA (internal vs. external negative affect); however, this was not supported with subsequent analyses. The final 13-item NA scale showed good internal consistency and factor loadings were fair to very good. The final revised 26-item PANAS-C showed two robust factors that were weakly correlated with one another. All items loaded well on the expected factor and poorly on the opposite factor. Temporal stability was found to be moderate for the 13-item NA scale. One outlier was removed from the PA scale analysis, which resulted in strong agreement between the two PANAS-C administrations.

Scale validation.

Correlation analyses.

Initial validation analyses included Pearson product-moment correlations between the revised 13-item PA and NA scales and the internalizing measures. Unlike the elementary school sample, the teens completed several self-report measures evaluating their internalizing symptoms (self-report BASC, CDI, MASC). As in the validation analyses with the previous age groups, it was expected that a significant positive correlation would emerge between the NA scale scores and both the anxiety and depression scores. Additionally, a significant negative correlation was expected between the PA scale scores and depression measure scores. Lastly, a non-significant correlation was expected between the PA scale scores and measures of anxiety symptoms.

Correlation analyses with revised PANAS-C and parent-report BASC-2.

The results of the correlation analyses are summarized in Tables 21 and 22, and show mixed support for the above stated expectations regarding the tripartite model of depression and anxiety. First, no support was found for the hypotheses when analyzing the parent-report BASC (PR-BASC) scores of depression or anxiety. The negative affect scale scores were negligibly associated with the PR-BASC anxiety and depression scores, and the direction of the relation between NA and depression scores was negative. While the lack of a significant correlation between the PA scale scores and the PR-BASC anxiety scores is in line with predictions, the lack of robust correlations between the other scale scores makes interpretation of this relationship more tenuous. As such, subsequent regression analyses were not carried out for this parent-report data.

Table 21

Group 3: Correlations Between Time 1, Time 2 PANAS and Internalizing Measures

Subscales	T1 PA	T1 NA	T2 PA	T2 NA
T1 13-item PA	—			
T1 13-item NA	-.04	—		
T2 13-item PA	.54**	-.36*	—	
T2 13-item NA	-.11	.54**	-.47**	—
Time 1 Measures				
BASC-2 Self-report	*n* = 29		*n* = 24	
Anxiety T	-.08	.34[a]	-.25	.33
Depression T	-.06	.46*	-.35[a]	.48*
Internalizing Composite T	-.28	.48**	-.56**	.55**
BASC-2 Parent-report	*n* = 31		*n* = 29	
Anxiety T	.10	.19	-.19	.30
Depression T	-.01	-.18	-.06	.00
Internalizing Composite T	-.03	-.04	-.23	.30
CDI	*n* = 34		*n* = 32	
Total T	-.30[a]	.52**	-.44*	.31[a]
Negative Mood T	-.35*	.65**	-.47**	.39*
Interpersonal Problems T	-.52**	.47**	-.30[a]	.30[a]
Ineffectiveness T	-.25	.22	-.37*	.27
Anhedonia T	-.17	.42*	-.38*	.17
Negative Self Esteem T	-.14	.41*	-.31[a]	.28

Note. Time 1 PANAS-C *n* = 40; Time 1 PANAS-C = 36. PA = positive affect; NA = negative affect; PANAS-C = Positive and Negative Affect Scale for Children; T1 = Time 1 (Entry); T2 = Time 2 (Exit); BASC-2 = Behavior Assessment Scales for Children, 2nd ed.; CDI = Children's Depression Inventory.

[a] $p \leq .10$; * $p \leq .05$; ** $p \leq .01$

Correlation analyses with revised PANAS-C and self-report BASC-2.

Slightly better support was seen for the predicted associations when analyzing the self-report BASC (SR-BASC) scores. Moderate positive correlations emerged between the NA scale scores and the SR-BASC depression and anxiety subscale scores. While only the association between the NA scale and the depression subscale was significant, the correlation between the NA scale and the anxiety score approached significance. Also supporting predictions was a low negative correlation between the PA scale scores and the SR-BASC anxiety subscale. Contrary to expectations, a low correlation was seen between the PA scale scores and the SR-BASC depression subscale scores. The Internalizing Composite score on the BASC is a combination of several subscales, which includes the depression and anxiety subscales. The results showed a significant positive correlation between this Internalizing Composite and the NA scale scores, and a moderate and negative non-significant correlation between the Composite scores and the PA scale scores, which also supports the tripartite model.

Summary of correlation analyses with revised PANAS-C and BASC-2.

In summary, based on these results it appears that the PA scale is a not an effective differentiating factor for depression and anxiety, *as defined by the parent- or self-report BASC*, in adolescents with ASD. Additionally, NA scores seem to be more strongly associated with depression scores than with anxiety scores, which does not support the contention of the tripartite model that an underlying construct of NA is common to both anxiety and depression.

Correlation analyses with revised PANAS-C, CDI, and MASC.

The tripartite model and the convergent validity of the PANAS-C scales were also evaluated using the CDI and the MASC. The picture that emerged showed clearer support for the tripartite model when using these two measures, as opposed to the BASC. All subscales of the

CDI and MASC were included in the correlation analyses to evaluate whether the relation to the PA and NA scales differed based on the subtypes of depression and anxiety. As can be seen in Table 22, the CDI correlated significantly and positively with nearly every subscale of the BASC as well as with the total score. The exception was for the Ineffectiveness subscale, which showed a moderate non-significant positive relation with the NA scale. The PA scale, as expected, was negatively associated with all of the subscales and the total score for the CDI. The negative correlations between PA and the Negative Mood and Interpersonal Problems subscales reached significance, and the association between the CDI total score and the PA scale approached significance. These associations are consistent with the predictions regarding depression, NA, and PA in tripartite model.

Table 22

Group 3: Correlations Between Time 1, Time2 PANAS-C Scores and Time 1 MASC Scores

	T1 PA	T1 NA	T2 PA	T2 NA
Time 1 MASC Scales	*n* = 32		*n* = 30	
Physical Symptoms				
Tense/Restless T score	-.20	.60**	-.41*	.38*
Somatic/Autonomic T score	-.18	.38*	-.44*	.53**
Total T score	-.23	.59**	-.52**	.50**
Harm Avoidance				
Perfectionism T score	.42*	-.18	.31	-.14
Anxious Coping T score	.25	-.26	.08	-.17
Total T score	.38*	-.27	.21	-.17
Social Anxiety				
Humiliation T score	-.19	.28	-.15	.30[a]
Performance Fears T score	-.35*	.47**	-.34[a]	.49**
Total T score	-.16	.42*	-.17	.45*
Separation/Panic T score	.04	.22	-.37*	.29
Total T Score	-.01	.18	-.30	.34[a]

Note. Time 1 PANAS-C = 36. PA = positive affect; NA = negative affect; PANAS-C = Positive and Negative Affect Scale for Children; T1 = Time 1 (Entry); T2 = Time 2 (Exit); BASC-2 = Behavior Assessment Scales for Children, 2nd ed.; CDI = Children's Depression Inventory.
[a] $p \leq .10$; * $p \leq .05$; ** $p \leq .01$

The results of the correlation analyses between the PANAS-C subscales and the MASC subscales were largely consistent with the tripartite model. Robust positive correlations emerged between the Physical Symptoms and Social Anxiety subscales and the NA scale scores. The PA scale scores showed small to moderate negative correlations with the Physical Symptoms and Social Anxiety subscales, as expected. These patterns were reversed for the Harm Avoidance scales (e.g., 'I keep my eyes out for danger'), which were phrased in a positive direction on the scale, in contrast to the items on the other subscales. Significant correlations were not found between the PA or NA scales and the Separation Anxiety and Panic subscale. Despite many scales showing significant associations with the NA scale, the correlation did not reach significance for the MASC total score. In line with expectations, the correlation between the total score and the PA scale was negligible. Overall, the tripartite model was supported with the Physical Symptoms subscale and the Social Anxiety subscale, but not with the MASC Total. It was necessary to interpret the Harm Avoidance scale in a reverse fashion, and as such, support was also shown for the tripartite model.

Regression analyses with revised PANAS-C, CDI, and MASC.

In the subsequent hierarchical regression analyses with the CDI and MASC, the tripartite model was also supported (see Table 23). While not all of the Beta weights reached significance, they were of the magnitude and direction expected. When the MASC Physical Symptoms Total score was entered as the criterion variable, the NA scale emerged as a significant predictor of

anxiety, but the PA scale did not. When predicting the CDI Total score, the NA scale score predicted a significant portion of the variance in the depression score. The Beta for the PA scale only approached significance, but was in the expected negative direction. Neither of the non-target measures emerged as a significant predictor of the criterion measure. A similar pattern of findings emerged when predicting MASC Social Anxiety Total scores (see Table 23).

Table 23

Group 3: Hierarchical Multiple Regression Examining Squared Part Correlations and Beta Weights of PA and NA Measures with Existing Anxiety and Depression Measures

			Block 1		Block 2		
Criterion	Non-target measure		Non-target	NA	Non-target	NA	PA
MASC Physical Symptoms Total	CDI Total	$Part^2$	.02	.20	.00	.22	.03
		B	.14	.56**	.07	.59**	-.15
CDI Total	MASC Physical Symptoms Total	$Part^2$	.02	.11	.00	.14	.07
		B	.17	.46*	.08	.50**	-.21[a]
	Non-target measure		Non-target	NA	Non-target	NA	PA
MASC Social Anxiety Total	CDI Total	$Part^2$	.02	08	.01	.09	.01
		β	.24	.46[a]	.18	.49[a]	-.11
CDI Total	MASC Social Anxiety Total	$Part^2$	.02	.17	.01	.18	.01
		β	.12	.49*	.08	.50**	-.21[a]
	Non-target measure		Non-target	NA	Non-target	NA	PA
MASC Total	CDI Total	$Part^2$	.00	.03	.00	.03	.00
		B	-.04	.27	-.05	.27	-.01
CDI Total	MASC Total	$Part^2$	.00	.26	.00	.25	.08
		B	-.02	.57**	-.02	.56**	-.22[a]

Note. [a] $p < .10$; * $p \leq .05$; ** $p \leq .01$

When evaluating the MASC Total score as the criterion variable, less support was found for the hypotheses. Specifically, the NA scale did not significantly predict the MASC Total score. However, the NA scale was a strong predictor of the CDI Total score, accounting for 26% of the variance in the first block of the regression. The PA scale score approached significance as a predictor of the CDI Total score, explaining another 8% of the variance.

Chapter 6: Discussion

Prevalence Rates of Internalizing Symptoms

It is commonly reported that individuals with autism spectrum disorders present with increased levels of internalizing symptomatology, including both depression and anxiety (e.g., Ghaziuddin et al., 1998; Merikangas et al., 2010b; Vickerstaff et al., 2007). While two-week morbidity rates for depression are reported to be 8% (CDC, 2012) for the general public in those 12 years of age and older (self-report), prevalence rates for those who met 'clinical range' cutoffs in the current longitudinal sample of ASD participants (15 to 23 years) were three to five times greater (27 to 38%). In contrast, the prevalence of 'clinical range' depression scores for the 12 to 17 year old participants in the friendship intervention study (averaged over both timepoints) was slightly lower (7.4% by self-report) than the national morbidity rate. It is typical for depressive symptoms to increase with age (Merikangas et al., 2010b), and these cross-sectional data may be capturing that trend.

Twelve-month prevalence rates for anxiety disorders have been reported at 0.8% for those 12 to 15 years of age in the general U.S. population (Merikangas et al., 2010a). Other national prevalence studies have shown three month prevalence rates of 5.7% for anxiety disorders (Angold et al., 2002). In the current longitudinal sample, total scores on the AMAS-A classified close to 40% of the 16 to 23 year olds as 'at risk' for anxiety, 19% of 16 to 18 year olds as meeting the clinical cutoff for anxiety, and just under 8% of 19 to 23 year olds as meeting the clinical cutoff for an anxiety disorder. For the teens (12 to 17 years) in the friendship intervention sample, 3.5% met the cutoff for the 'clinical range' and 5.6% met the

cutoff for being 'at-risk' for an anxiety disorder on the self-report BASC-2. Despite reporting substantially lower levels of internalizing symptoms than the older participants, the rates of elevated anxiety symptoms for this 12 to 17 year old group are nonetheless greater than what would be expected in the general population. It is difficult to make a direct comparison of the prevalence rates between these two samples due to the use of different measures (AMAS-A versus BASC-2) of anxiety symptoms, but with the current data a trend appears in which 'clinical range' anxiety symptoms peak between the ages of 16 and 18 years, based on self-report data.

While the lower levels of reported depression and anxiety for the 12 to 17 year olds may reflect a developmental trend for increasing internalizing symptoms over the course of adolescence (Kuusikko et al., 2008), the possibility of a tendency for individuals with ASD to under-report symptoms should also be considered (Mazefsky et al., 2011; White et al., 2012). For example, in this sample parent-reports showed much higher rates of 'at risk' and 'clinical range' levels of depression (27.2% and 14.1%, respectively) and anxiety (19.7% and 22%, respectively) for the teens than the teens reported about themselves. These issues will be discussed in greater depth below. Overall, these results replicate the findings of substantially elevated internalizing symptoms for adolescents and adults with ASD (e.g., Ghaziuddin et al., 1998; Mazefsky et al., 2011).

Prevalence rates in young school-age children

As discussed earlier, less attention has been given to young elementary school-age students in evaluating the prevalence of internalizing symptomatology and disorders. Several studies have included children as young as six years of age, but generally the average age of the sample is eight or greater (e.g., Ghaziuddin et al., 1998; Sukhodolsky et al., 2008) and no

specific attention has been paid to the youngest children in the samples. Weisbrot and colleagues (2005) made an effort to divide their sample based on age; the youngest of their participants were aged 3 to 5 years and the next age group was comprised of 6 to 12 year olds. Results demonstrated a shift in internalizing symptoms for children over time; in the younger group, parents of children with ASD identified significantly fewer symptoms than parents of typically developing children, whereas in the older group the children with ASD were reported to have significantly greater levels of internalizing symptoms than typically developing children. It was not reported whether this shift had already occurred for the six year olds or whether elevated internalizing symptoms in the older children pulled up the overall mean of the larger group.

This dissertation addressed this gap in the literature by separating the youngest elementary school-age children (6 to 7 years) from the older elementary students (8 to 11 years) and from those in middle and high school (11 to 17 years). Data for the current friendship intervention sample showed that 14 to 19% of the 6 to 7 year olds met the cutoff for an 'at risk' classification for depression and anxiety, respectively, and 10 to 11% fell in the 'clinical range' for depression and anxiety disorders based on parent-report. Although the prevalence rates for this sample are lower than those reported in other studies for children with ASD, they are nonetheless elevated in relation to the national prevalence statistics for children and adolescents. Related to Weisbrot and colleagues' (2005) findings, these results suggest that internalizing symptoms, while not apparent for 3 to 5 year olds, have indeed begun to increase by the age of six in children with ASD. Effort should be made in future studies to oversample for kindergarten and early elementary school-aged children with ASD to investigate more thoroughly the onset of internalizing symptomatology.

Early identification of internalizing symptoms is especially important in light of findings showing that early symptoms predict later internalizing disorders. For example, Ialongo et al. (2001) showed that first grade self-reports of depressed mood predicted the diagnosis of major depressive disorder, the need for and use of mental health services, and suicidal ideation by the age of 14. Additionally, some groups have reported an association between youth depression and immediate clinical and social consequences, which include problems with peer and family relationships, social disengagement, loneliness, and increased suicidal behaviors (e.g. Garber, Gallerani, Frankel, Gotlib, & Hammen, 2009). Because these same issues are common for individuals with ASD (without depression), this particular comorbidity is especially important to address as the combination of both disorders may exacerbate the negative outcomes association with each one individually. It has been suggested that the development of psychosocial dysfunction during childhood and adolescence may contribute to recurrent pathological behaviors and a potential lifetime course of depression (Fombonne, Cooper, Harrington, & Rutter, 2001; Lewinsohn et al., 1999). Obviously, early identification and intervention is vital to the long-term health of individuals with ASD.

Measuring Internalizing Symptomatology in an ASD Population

In order to address this issue, however, we must first identify instruments which can reliably screen for internalizing problems in children with autism spectrum disorders. While a variety of measures have been utilized with this population, a number of complications have arisen to prevent their reliable and valid use. First and foremost, many instruments measuring anxiety and depression include items that not only overlap with one another, but also overlap with the diagnostic criteria for ASD. As a result, it is extremely difficult to discriminate between the presence of anxiety or depression in individuals who also have an ASD diagnosis.

The PANAS and PANAS-C provided the unique opportunity to evaluate the presence of depression and anxiety symptomatology without the problematic practice of asking questions that overlap with the diagnostic criteria for these diagnoses. By virtue of their diagnosis, individuals with autism spectrum disorders have some difficulty evaluating their own internal states. However, it has been shown that

Positive and Negative Affect Scale

The 10-item NA and PA scales were subjected separately to correlation, reliability, and factor analyses. Based on these analyses, the item *ashamed* was removed from the NA scale, but all other items were retained. The item *ashamed* loaded weakly on the expected factor and showed relatively low corrected item-total correlations with the total scale scores. Overall, internal consistency was not affected by the removal of this item. Because the PANAS has never been used with and ASD population, an effort was made to evaluate why this item may not have been as robust of a contributor to their affect scales.

Interestingly, this item reflected a more complex, and self-conscious emotion than some of the others presented on the PANAS. Specifically, being *ashamed* often requires an individual to (1) understand that their behavior has social consequences in the eyes of others, and (2) to understand and recognize violations of social norms (Heerey, Keltner, Capps, 2003) or standards of personal character (Wallbott & Scherer, 1995). It is perhaps not surprising that individuals with ASD would demonstrate difficulty with this type of emotion—with an inherent impairment in social evaluation as well as the difficulty reasoning about social norm violations, a diminished level of the ability to recognize these self-conscious emotions would be expected. Related to this theoretical argument, Heerey et al. (2003) reported that children with ASD showed impairment in recognizing self-conscious emotions, but did not show

differences in their ability to identify non-self-conscious emotions such as happiness, fear, or disgust. The authors suggest that self-conscious emotion deficits in individuals with ASD are linked to Theory of Mind, rather than to basic facial recognition difficulties, as group differences were attenuated between those with ASD and those who were typically developing when ToM ability was statistically controlled. While the study focused on the ability of children with ASD to identify self-conscious emotions in others, an extrapolation to identifying one's own emotions could be made as well, thus providing some explanation for the poor performance of the item *ashamed* on the PANAS, and better performance of items reflecting basic emotions, such as *excited* or *afraid*.

In contrast to this self-conscious emotion, the factor and reliability analyses also revealed a set of items seemingly reflecting more external manifestations of emotion. For example, when the PAF on the 10-item NA scale was unspecified, the results showed a separate factor for the items *irritable* and *hostile*. However, following guidelines by Gorsuch (1997) that a meaningful factor should have at least three items loading on it with an absolute value or .40 or greater, this two-item factor was viewed as "trivial" (Gorsuch, 1997). It may be that with a greater number of items on the NA scale that reflected externalized negative affect, two separate and robust factors would emerge. However, for the current sample, merging these two items with the entire scale created an acceptable factor reflecting negative affect. The addition of items reflecting irritability may be especially relevant for an ASD population, as it has been reported that increased irritability is a symptom of depression specific to those with ASD (Ghaziuddin, 2005). Other symptoms that have been found to be specific to individuals with ASD include an increase in social withdrawal beyond what is normal for an individual, a change in the character of obsessions (or a more morbid tone to the fixations), and an increase

in compulsive behavior. Unfortunately, these symptoms are difficult to capture with a single adjective, but could potentially include items such as *dark*, *moody*, *driven*, *obsessed*, or *alone*.

Aside from the item NA item *ashamed,* the remainder of the items loaded robustly on the expected factor. Consistent with previous findings, and supporting the original claim by Watson et al. (1988) regarding the relationship between the constructs of positive and negative affect, the PA and NA scales were modestly and negatively correlated with one another, suggesting relatively independent PA and NA factors.

In the analyses pointed at validating the revised 19-item PANAS, it was shown that PA and NA scores were correlated in the expected directions with anxiety and depression scores. Specifically, NA was significantly and positively correlated with anxiety scale scores. Contrary to expectations, NA was not significantly correlated with BDI-II scores or the CBCL depression scale scores (approached significance for Anxiety/Depression subscale). The PA scale demonstrated a significant negative association with anxiety scores on the AMAS-A and depression scores from the BDI-II. In the hierarchical regression analyses, only partial support was found for the tripartite model. As expected, NA explained a significant portion of unique variance in anxiety scores and PA did not contribute uniquely to the prediction of anxiety scores. This is consistent with the original PANAS research (Watson et al., 1988). Surprisingly, when predicting depression scores neither NA nor PA accounted for a significant amount of unique variance in the BDI-II scores when controlling for comorbidity with the AMAS-A score. Additionally, using the CBCL scales, NA accounted for a unique portion of variance in the anxiety scale scores, but PA did not contribute to the prediction of anxiety scores. On the other hand, the PA scale score was shown to be the only predictor of depression scores (CBCL Withdrawn subscale); NA did not account for any unique variance in the

depression score. To a certain extent, this differential contribution to predicting depression scores was expected, as it has been shown that PA accounts for a significantly larger portion of the variance when predicting depression scores (e.g., Crawford & Henry, 2004).

Of particular note were the high correlations and shared variance between the AMAS-A, CBCL Anxiety and NA scores; relations that did not appear between the NA scale scores and the depression scores (BDI-II or CBCL Withdrawn). Additionally, the PA scale scores explained significant portions of the unique variance in the AMAS Total score (but not in the BDI-II score, as would be expected), as well as a significant unique portion of the variance in the CBCL Withdrawn score. These results do not present nearly as clear of a picture as the tripartite model proposes regarding the associations of NA, PA, depression, and anxiety that have been widely supported in the literature.

Several issues may have contributed to these ambiguous results. First, the NA and PA scales relate to certain measures of anxiety and depression differently. Specifically, different results were seen when evaluating the PANAS scales with the self-report BDI-II and the AMAS-A, than were seen when using the parent-report CBCL Anxiety and Withdrawn scales. While neither of the regression analyses showed perfect support for the tripartite model, the parent-report scales showed more support for the model than the self-report scales. These results are fairly counterintuitive, as studies have shown that individuals with ASD are capable of accurately reporting their behaviors and emotions on these types of scales (Berthoz & Hill, 2005; Hillier et al., 2011; Sebastian et al., 2009), and therefore would be assumed to be the preferable rater. Additionally, not only does the literature support the increased difficulty of parents to report on the internalizing symptoms of their children (e.g., Eiser & Morse, 2001), but studies have shown cross-informant reports to have substantially attenuated associations

with one another (Achenbach et al., 1987). Consistent with these findings, the correlations between the parent-report CBCL scale scores and the PANAS scales were quite low. All of these issues support the utilization of self-report measures to evaluate internalizing symptoms in individuals with ASD. A common issue in studies utilizing multiple informants, it is impossible to know which informant is providing information closest to the 'true score'. Future studies may benefit from the use of clinical interviews and behavioral observations focusing on internalizing symptoms or ratings of these symptoms from teachers or other individuals close to the participants, in order to more closely approximate a true level of internalizing symptomatology. Overall, these results provide mixed and tenuous support for the tripartite model in this population of adolescents and young adults with ASD.

Alternatively, it is possible that anxiety and depression are experienced differently for individuals with ASD, and thus the theorized associations between NA, PA, and internalizing symptoms are not applicable. If parents are evaluating their children's internalizing symptoms based on their own conceptualization of those constructs, which is more in line with the conceptualization of NA, PA, anxiety, and depression as set forth in the PANAS, then this may be an explanation for why the use of parent-report measures demonstrates greater support for the tripartite model than the use of self-report measures. Therefore, future research would benefit from more carefully evaluating the types of symptoms that represent depression and anxiety in adolescents and young adults with ASD. One specific area that could be investigated further is the finding that the PA scale scores were stronger predictors of anxiety than of depression, counter to predictions.

While these results do not replicate previous findings with the PANAS (e.g., Crawford & Henry, 2004; Laurent et al., 2013; Terracciano et al., 2003) showing a robust NA scale score

that predicts both depression and anxiety scores across a wide variety of populations, the measure still demonstrated good psychometric properties, which replicate those of Watson et al. (1988) and others. Specifically, the alpha coefficient for the final 9-item NA scale was .86, and the alpha coefficient for the 10-item PA scale was .92. Test-retest reliability for the NA scale was fair to moderate (i.e., overall ICC = .50), while the temporal stability of the PA scale was strong (ICC = .73).

Based on the above reliability, validity, and factor structure analyses, it appears that the PANAS is a reliable measure, but lacks some validity in this sample of individuals with ASD. The trends in the correlation analyses and the regression analyses (with the exception of the PA-Anxiety regressions) were in line with the tripartite model. However, due to the small sample sizes, it is difficult to make any concrete claims either for or against the utility of the PANAS in the ASD population. More studies of the PANAS, in addition to other validated measures of depression and anxiety are needed in order to further investigate these findings.

Positive and Negative Affect Scale for Children

The results for the PANAS-C for the three age groups evaluated were mixed. While it was expected that all groups would reflect a two factor structure of positive and negative affect, supportive of existing literature relating to a variety of ages and populations, this was not the case. Additionally, the tripartite model of depression and anxiety was not the most effective theoretical model of emotion for each age group.

Group 1: Under 8 years of age.

The results for this group of children under 8 years of age were the most divergent from the initial hypotheses. First, the factor structure differed a good deal from other published

research evaluating the structure of the PANAS-C in children from a variety of populations (e.g., community samples: Ebesutani et al., 2011; patients with anxiety disorders: Hughes & Kendall, 2009). While most researchers reported the presence of two robust factors uniquely representing positive and negative affect (Watson et al., 1988; Laurent et al., 1999), the factor structure that best fit the present data included one factor with robust loadings from both positive and negative items and a second factor with primarily fear-based negative items. The first of these factors was characterized as Happy/Sad and was comprised of five positive items (*excited, happy, cheerful, proud, delighted*) and four negative items (*sad, gloomy, guilty, disgusted*).

Structure of emotion in 6 to 7 year olds.

In contrast to the Tripartite Model where negative affect is considered to be a common underlying construct for both anxiety and depression and positive emotion is negatively related to depression but not to anxiety, the Differential Emotions Theory (DET; Blumberg & Izard, 1986) emphasizes two types of negative affect that differentially relate to depression and anxiety. Specifically, the DET proposes that there are 10 basic discrete emotions: interest, joy, sadness, anger, disgust, contempt, fear, shyness, guilty, and surprise. According to the theory, anxiety and depression are complex combinations of these discrete emotions, and while there is overlap between anxiety and depression, they are said to be differentiated by their dominant emotion. Specifically, fear is the predominant emotion for anxiety, while sadness is predominant in depression. For children, depression is also highly influenced by the emotion anger. In the sample used for this dissertation, the PANAS-C items *mad* and *upset*, which are the most similar to anger, were removed from the scale due to large cross-loadings between factors. Interestingly, although the strong influence of the item *disgusted* on the Happy/Sad

scale seemed somewhat counterintuitive, it is possible that this item could be interpreted as a proxy for anger. This suggests that the DET better represents the theoretical underpinnings of the emotional structure in the revised PANAS-C for children with ASD under 8 years of age than does the tripartite model.

The emergence of a bipolar dimension of affect in this young sample supports other findings which suggest that comorbidity models emphasizing a single mixed factor may fit best for young children, whereas a two-factor model may be more appropriate for older children (Cannon & Weems, 2006; Cole, Truglio, & Peeke, 1997). As mentioned previously, it is also likely that depression and anxiety are presented somewhat uniquely in individuals with ASD, making it necessary to include items assessing irritability, social withdrawal, and compulsions (Ghaziuddin, 2005). However, for this young group, it is also vital to consider cognitive capacity in comprehending the scale's items. It can be seen from the items removed from the scales (e.g., NA: *blue, jittery, ashamed, nervous,* PA: *fearless, interested, daring, energetic, lively*), that these complex adjectives are inappropriate and do not perform well on a scale measuring affect in these young children with ASD. This finding supports the presence of an affect structure more closely approximating the Differential Emotions Theory, which is based on 10-basic emotions.

Summary for 6 to 7 year olds from the friendship intervention sample.

Overall, it would appear that the PANAS-C is not appropriate for use in children with ASD under 8 years of age, as the symptoms necessitating measurement (i.e., irritability, social withdrawal) cannot be reliably assessed with single adjectives reflecting basic emotions. Rather, parent-report, clinical interviews, and observations may be more appropriate for evaluating internalizing symptomatology in young school-age individuals with ASD.

Group 2: 8 to 11 years of age

As was the case for the younger group, a substantial number of the PANAS-C items were removed from the scale in order to reach acceptable standards in the factor analysis. Specifically, seven PA items were removed (*alert, fearless, strong, interested, energetic, daring, calm*) and four NA items were removed (*nervous, guilty, jittery, blue*). Interestingly, the majority of the PA items removed reflect a higher level of activation than the items which remained in the PA scale. In fact, Laurent et al. (1999) recommended the removal of the items *alert, fearless,* and *daring* as they felt these items more appropriately represented physiological hyperarousal than simple positive affect. It could be argued that items such as *strong* and *energetic* also fall into this category of items reflecting a higher level of activation. Somewhat out of place is the item *calm,* which reflects a level of affect quite the opposite of these other items. Future research would benefit from an evaluation of whether feeling calm or interested reflect feelings of positivity for individuals with ASD. It is possible that these items are simply not as meaningful to this population.

The items removed from the NA scale were more varied than those for the PA scale. The item *guilty* reflects a more internal manifestation of negative affect, whereas *jittery* is more externally-valenced and could be considered as part of the grouping related to physiological hyperarousal. The item *nervous* could be interpreted as either internal or external, depending on the participants' interpretation of the word. As was discussed previously for the item *ashamed*, which was removed from the PANAS, research has shown that individuals with ASD may particularly struggle to identify self-conscious emotions (Heerey et al., 2003; Wallbott et al, 1995); however, the item *ashamed* was retained in the revised scale for these 8 to 11 year olds, so this may not be the cause for the poor performance of the related emotion of guilt.

Alternatively, it is important to consider that these results could be a reflection of the small sample size rather than of the true representation of affect in this population. Future studies should include a careful evaluation of the items revealed herein as weak contributors to the PA and NA scales, and should not preemptively remove them from scales.

Structure of emotion for 8 to 11 year olds.

While the results of the PAF for the 6 to 7 year olds suggested the more appropriate application of the Differential Emotions Theory, the factor structure of the PANAS-C for the 8 to 11 year olds was more in line with expectations from the tripartite model. The PAF for these revised scales showed support for the two-factor solution, representing NA and PA as unipolar rather than bipolar factors of affect. The NA and PA scales both showed good internal consistency and temporal stability ranged from moderate to strong. Considering that the PANAS-C is measuring state-like, rather than trait-like, emotion these levels of temporal stability over the course of two months are noteworthy.

Despite respectable levels of reliability, and encouraging correlations between the NA, PA, and internalizing BASC scales, the discriminant validity of the measure was poor for the 8 to 11 year old sample, showing little support for the tripartite model. In fact, neither NA nor PA was shown to be significant predictor of parent-reported anxiety or depression scores. Instead, these two subscales seemed only to predict one another. Unfortunately, no self-report measures of depression and anxiety were available for this group; therefore, the potential problematic nature of the parent-report could not be evaluated. While some studies have reported evidence of the utility of parent-reports of the their children's internalizing symptoms (e.g., Ebesutani et al, 2010), others have questioned the use of parent report of youth internalizing problems, citing their moderate convergence with child-reported measures (e.g.,

Kenny & Faust, 1997). This again raises the importance of using multiple informants in studies evaluating internalizing symptomatology.

Group 3: 11 to 17 years of age

Fortunately, self-report measures were utilized alongside parent-report measures for the teen sample. This provided an opportunity to evaluate the differences in associations between NA, PA, and internalizing symptoms for this sample.

First, however, discussion of the reliability and factor structure of the PANAS-C is warranted. Internal consistency was good for both the NA and PA scales, and temporal stability ranged from moderate to strong. Only two items were removed from each scale: *alert* and *interested* from the PA scale and *jittery* and *guilty* from the NA scale. Interestingly, all four of the items were shown to be problematic in the 8 to 11 year old group as well, lending credence to the argument that these items may not be appropriate for use in an ASD population. Explanations for the poor utility of these items may include the difficulty with self-conscious emotions (i.e., *guilty*) discussed earlier (Heerey et al., 2003) or the possibility that the item *jittery* is more appropriately a reflection of physiological hyperarousal rather than negative affect. However, more research needs to be completed including all 30 items of the PANAS-C before making any conclusions.

Replicating the results found in the 8 to 11 year old group, no significant associations were found between the parent-report BASC scales and the revised PANAS-C scales for the teenaged group. However, substantial support was seen for the tripartite model when using the self-report measures for anxiety (MASC) and depression (CDI). Significant positive correlations were found between NA scale scores and the scores on the CDI and MASC.

Additionally, PA scores were minimally related to the MASC scores, as would be expected. The regression analyses also supported the tripartite model, in particular with the Physical Symptoms and Social Anxiety totals. Overall, the MASC total score was not a useful scale with which to measure the validity of the PANAS-C and the tripartite model, as it encompassed too wide of a range of anxiety symptoms. In the future, researchers are urged to use a measure with a narrower focus. Specifically, it would be most useful to measure Social anxiety and Separation anxiety, as these were shown to be the most prevalent in the current study, as well as in the extant literature (e.g., Kim et al., 2000).

Parent-Child Concordance

The issue of poor parent-child concordance emerged for the teen participants in the friendship intervention sample and for the participants in the longitudinal sample, replicating findings that children rate their behavior more positively than their parents (Achenbach et al., 1987). Some have suggested that parents have a particularly difficult time evaluating internal emotions or social-emotional domains in their children, but are more effective at reporting on overt and observable behaviors (DeCivita et al., 2005; Eiser & Morse, 2001; Waters, Stewart-Brown, & Fitzpatrick, 2003; Verrips et al., 2000). As children approach their teen years, they are generally less likely to share their emotions with their parents, thus increasing the difficulty for parents to evaluate the internal emotional status of their children.

While some report that parent-report measures are more stable and appropriate for use than self-reports of children and adolescents (or individuals with disabilities; Edelbrock et al., 1985; Theunissen et al., 1998), others have identified the merit of including self-report measures. For example, Riley et al. (2004) suggested that evaluating a child's internal experiences through their own lens over time contributes valuable information, in addition to

parent-reports. Additionally, Achenbach and colleagues (1987) suggested that the common lack of consistency seen between parent- and child-reports does not necessarily imply that either of the raters' information should be considered invalid; rather, researchers need to consider that different informants may contribute different, but equally valid, information. This multi-informant methodology was established as the gold-standard by Achenbach and his colleagues (1987). Future studies should aim to include at least parent- and self-report measures of internalizing symptoms, even for participants as young as 5 or 6 years of age (Ialongo et al., 1995, 2001; Rebok et al., 2001).

Self-report measures were not collected for the grade-school-age participants and therefore agreement could not be evaluated for these dyads. However, previous literature suggests that agreement is also low for young children when evaluating internalizing symptoms (Mazefsky et al., 2011). Specific to parents of children with ASD, there may be a tendency to overlook co-morbid internalizing problems in light of the ASD diagnosis. Referred to as diagnostic overshadowing (Mason & Scior, 2004), this tendency can arise from attributing the observed internalizing symptoms to the ASD diagnosis, which is likely more salient for the parent (Levitan & Reiss, 1983). This issue is similar to the problematic use of many standardized mood disorder instruments which overlap significantly with ASD diagnostic criteria. For example, a child may be exhibiting severe social withdrawal and whereas a parent of a typically developing child may have serious concerns, the parent of a child with ASD may simply assume the social withdrawal is a symptom of the ASD. Similarly, some anxiety symptoms (e.g., panic attacks, obsessions) may be misinterpreted as aberrant behavior that is directly related to the ASD diagnosis (Tsai, 2006). Alternatively, parents may

have a tendency to simply ignore co-morbid internalizing symptoms because they consider them to be less significant than the core symptoms of ASD (Mason & Scior, 2004).

For parents of children with ASD, these issues make it especially difficult to report on internalizing symptoms, perhaps particularly so for parents of younger children. Speculatively speaking, diagnostic overshadowing may be especially potent shortly after parents have received their child's diagnosis, due to the emotional and psychological stress involved with the diagnostic process and the intense focus on a specific set of diagnostic criteria. In these circumstances, it would not be surprising for parents to misinterpret their child's symptoms or to simply overlook them. Interestingly, this may contributed to the findings from Weisbrot and colleagues (2005) showing that parents of children aged 3 to 5 years rated their children lower on a measure of internalizing symptomatology compared to parents of typically developing children. As mentioned earlier, more able individuals with ASD are more likely to receive an ASD diagnosis at a later age than less able individuals. Therefore, it is possible that the parents of the 3 to 5 year olds in Weisbrot et al.'s study were unintentionally downplaying internalizing symptoms in their children because they were focused on the more prominent concerns with their children's developmental delay.

However, the proximity to diagnosis would not likely explain the lower prevalence of elevated internalizing symptoms found in the 6 to 7 year old sample used for this dissertation, as diagnoses are generally established by the age of three years. By the time children are school-age, parents have likely become accustomed to their children's specific presentation of ASD symptoms, thus allowing for a more discriminating eye for aberrations from their normal behavior. This increased parental awareness may contribute to the increased reports of internalizing symptoms across the grade-school years that were demonstrated in this paper.

Future studies would benefit from including 'time since diagnosis', as well as measures assessing the impact of the ASD diagnosis on the family and the level of comfort/acceptance of the diagnosis as covariants in analyses.

Developmental Considerations

Coinciding with this increase in parental attentiveness to internalizing symptoms is the transition to grade-school, which comes with increased expectations behaviorally, cognitively and socially. Children are expected to get along with their peers, follow instructions, and participate in class. This increased stress may contribute to the increase in the prevalence of internalizing problems throughout the school-age years. The differing expectations between home and school may also explain discrepancies between parent- and child-reports of internalizing symptoms. Findings that teachers report greater levels of anxiety in preschoolers than do their parents (Weisbrot et al., 2005) suggest that some component of school is associated with increased levels of internalizing symptoms. Several social variables which may have contributed to increased levels of internalizing symptoms in this sample can be found in the exploratory analyses in Appendix E.

At a cognitive level, it is possible that certain cognitive shifts that occur in development affect the ability of younger children with ASD to report their own internalizing symptoms. It has been shown that typically developing children as young as five years of age can describe their internal mental states (Stone & Lemanek, 1990) and by first grade most typically developing children understand feelings and imaginations are different from actions (Flavell, 1999; Wellman et al., 1995). Often cited to be one of the core deficits in those with ASD, Theory of Mind (ToM) has been shown to emerge at an older age for individuals with ASD than for individuals who are typically developing. For example, Dahlgren and Trillingsgaard

(1996) reported that while 10 to 11 year olds with ASD passed higher-order ToM tasks 60% of the time, a group of typically developing 9 year old children passed the same task 90% of the time.

It is possible that the increasing levels of internalizing symptoms that emerge in the older school-age participants in this sample are the result of an unfortunate interaction between contextual shifts requiring greater social skills and impairments in cognition which support the development of these social skills. This is likely exacerbated by the fact that many more able individuals with ASD are aware of their disability; they want to have more friends, but they know they have difficulty doing so (Bauminger & Kasari, 2000; Locke et al. 2010).

Relatedly, Lewinsohn (1974) proposed that depression results from a reduced quantity of positive reinforcement of a person's behavior. The quantity of positive reinforcement can affect the emotional experiences of an individual, which in turn can feed back to affect the probability of engaging in activities that are likely to result in positive reinforcement. Building on this, Kellam (1990) proposed a Developmental Epidemiological Framework in which psychological wellbeing is seen as a consequence of, and an antecedent to, the adaptation to developmental tasks. As such, Kellam suggested that a failure to adapt to the social and cognitive demands, and the consequent negative feedback from peers, may be quite stressful for the child, thus resulting in a decrease in psychological wellbeing. The outcome of this trajectory is typically the presentation depression and anxiety symptoms. Kellam & Rebok's (1992) life course/social field framework stems from both Lewinsohn and Kellam's earlier work. This framework purports that early social failures lead to a reduction in reinforcement from peers, cycling into a chronic history of social failures resulting in sustained emotional distress, which eventually leads to a diagnosis of major depressive or anxiety disorder. While

this cycle is not inevitable, it is vital that these patterns are identified early and intervened upon to protect against the development of internalizing disorders in this population which is especially at-risk.

General Discussion

Overall, the results of this dissertation suggest qualified support for the utility of a modified PANAS/PANAS-C for a population with ASD. More research is needed with larger sample sizes to evaluate whether the factor structures and patterns of associations between PA scales, NA scales, and internalizing symptoms of anxiety and depression found herein can be replicated. In particular, future research should continue the effort to discover whether separate versions of the PANAS-C are most appropriate for different age groups of individuals with ASD. Results of the current study suggest that, at the very least, the construct of emotion is represented more effectively by the Differential Emotions Theory and a bipolar structure of emotion, than by the tripartite model for the children aged 6 to 7 years. Although by reverse coding the NA item scores on the joint Happy/Sad scale to create a revised PA scale, the PA and NA scores can be evaluated in a similar fashion as the tripartite model, it does not appear that its use is appropriate for a young population of individuals with ASD.

While results from the older age-groups suggested the previously theorized unipolar dimensions of PA and NA are appropriate, some have suggested that their orthogonality is simply a statistical artifact resulting from both systematic and random error. Green and colleagues (Green, Goldman, Salovey, 1993) have submitted that researchers have failed to take into account errors of measurement that arise when assessing mood. Specifically, they suggest that errors occur because people have difficulty applying their internal feelings and moods to the response options provided on mood questionnaires. Russell and Carroll (1999)

have also published extensively on this topic, proposing a confound due to the multidimensional nature of affect. They start by explaining that two variables that are bipolar opposites are the whole or part of a single dimension, whereas two variables that are independent or separable comprise two separate dimensions. This multidimensional nature of affect thus opens the door to substantial confounds. If bipolarity is assumed to predict one dimension, while independence predicts two, then evidence of two or more substantive dimensions in the domain of affect could ostensibly be mistaken for evidence against bipolarity (Russell & Carroll, 1999). This line of research has been masked by the influx of research on the unipolar dimensions of the PA and NA scales over the past couple of decades, which was spearheaded by the creation of the PANAS (Watson et al., 1988).

Russell and Carroll (1999) proposed that affect is best represented by two constructs, the first of which is NA/PA and the second of which relates to what they termed 'activation'. This results in six groupings of emotions, three for positive affect: PA/High activation (e.g., enthused, excited, energetic), PA/Medium activation (e.g., happy, gratified, content), PA/Low activation (e.g., calm, serene, relaxed), and three for negative affect: NA/High activation (e.g., jittery, tense, nervous), NA/Medium activation (e.g., unhappy, miserable, troubled), NA/Low activation (e.g., depressed, lethargic, down). In order to get a valid test of bipolarity, one needs to compare only items which are truly bipolar. Due to the items included on the PANAS scales, this is not possible because the negative set of words do not include any of the semantic opposites of the positive set. Additionally, according to these authors, the PA and NA scales from the PANAS do not cover a full range of either positive or negative affect. Specifically, the PANAS' PA scale can be represented as PA/High activation while the NA scale can be represented with NA/High activation, although the true opposite would be the NA/Low

activation items. In fact, the authors note that when the PA and NA scales are defined through item selection to be independent (i.e., lack polar opposites), the scale would be expected to have differential external correlates with anxiety and depression scales (as proposed by the tripartite model). Perhaps in response to this line of research, the PANAS-C was created to include several of the bipolar opposites presented by Russell and Carroll (1999), which thus allowed for the emergence of the bipolar PA Happy/Sad scale in the 6 to 7 year olds. Future research would benefit from modifying the PANAS and PANAS-C to include more of these bipolar pairs in order to investigate such claims made by these authors (Green et al., 1993; Russell & Carroll, 1999).

The issues raised by Russell and Carroll (1999) bring to the forefront the importance of item selection on scales on affect, as it was made clear that the presence or absence of bipolar pairs could have a significant effect on the correlation between the two factors (refer to Russell & Carroll, 1999 for in-depth discussion of these issues). Specifically, the absence of these bipolar pairs can artificially deflate the association between PA and NA, lending artificial support to the claims of independence made by Watson, Laurent and colleagues (Laurent et al., 1999; Watson et al., 1988). For example, Green et al. (1993) showed that the observed correlation between the happy and sad mood adjective scales (similar to the PANAS scales) was -.40; however when the random error was accounted for using confirmatory factor analysis, the correlation coefficient increased to -.92. While the sample size required for CFA is quite large, efforts should be made to collect this information regarding affect in multiple formats (as discussed previously, to enable statistical control of both systematic and random error). Additionally, care should be taken to include a wide range of ages and ability levels, as this dissertation has provided preliminary evidence that the construct of affect is represented

differently at different ages and also perhaps for varying levels of severity within more able individuals with ASD.

In conclusion, the results of this dissertation show preliminary support for the use of the PANAS and PANAS-C in a population of individuals with ASD over 8 years of age. At the outset, the viability of a self-report scale that evaluated internal states seemed questionable for this population. However, these results replicate others' showing that older children, adolescents, and young adults with ASD are capable of evaluating their own internal emotions (e.g., Riley, 2004). The more complicating factors relate to the problems with cross-informant data (parent-report) and the multidimensional nature of affect, discussed previously.

Limitations

As has been stated numerous times, care should be taken in generalizing these results, as the sample size was especially small. However, despite this small sample size and the resulting low power, significant results were found to support some of the hypotheses, which demonstrated the strength of the relationships and constructs tested.

Several issues were responsible for the loss of participants and/or data over time. In the friendship study, many of the parent- and self-report measures were sent home with the participants for completion and were never returned. To ensure complete data, time should be provided to complete questionnaires at face-to-face assessments. Although the PANAS-C was always completed in the presence of a staff member, some participants may not have understood the meaning of certain items and thus left them blank rather than asking for the definition of the word. Previous studies have included a glossary with the PANAS when used with children (Joiner et al., 1996), and this is recommended for future use of the PANAS-C to ensure more complete questionnaires. Additionally, due to late start dates of the interventions,

most of the participants only contributed data at entry and exit time points because the school year ended before the three month follow-up. As such, data for the follow-up time point was seldom used in these analyses, which precluded the use of more complex trajectory analysis that required at least three time points of data.

This study would also have benefitted from the addition of self-report measures of internalizing symptoms for the younger children. Not only would this allow more direct evaluation of convergent and divergent validity, but it would provide the opportunity to compare parent- versus child-report, as was possible in the teenaged group.
Additionally, the validity of the PANAS and PANAS-C in this study was based on correlations between different subscales of the BASC-2, CBCL and different symptom measures for which norms are primarily based on non-referred samples, rather than children who are on the autism spectrum. Therefore, the current sample may have been qualitatively different from the groups used for norming the measures, thus deceasing the ability of the measure to find differences between anxiety and depression. Of course, other possibilities are (1) that the PANAS and PANAS-C are not able to reliably discriminate between anxiety and depression in individuals of all ages with ASD or (2) the measures used for validation do not represent anxiety and depression in a distinct fashion as it relates to the manifestation of internalizing symptoms in ASD, and are therefore not useful as discriminating variables.

While prevalence rates reported in this dissertation were substantially higher than the rates published in the measures' manuals or in validation studies, the addition of a typically developing comparison group would have been useful. Many of the national prevalence statistics are out of date, and such a wide range of prevalence rates are reported for the ASD population that it was difficult to truly determine whether these results align with current

prevalence rates of depression and anxiety in individuals with ASD, as well as the general population.

Although the longitudinal study presents a unique opportunity to evaluate the internalizing and social symptoms of individuals with ASD over the course of many years, the sample for this dissertation was attenuated due to the requirement of an IQ greater than 70 as well as the fact that the measures of interest were not collected at each assessment or wave of data collection. Therefore, the results are difficult to generalize to a greater ASD population. However, these data provide a jumping off point for future research that proposes using the PANAS.

Increasing the sample size would not only have allowed for more power to calculate complex inferential statistics, it would also have allowed for a replication sample to evaluate revised scales of the PANAS and PANAS-C. Had a larger sample been available, using CFA rather than EFA would have provided several opportunities to control systematic and random error, which is vital to determining the true underlying construct of affect.

Future Research

Recommendations for future research have been made throughout, but are summarized here. Related research studies would be enhanced by (1) larger samples to discover whether these factor structures can be replicated for each of the groups evaluated, (2) modifying the PANAS and PANAS-C to more appropriately measure the construct of affect from both a unipolar and bipolar perspective, (3) more qualitative research investigating how each of the items on the PANAS is interpreted by a individuals with ASD of varying ages and ability levels, and finally (4) a more in-depth evaluation of concordance rates between parent- and

child-report, and the inclusion of multiple methods of assessment (e.g., behavioral observations for internalizing symptoms, teacher/manager-report; i.e., Mazefsky et al., 2011). Because varying results were found using different measures of internalizing symptoms, care should be taken when choosing which measures to use for validation purposes. The majority of the studies reviewed for this dissertation used the CDI and either the RCMAS or the AMAS; therefore, these scales may be most appropriate to use for replication purposes.

Future studies should aim to collect larger samples of individuals with ASD in order to evaluate the construct of emotion using the PANAS and PANAS-C. Not only would a larger sample increase the power necessary to find significant associations between the affect scales and measures of depression and anxiety, it would expand the range of empirical tests that could be run. Specifically, a larger sample would allow the use of confirmatory factor analysis (CFA) in evaluating the factor structure of the PANAS and PANAS-C, which has been strongly recommended by Green et al. (1993) in order to account for random and systematic error. While the small sample size of the current dissertation forced the use of EFA over CFA, this decision was also based on the fact that these measures had never been used in this population. Now that it has been tentatively established that the PANAS and PANAS-C can be reliably used to evaluate affect in individuals with ASD, subsequent studies would benefit from using a more direct analytic approach.

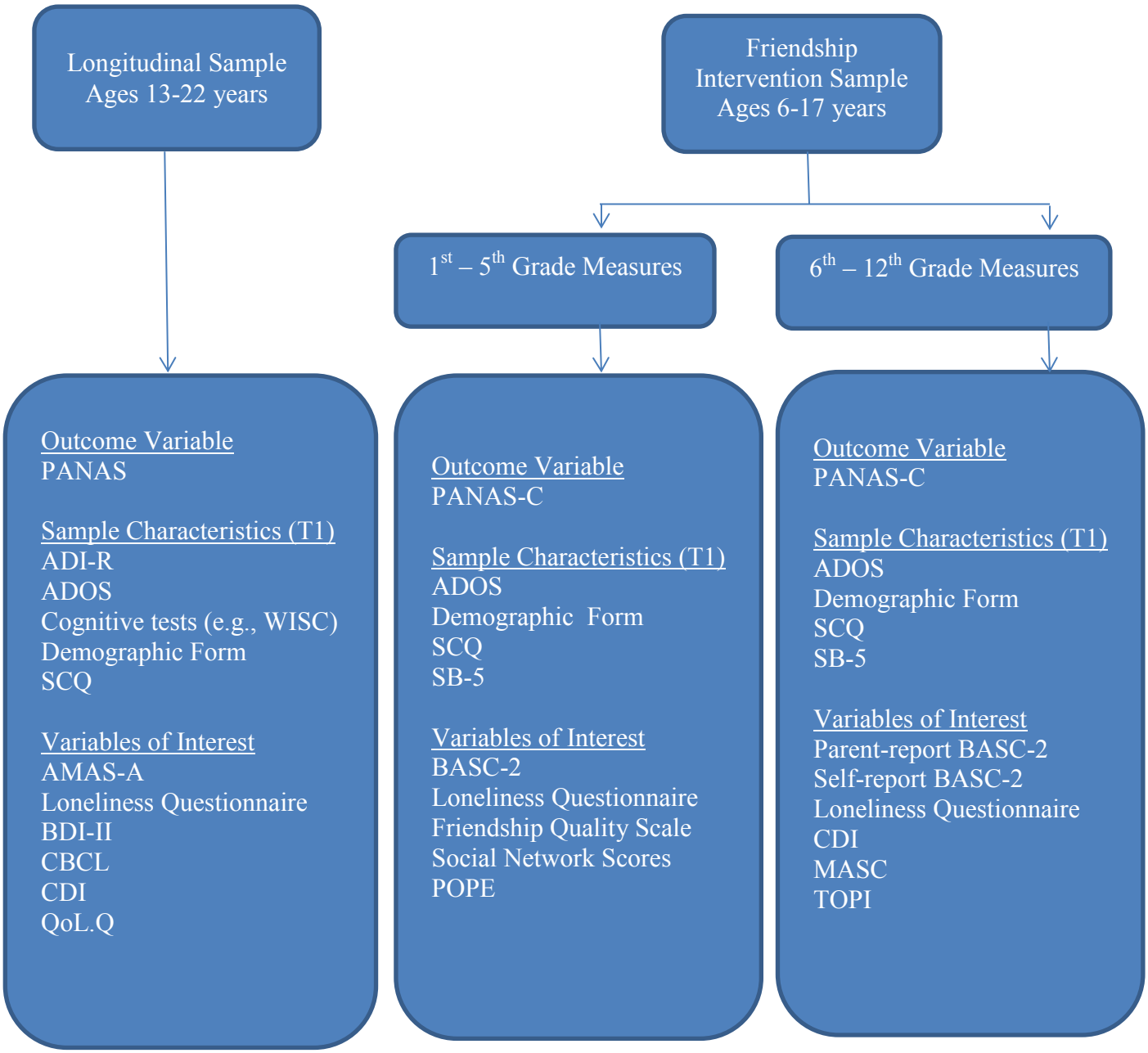
CFA provides several benefits over EFA. First, it allows a priori specification of theoretical models by establishing on which factors variables do and do not load, as well as the relations between factors. The main advantage is the opportunity for hypothesis testing in which a priori models can be empirically evaluated. The latent variables produced by CFA are less contaminated by error than observed variables, which in turn allows for a more precise

determination of the relation of underlying constructs with each other and with other constructs. The use of CFA will ultimately provide the opportunity to replicate findings from Green et al. (1993) who have suggested the bipolar nature of affect, as opposed to two separate unipolar dimensions, by accounting for both random and non-random error in the model. In order to provide a sufficient test of this bipolarity, a multiple method assessment of mood must be used. Specifically, Green et al. (1993) recommend the use of three methodologically distinct assessments of mood statements (an adjective checklist, use of a response options format, and an *n*-point Likert scale). Using this multiple method assessment allows the opportunity to evaluate and counteract the effects of systematic response bias which have been found to be prevalent in self-report measures of mood.

Although mixed support was found for the hypotheses related to the PANAS and PANAS-C, these results provided sufficient support for the continued investigation of these measures with an ASD population over the age of 8 years. While substantial revisions may be necessary (e.g., including bipolar pairs, revising based on qualitative responses from participants about the meaning of the items, and creating separate versions for children and adolescents of varying developmental levels), the general adjective-list format of the PANAS and PANAS-C seems to be effective at capturing affective states of individuals with ASD.

APPENDIX A

Measures administered in each study



Note. All measures were collected at all three timepoints unless otherwise specified.

APPENDIX B

Examples of Items and Measures

Aberrant Behavior Checklist (ABC)

Instructions given to parents: Please rate this client's behavior for the last four weeks. For each item, decide whether the behavior is a problem and circle the appropriate number:

0 = not at all a problem
1 = the behavior is a problem but slight in degree
2 = the problem is moderately serious
3 = the problem is severe in degree

Irritability Items

2. Injures self on purpose
4. Aggressive to other children or adults
8. Screams inappropriately
10. Temper tantrums
14. Irritable and Whiny
19. Yells inappropriately
25. Depressed mood
36. Mood changes quickly
34. Cries over minor annoyances or hurts
29. Demands must be met immediately
41. Cries and screams inappropriately
47. Stamps feet or bangs objects or slams doors
50. Deliberately hurts self
52. Does physical violence to self
57 Has temper tantrums or outbursts when doesn't get way

Lethargy Items

3. Listless, sluggish inactive
5. Seeks isolation from others
12. Preoccupied; stares into space
16. Withdrawn; prefers solitary activities
20. Fixed facial expression
23. Does nothing but sit and watch others
26. Resists physical contact
30. Isolates self from others
32. Sits or stands in one position for long time
37. Unresponsive to structured activities
40. Difficult to reach, contact, get through to
43. Does not try to communicate with words or gestures
42. Prefers to be alone
53. Inactive, not spontaneous
55. Responds negatively to affection
58. Shows few social reactions to others

ABC (cont.)

Stereotypic Behavior Items

6. Meaningless recurring body movements
11. Abnormal repetitive movements
17. Odd, bizarre behavior
27. Moves or roll head repetitively
35. Repetitive hand, body, or head movements
45. Waves or shakes extremities repeatedly
49. Rocks body repeatedly

Hyperactivity Items

1. Excessively active at home, school, work, etc.
7. Boisterous (inappropriately noisy or rough)
13. Impulsive (Acts without thinking)
15. Restless, unable to sit still
18. Disobedient, difficult to control
21. Disturbs others
28. Does not pay attention to Instructions
24. Uncooperative
31. Disrupts group activities
38. Does not stay in seat
39. Will not sit for any length of time
44. Easily distractible
48. Constantly runs or jumps around the room
51. Pays no attention when spoken
54. Tends to be excessively active
56. Deliberately ignores directions

Inappropriate Speech Items

9. Talks excessively
22. Repetitive Speech
33. Talks to self loudly
46. Repeats word/phrases

ABCL Syndrome Scale Items (18-59 year version)

DSM-Oriented Scales

Depressive Problems	Antisocial Personality Problems	Avoidant Personality Problems	Friends Adaptive Functioning
14. I cry a lot	3. Argues a lot	25. Doesn't get along with other people	IA. About how many close friends does s/he have? (Do not include family members)
18. Deliberately harms self or attempts suicide	5. Blames others for own problems	42. I would rather be alone than with others	IB. About how many times a month does s/he have contact with any close friends?
24. Doesn't eat well	16. Cruelty, bullying, or meanness to others	47. Lacks self-confidence	IC. How well does s/he get along with close friends?
35. I feel worthless or inferior	21. Damages or destroys things belonging to others	67. Has trouble making and keeping friends	ID. About how many times a month do any friends or family visit him/her?
52. I feel too guilty	23. Breaks rules at work or elsewhere	71. Self-conscious or easily embarrassed	
60. There is very little that he/she enjoys	26. Doesn't seem to feel guilty after misbehaving	75. I am too shy or timid	
77. Sleeps more than most other people during the day and/or night	28. Gets along badly with family	111. I keep from getting involved with others	
78. Has trouble making decisions	37. Gets in many fights		
91. I think about killing myself	39. Hangs around people who get in trouble		
96. Passive or lacks initiative	43. Lying or cheating		
100. Has trouble sleeping	57. Physically attacks people		
102. Underactive, slow moving, or lacks energy	76. Irresponsible behavior		

ABCL Syndrome Scale Items (18-59 year version) (cont.)

DSM-Oriented Depressive Problems	DSM-Oriented Antisocial Personality Problems	DSM-Oriented Avoidant Personality Problems	Friends Adaptive Functioning
103. Unhappy, sad, or depressed	82. Steals		
107. Feels he/she can't succeed	92. Does things that may cause trouble with the law		
	95. Temper tantrums or hot temper		
	97. Threatens to hurt people		
	101. Stays away from job even when not sick and not on vacation		
	114. Fails to pay his/her debts or meet other financial responsibilities		
	120. Drives too fast		
	122. Has trouble keeping a job		

Note. ABCL = Adult Behavior Checklist

Adult Manifest Anxiety Scale- Adult Version (AMAS-A)

Answer Yes or No for each sentence.

1. I worry about doing the right thing.
2. I often feel restless.
3. I often worry about what could happen to my family.
4. I am always nice to everyone.
5. I get nervous when things do not go the right way for me.
6. I feel keyed up or on edge a lot.
7. My feelings get hurt easily when I am scolded.
8. I am always kind.
9. Sometimes I worry about things that don't really matter.
10. I am often described as restless.
11. Life is getting too stressful.
12. I always have good manners.
13. My feelings get hurt easily.
14. My body often feels tense.
15. I worry about money.
16. I worry about what is going to happen.
17. I am nervous.
18. I have trouble making up my mind.
19. I worry about getting older.
20. I worry about the future
21. My muscles feel tense
22. I worry about how well I am doing in my work.
23. I am easily irritated with others.
24. I tell the truth every single time.
25. I worry about what other people think about me.
26. I have a lot of trouble sitting still.
27. I worry about death.
28. I am always good.
29. I am tired a lot
30. I worry when I got to bed at night.
31. I feel that someone will tell me I do things the wrong way.
32. I like everyone I know.
33. I worry a lot of the time.
34. I wake up thinking about my problems.
35. I often feel stressed out.
36. Others seem to do things more easily than I can.

CBCL Syndrome Scale Items(6-18 year old version; many overlaps with 18-59 year version)

Internalizing Composite			
Anxious/Depressed	Withdrawn/Depressed	Somatic Complaints	Social Problems
14. I cry a lot	5. There is very little I enjoy	47. I have nightmares	11. I'm too dependent on adults
29. I am afraid of certain animals, situations, or places	42. I would rather be alone than with others	51. I feel dizzy or lightheaded	12. I feel lonely
30. I am afraid of going to school	65. I refuse to talk	54. I feel overtired without good reason	25. I don't along with other kids
31. I am afraid I might think/do something bad	69. I am secretive or keep things to myself	56. Physical pains without known medical cause:	27. I am jealous of others
32. I feel that I have to be perfect	75. I am too shy or timid	56a. Aches or pains (not stomach or headaches)	34. I feel that others are out to get me
33. I feel that no one loves me	102. I don't have much energy	56b. Headaches	36. I accidentally get hurt a lot
35. I feel worthless or inferior	103. I am unhappy, sad, or depressed	56c. Nausea, feel sick	38. I get teased a lot
45. I am nervous or tense	111. I keep from getting involved with others	56d. Problems with eyes (not if corrected by glasses)	48. I am not liked by other kids
50. I am too fearful or anxious		56e. Rashes or other skin problems	62. I am poorly coordinated or clumsy
52. I feel too guilty		56f. Stomachaches	64. I would rather be with younger kids than kids my own age
71. I am self-conscious or easily embarrassed		56g. Vomiting, throwing up	79. I have a speech problem
91. I think about killing myself			
112. I worry a lot			

Note. CBCL = Child Behavior Checklist

FRIENDSHIPS SURVEY

What is your name? _____ Date: _____

School Name: _____ Teacher Name: _____

Age: _____

Are you a BOY or a GIRL ? (circle one)

1. Are there any kids in your class that you like to hang out with?
   Who are they? (Use first names only; plus last initial if needed

2. Circle the names of the 3 kids you <u>most</u> like to hang out with.
3. Put a STAR * next to the name of the ONE kid you <u>most</u> like to hang out with.
4. How often do you play with the friend with the STAR *next to their name? (circle one)

   <u>almost everyday</u> <u>sometimes</u> <u>only once in a while</u>

5. Are there any kids in your class that you don't like to hang out with?
   Who are they? (Use first names only, plus last initial if needed)

6. What is your favorite game to play at school? Who do you play this game with?

7. Are there kids in your class who like to hang out together?
   Who are they?

   Remember to think about Boys <u>and</u> Girls. Remember to put yourself if you hang out with a group.

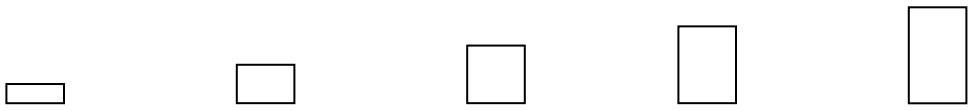
Write the kids names and then draw a CIRCLE around each group!

FQS

Think about the ONE kid you MOST like to hang out with

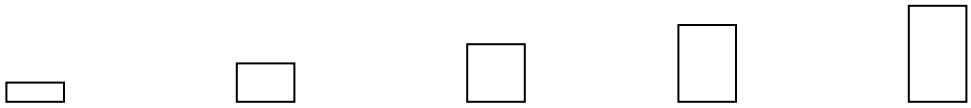
That friend's name is : _____

Answer the following questions by filling in the box which shows how you feel:



1	2	3	4	5
never	hardly ever	sometimes	usually	always

1. My friend and I spend all our free time together.
2. I can get into fights with my friend.
3. If I forgot my lunch or needed a little money, my friend would loan it to me.
4. If I have a problem at school or at home, I can talk to my friend about it.
5. If my friend had to move away, I would miss my friend.
6. My friend thinks of fun things for us to do together.
7. My friend can bug or annoy me even though I ask my friend not to.
8. If other kids were bothering me, my friend would help me.
9. If I said I was sorry after I had a fight with my friend, he or she would stay mad at me.
10. When I do a good job at something, my friend is happy for me.
11. If there is something bothering me, I can tell my friend about it even if it is something I cannot tell to other people.
12. I feel happy when I am with my friend.



1	2	3	4	5
never	hardly ever	sometimes	usually	always

13. My friend helps me when I am having trouble with something.
14. My friend and I go to each other's houses after school and on weekends.
15. My friend and I can argue a lot.
16. My friend would stick up for me if another kid was causing me trouble.
17. If my friend or I do something that bothers the other one of us, we can make up easily.
18. I think about my friend even when my friend is not around.
19. Sometimes my friend and I just sit around and talk about things like school, sports, and things we like.
20. My friend and I disagree about many things.
21. My friend would help me if I needed it.
22. If my friend and I have a fight or argument, we can say "I'm sorry" and everything will be all right.
23. Sometimes my friend does things for me, or makes me feel special.

Index of Peer Relations (IPR)

Hudson, Nurius, Daley, & Newsome (1990)

This questionnaire is designed to measure the way you feel about the people you work, play, or associate with most of the time; your peer group. It is not a test, so there are no right or wrong answers. Answer each item as carefully and as accurately as you can by circling the number next to each statement to indicate how often each statement is true.

	Rarely Most of the time	A little of the time	Sometimes	A good part of the time	
1) I get along very well with my peers.	1	2	3	4	5
2) My peers act like they don't care about me.	1	2	3	4	5
3) My peers treat me badly.	1	2	3	4	5
4) My peers really seem to respect me.	1	2	3	4	5
5) I don't feel like I am "part of the group"	1	2	3	4	5
6) My peers are a bunch of snobs.	1	2	3	4	5
7) My peers understand me.	1	2	3	4	5
8) My peers seem to like me very much.	1	2	3	4	5
9) I really feel "left out" of my peers group.	1	2	3	4	5
10) I hate my current peer group.	1	2	3	4	5
11) My peers seem to like having me around.	1	2	3	4	5
12) I really like my current peer group.	1	2	3	4	5

13) I really feel like I am disliked by my peers.	1	2	3	4	5
14) I wish I had a different peer group.	1	2	3	4	5
15) My peers are very nice to me.	1	2	3	4	5
16) My peers seem to look up to me.	1	2	3	4	5
17) My peers think I am important to them.	1	2	3	4	5
18) My peers are a real source of pleasure for me.	1	2	3	4	5
19) My peers don't seem to even notice me.	1	2	3	4	5
20) I wish I were not part of this peer group.	1	2	3	4	5
21) My peers regard my ideas and opinions very highly.	1	2	3	4	5
22) I feel like I am an important member of my peer group.	1	2	3	4	5
23) I can't stand to be around my peer group.	1	2	3	4	5
24) My peers seem to look down on me.	1	2	3	4	5
25) My peers really do not interest me.	1	2	3	4	5

Loneliness Questionnaire

Please answer all the following questions by circling the number that is most true for you using the scale below.

1 = always true
2 = true most of the time
3 = true sometimes
4 = hardly ever true
5 = not true at all

1. It's easy for me to make new friends at school.	1	2	3	4	5
2. I like to read.	1	2	3	4	5
3. I have nobody to talk to.	1	2	3	4	5
4. I'm good at working with other children.	1	2	3	4	5
5. I watch TV a lot.	1	2	3	4	5
6. It's hard for me to make friends.	1	2	3	4	5
7. I like school.	1	2	3	4	5
8. I have lots of friends.	1	2	3	4	5
9. I feel alone.	1	2	3	4	5
10. I can find a friend when I need one.	1	2	3	4	5
11. I play sports a lot.	1	2	3	4	5
12. It's hard to get other kids to like me.	1	2	3	4	5
13. I like science.	1	2	3	4	5
14. I don't have anyone to play with.	1	2	3	4	5
15. I like music.	1	2	3	4	5
16. I get along with other kids.	1	2	3	4	5
17. I feel left out of things.	1	2	3	4	5
18. There's nobody I can go to when I need help.	1	2	3	4	5
19. I like to paint and draw.	1	2	3	4	5
20. I don't get along with other children.	1	2	3	4	5
21. I'm lonely.	1	2	3	4	5
22. I am well-liked by the kids in my class.	1	2	3	4	5
23. I like playing board games a lot.	1	2	3	4	5
24. I don't have any friends.	1	2	3	4	5

Subscale Items from the Multidimensional Anxiety Scale for Children (MASC)

Physical Symptoms

Tense Restless

1. I feel tense or uptight
15. I'm jumpy
20. I feel strange, weird, or unreal
27. I feel restless and on edge

Somatic/Autonomic

6. I have trouble getting my breath
8. I get shaky or jittery
12. I get dizzy or faint feelings
18. I have pains in my chest
24. My heart races or skips beats
31. I feel sick to my stomach
35. My hands shake
38. My hands feel sweaty or cold

Harm Avoidance

Perfectionism

2. I usually ask permission
11. I try hard to obey my parents and teachers
21. I try to do things other people will like
28. I try to do everything exactly right

Anxious Coping

5. I keep my eyes open for danger
13. I check things out first
17. I keep the light on at night
25. I stay away from things that upset me
32. If I get upset or scared, I let someone know right away
36. I check to make sure things are safe

Social Anxiety

Humiliation

3. I worry about other people laughing at me
10. I'm afraid that other kids will make fun of me
16. I'm afraid other people will think I'm stupid
29. I worry about doing something stupid or embarrassing

Performance Fears

14. I worry about getting called on in class
22. I worry about what other people think of me
33. I get nervous if I have to perform in public
37. I have trouble asking other kids to play with me
39. I feel shy

Separation/Panic

4. I get scared when my parents go away
7. The idea of going away to camp scares me
9. I try to stay near my mom or dad
19. I avoid going to places without my family
23. I avoid watching scary movies and TV shows
26. I sleep next to someone from my family
30. I get scared riding in the car or on the bus
34. Bad weather, the dark, heights, animals, or bugs scare me

Feelings and Emotions (PANAS)

This scale consists of a number of words that describe different feelings and emotions. Read each item and then circle the appropriate answer next to that word.

Indicate to what extent you have felt this way during the past few weeks.

	Not much or not at all	A little	Some	Quite a bit	A lot
Interested	1	2	3	4	5
Distressed	1	2	3	4	5
Excited	1	2	3	4	5
Upset	1	2	3	4	5
Strong	1	2	3	4	5
Guilty	1	2	3	4	5
Scared	1	2	3	4	5
Hostile	1	2	3	4	5
Enthusiastic	1	2	3	4	5
Proud	1	2	3	4	5
Irritable	1	2	3	4	5
Alert	1	2	3	4	5
Ashamed	1	2	3	4	5
Inspired	1	2	3	4	5
Nervous	1	2	3	4	5
Determined	1	2	3	4	5
Attentive	1	2	3	4	5
Jittery	1	2	3	4	5
Active	1	2	3	4	5
Afraid	1	2	3	4	5

Feelings and Emotions (PANAS-C)

This scale consists of a number of words that describe different feelings and emotions. Read each item and then circle the appropriate answer next to that word. Indicate how much you have felt this way during the past few weeks.

	Not much or not at all	A little	Some	Quite a bit	A lot
Interested	1	2	3	4	5
Sad	1	2	3	4	5
Frightened	1	2	3	4	5
Alert	1	2	3	4	5
Excited	1	2	3	4	5
Ashamed	1	2	3	4	5
Upset	1	2	3	4	5
Happy	1	2	3	4	5
Strong	1	2	3	4	5
Nervous	1	2	3	4	5
Guilty	1	2	3	4	5
Energetic	1	2	3	4	5
Scared	1	2	3	4	5
Calm	1	2	3	4	5
Miserable	1	2	3	4	5
Jittery	1	2	3	4	5
Cheerful	1	2	3	4	5
Active	1	2	3	4	5
Proud	1	2	3	4	5
Afraid	1	2	3	4	5
Joyful	1	2	3	4	5
Lonely	1	2	3	4	5
Mad	1	2	3	4	5
Fearless	1	2	3	4	5
Disgusted	1	2	3	4	5
Delighted	1	2	3	4	5
Blue	1	2	3	4	5
Daring	1	2	3	4	5
Gloomy	1	2	3	4	5
Lively	1	2	3	4	5

Quality of Life Questionnaire

1. Overall, would you say that life:
A. Brings out the best in you?
B. Treats you like everybody else?
C. Doesn't give you a chance?

2. How much fun and enjoyment do you get out of life?
A. Lots
B. Some
C. Not much

3. Compared to others are you better off, about the same, or less well off?
A. Better
B. About the same
C. Worse

4. Are most of the things that happen to you:
A. Rewarding
B. Acceptable
C. Disappointing

5. How satisfied are you with your current home or living arrangement?
A. Very satisfied
B. Somewhat satisfied
C. Unsatisfied or very unsatisfied

6. Do you have more or fewer problems than other people?
A. Fewer problems
B. The same number of problems as others
C. More problems than others

7. How many times per month do you feel lonely?
A. Seldom, never more than once or twice
B. Occasionally, at least 5 or 6 times per month
C. Frequently, at least once or twice per week

8. Do you ever feel out of place in social situations?
A. Seldom or never
B. Sometimes
C. Usually or always

9. How successful do you think you are, compared to others?
A. Probably more successful than the average person
B. About as successful as the average person
C. Less successful than the average person

10. What about your family members? Do they make you feel:
A. An important part of the family
B. Sometimes a part of the family
C. Like an outsider

11. How well did your educational or training program prepare you for what you are doing now?
A. Very well
B. Somewhat
C. Not at all well

12. Do you feel your job or other daily activity is worthwhile and relevant to either yourself or others?
A. Yes, definitely
B. Probably
C. I'm not sure, or definitely not

13. How good do you feel you are at your job?
A. Very good, and others tell me I am
B. I'm good, but no one tells me
C. I'm having trouble on my job

14. How do people treat you on your job?
A. The same as all other employees
B. Somewhat differently than other employees
C. Very differently

15. How satisfied are you with the skills and experience you have gained or are gaining from your job?
A. Very satisfied
B. Somewhat satisfied
C. Not satisfied

16. Are you learning skills that will help you get a different or better job? What are these skills?
A. Yes, definitely (one or more skills mentioned)
B. Am not sure, may be (vague, general skills mentioned)
C. No, job provides no opportunity for learning new skills

17. Do you feel you receive fair pay for your work?
A. Yes, definitely
B. Sometimes
C. No, I do not feel I am paid enough

18. Does your job provide you with enough money to buy the things you want?
A. Yes, I can generally buy those reasonable things I want
B. I have to wait to buy some items or not buy them at all
C. No, I definitely do not earn enough to buy what I need

19. How satisfied are you with the benefits you receive at the workplace?
A. Very satisfied
B. Somewhat satisfied
C. Not satisfied

20. How closely supervised are you on your job?
A. Supervisor is present only when I need him or her
B. Supervisor is frequently present whether or not I need him or her
C. Supervisor is constantly on the job and looking over my work

21. How did you decide to do the job or other daily activities you do now?
A. I chose it because of pay, benefits, or interests
B. Only thing available or that I could find
C. Someone else decided for me

22. Who decides how you spend your money?
A. I do
B. I do, with assistance from others from others
C. Someone else decides

23. How do you use health care facilities (doctor, dentist, etc.)?
A. Almost always on my own
B. Usually accompanied by someone, or someone else has made the appointment
C. Never on my own

24. How much control do you have over things you do every day, like going to bed, eating, and what you do for fun?
A. Complete
B. Some
C. Little

25. When can friends visit your home?
A. As often as I like or fairly often
B. Any day, as long as someone approves or is there
C. Only on certain days

26. Do you have a key to your home?
A. Yes, I have a key and use it as I wish
B. Yes, I have a key but it only unlocks certain areas
C. No

27. May you have a pet if you want?
A. Yes, definitely
B. Probably yes, but would need to ask
C. No

28. Do you have a guardian or conservator?
A. No, I am responsible for myself
B. Yes, limited guardian or conservator
C. Yes, I have a full guardian

29. Are there people living with you who sometimes hurt you, pester you, scare you, or make you angry?
A. No
B. Yes, and those problems occur once a month or once a week
C. Yes, and those problems occur every day or more than once a day

30. Overall, would you say that your life is:
A. Free
B. Somewhat planned for you
C. Cannot usually do what you want

31. How many civic or community clubs or organizations (including church or other religious activities) do you belong to?
A. 2-3
B. 1 only
C. None

32. How satisfied are you with the clubs or organizations (including church or other religious activities) to which you belong?
A. Very satisfied
B. Somewhat satisfied
C. Unsatisfied or very unsatisfied

33. Do you worry about what people expect of you?
A. Sometimes, but not all the time
B. Seldom
C. Never or all the time

34. How many times per week do you talk to (or associate with) your neighbors, either in the yard or in their home?
A. 3-4 times per week
B. 1-2 times per week
C. Never or all the time

35. Do you have friends over to visit your home?
A. Fairly often
B. Sometimes
C. Rarely or never

36. How often do you attend recreational activities (homes, parties, dances, concerts, plays) in your community?
A. 3-4 per month
B. 1-2 per month
C. Less than 1 per month

37. Do you participate actively in those recreational activities?
A. Usually, most of the time
B. Frequently, about half of the time the time
C. Seldom or never

38. What about opportunities for dating of marriage?
A. I am married, or I have the opportunity to date anyone I choose
B. I have limited opportunities to date or marry
C. I have no date or marry opportunity to

39. How do your neighbors treat you?
A. Very good or good (invite you to activities, coffee, etc
B. Fair (say hello, visit, etc.)
C. Bad or very bad (avoid you, bother you, etc.)

40. Overall, would you say that your life is:
A. Very worthwhile
B. Okay
C. Useless

APPENDIX C

Percent of individuals missing specific PANAS-C items for each age group in the friendship intervention sample

Item	6 to 11 yrs	8 to 11 yrs	11 to 17 yrs
interested	5.00	7.7	0.0
sad	5.00	3.1	7.1
frightened	7.50	1.5	8.3
alert	20	9.2	1.2
excited	7.5	3.1	1.2
ashamed	22.5	3.1	1.2
upset	0	3.1	0.0
happy	10	0.0	7.1
strong	2.5	3.1	0.0
nervous	2.5	0.0	0.0
guilty	20	3.1	0.0
energetic	17.5	6.2	7.1
scared	0	0.0	0.0
calm	15	1.5	8.3
miserable	22.5	6.2	7.1
jittery	22.5	7.7	2.4
cheerful	5	1.5	8.3
active	15	1.5	1.2
proud	2.5	4.6	0.0
afraid	2.5	6.2	1.2
joyful	10	4.6	8.3
lonely	10	1.5	8.3
mad	5	6.2	8.3
fearless	25	6.2	8.3
disgusted	17.5	7.7	8.3
delighted	20	7.7	8.3
blue	10	4.6	10.7
daring	25	7.7	10.7
gloomy	25	9.2	8.3
lively	17.5	6.2	8.3

APPENDIX D

Central Tendency and Dispersion Statistics Comparing Two Multiply Imputed Datasets to the Original Data

	Mean			Standard Deviation			Median			Kurtosis			Skewness		
Item	Orig.	Imp1	Imp2	Orig.	Imp1	Imp2	Orig.	Imp1	Imp2	Orig.	Imp1	Imp2	Orig.	Imp1	Imp2
PA															
Interested	3.5	3.4	3.5	1.3	1.3	1.3	3	3	4	-1.0	-1.0	-.9	-.4	-.4	-.3
Alert	3.1	3.1	3.1	1.4	1.4	1.4	3	3	3	.0	-1.3	-1.3	.9	-.1	.0
Excited	3.8	3.8	3.9	1.3	1.3	1.2	4	4	4	.1	-.3	-.3	1.1	-.9	-.9
Happy	4.1	4.0	4.0	1.1	1.2	1.1	4	4	4	-1.3	-.1	.6	-.1	-1.1	-1.0
Strong	3.4	3.4	3.4	1.4	1.4	1.4	3	3	3	-.4	-1.2	-1.2	-.9	-.3	-.3
Energetic	3.3	3.3	3.3	1.5	1.4	1.5	3	3	3	1.4	-1.2	-1.2	1.5	-.3	-.3
Calm	3.5	3.5	3.5	1.4	1.3	1.3	4	4	4	-.4	-.8	-.8	.7	-.6	-.6
Cheerful	3.6	3.5	3.6	1.3	1.2	1.3	4	4	4	.7	-1.0	-.7	-1.2	-.5	-.3
Active	3.4	3.4	3.4	1.5	1.4	1.4	4	3	4	-1.2	-1.2	-1.2	-.3	-.4	-.3
Proud	3.7	3.7	3.7	1.4	1.4	1.3	4	4	4	-.7	-.7	-.8	.6	-.7	-.7
Joyful	3.6	3.5	3.5	1.4	1.4	1.4	4	4	4	1.8	-.9	-1.0	1.6	-.5	-.6
Fearless	2.7	2.7	2.7	1.6	1.5	1.4	2	2	3	-1.4	-1.1	-1.2	-.3	.3	.4
Delighted	3.5	3.5	3.5	1.4	1.3	1.3	4	4	4	.7	-1.0	-.9	1.2	-.4	-.4
Daring	2.5	2.6	2.5	1.5	1.4	1.5	2	2	2	-1.0	-1.2	-1.2	-.5	.5	.4
Lively	3.7	3.6	3.7	1.4	1.3	1.3	4	4	4	2.2	-.9	-.8	1.6	-.7	-.6

Central Tendency and Dispersion Statistics Comparing Two Multiply Imputed Datasets to the Original Data: NA Scale

	Mean			Standard Deviation			Median			Kurtosis			Skewness		
Item	Orig.	Imp1	Imp2	Orig.	Imp1	Imp2	Orig.	Imp1	Imp2	Orig.	Imp1	Imp2	Orig.	Imp1	Imp2
NA															
Sad	2.0	2.1	2.1	1.1	1.1	1.1	2	2	2	-.2	-.2	-.2	1.0	.8	.8
Frightened	2.0	2.1	2.1	1.3	1.2	1.3	2	2	2	-.8	.0	.1	-.5	1.0	1.0
Ashamed	1.8	1.9	1.9	1.1	1.1	1.2	1	1	1	-1.2	.9	1.3	-.4	1.4	1.3
Upset	2.3	2.3	2.3	1.2	1.2	1.2	2	2	2	-.8	-.4	-.4	-.7	.7	.7
Nervous	2.4	2.4	2.4	1.3	1.3	1.3	2	2	2	.8	-.7	-.7	1.3	.6	.6
Guilty	1.7	1.7	1.8	1.1	1.1	1.1	1	1	1	-.8	1.4	1.2	-.6	1.4	1.5
Scared	1.9	1.9	1.9	1.1	1.1	1.1	2	2	2	-.3	.6	.6	.9	1.2	1.2
Miserable	1.7	1.8	1.8	1.1	1.0	1.0	1	2	1	-.6	1.8	2.1	.6	1.5	1.4
Jittery	2.1	2.2	2.2	1.3	1.4	1.4	2	2	2	-1.4	-.6	-.5	.3	.9	.9
Afraid	1.9	1.9	2.0	1.2	1.2	1.2	2	2	2	.8	.8	.6	1.3	1.2	1.3
Lonely	2.1	2.2	2.2	1.3	1.3	1.3	2	2	2	-1.1	-.4	-.5	-.5	.8	.8
Mad	2.3	2.4	2.4	1.2	1.2	1.2	2	2	2	.9	-.7	-.7	1.4	.5	.5
Disgusted	1.8	2.1	2.1	1.1	1.2	1.2	1	2	2	-1.3	-.4	-.2	.5	.9	.8
Blue	2.0	2.1	2.1	1.2	1.3	1.3	2	2	2	.6	-.2	.3	1.2	1.2	1.0
Gloomy	1.9	2.0	2.2	1.2	1.2	1.1	2	2	2	-.9	.3	-.6	-.7	.7	1.0

Note. PA = positive affect. NA = negative affect. Orig. = Original dataset before imputation. Imp1 = Imputed dataset used for analyses; Imp2 = Imputed dataset used for sensitivity check.

APPENDIX E

Exploratory Analyses and Results

Due to the small number of participants in each of the samples utilized for this dissertation, and the need to break the younger sample up even further to accommodate different structural fits of the PANAS and PANAS-C, the options for inferential statistical analyses were limited. However, these are rare and unique datasets that warrant deeper investigation. As such, caution should be used in generalizing these results to the larger population. Specific analyses are detailed in the sections below.

Longitudinal study

Trajectory Analyses

A mixture modeling procedure called Proc TRAJ (Jones, Nagin, & Roeder, 2001) was used to evaluate the variability in the patterns of outcomes for the two PANAS subscales (positive affect, negative affect) from approximately age 15 to age 23. Proc TRAJ is an exploratory and analytic procedure written for use in SAS software (v9.3) that identifies linear and nonlinear patterns in longitudinal data and classifies the sample into groups. The procedure was run using an uncensored normal distribution. Because the waves of data collection occurred multiple times each year, participants contributed multiple data points within a single year. Therefore, age was rounded to the nearest quarter of a year in order to utilize all data points. To determine the optimal number of groups, the absolute values of the Bayesian Information Criterion (BIC) between nested models were compared (smaller indicates a better

fit; Jones et al., 2001). Due to the small sample size in each group, there was not sufficient power to run the Proc TRAJ analysis with risk factors to predict group membership. Alternatively, the three groups were compared using analysis of variance (ANOVA) with post hoc paired-comparison tests using a Bonferroni correction.

The remainder of the statistical analyses were performed using SPSS software (v20). Basic descriptive statistics were computed for each variable, and t-tests, ANOVAs, and multiple hierarchical regression analyses were computed to compare groups. Post hoc paired comparisons using the Bonferroni procedure were used with ANOVA analyses.

The exploratory analyses for the longitudinal sample focused on finding subgroups that showed unique trajectories of PA and NA scores over time. Rather than evaluate the sample based on waves of data collection, the sample was divided based on chronological age. Because the greatest numbers of participants were between the ages of 15 and 22 years, individuals outside of this age range were excluded from the following analyses. Only participants with two or more PANAS administrations were included, because this was a minimum requirement to be able to fit a linear trajectory to the data (10 participants were dropped based on this criteria). Using these criteria, 32 individuals contributed 216 administrations of the PANAS: 20 participants contributed data to seven, eight, or nine waves of data collection, seven individuals contributed data to five or six waves, and five individuals contributed data to three or four waves. Additional modifications to the sample were made in the process of running the ProcTRAJ analyses. These changes will be discussed in more detail below.

For both the PA and NA scales, a series of models were run to discover the best fit for the data. Linear, quadratic, and cubic fits were evaluated. With each model tested, the BIC was

noted (smaller is better), the significance of the fit trend (linear, cubic, quadratic) was evaluated, and plots were investigated to look for individuals who did not fit the trend of the group. In some cases, these outliers were removed from analyses to discern whether a more coherent group could be formed in their absence.

Positive Affect Scale

All participants but one were retained for the PA analyses (n = 30). The participant who was dropped from the analyses did not fit well within any of the model derivations. The model to best fit the data was a four-group solution, with all four groups fitting a linear trend. The BIC was -656.20 (N =198 PANAS administrations from 30 individuals). In order to create a more interpretable intercept, age was centered, with age 15 converted to 0 (i.e., a value of 2 on the x-axis denotes 17 years of age). See Figure 31 for the four linear trajectories. Group 1 (n = 3) showed a negative linear trend which started at a relatively low level of PA (26.68; less positive affect) and decreased across time (becoming less positive). The intercept for Group 2 (n = 10) was similar to that of Group 1 (24.47), but the trajectory was positive (increasing in positive affect over time) rather than negative. Group 3 (n = 6) showed a negative linear trend, with a higher intercept (44.25, maximum possible = 50), and a negative linear trend across time. Finally, Group 4 (n = 11) also had a high intercept (36.11), and showed a moderate positive trend over time. All of the slopes were significant at $p < .03$.

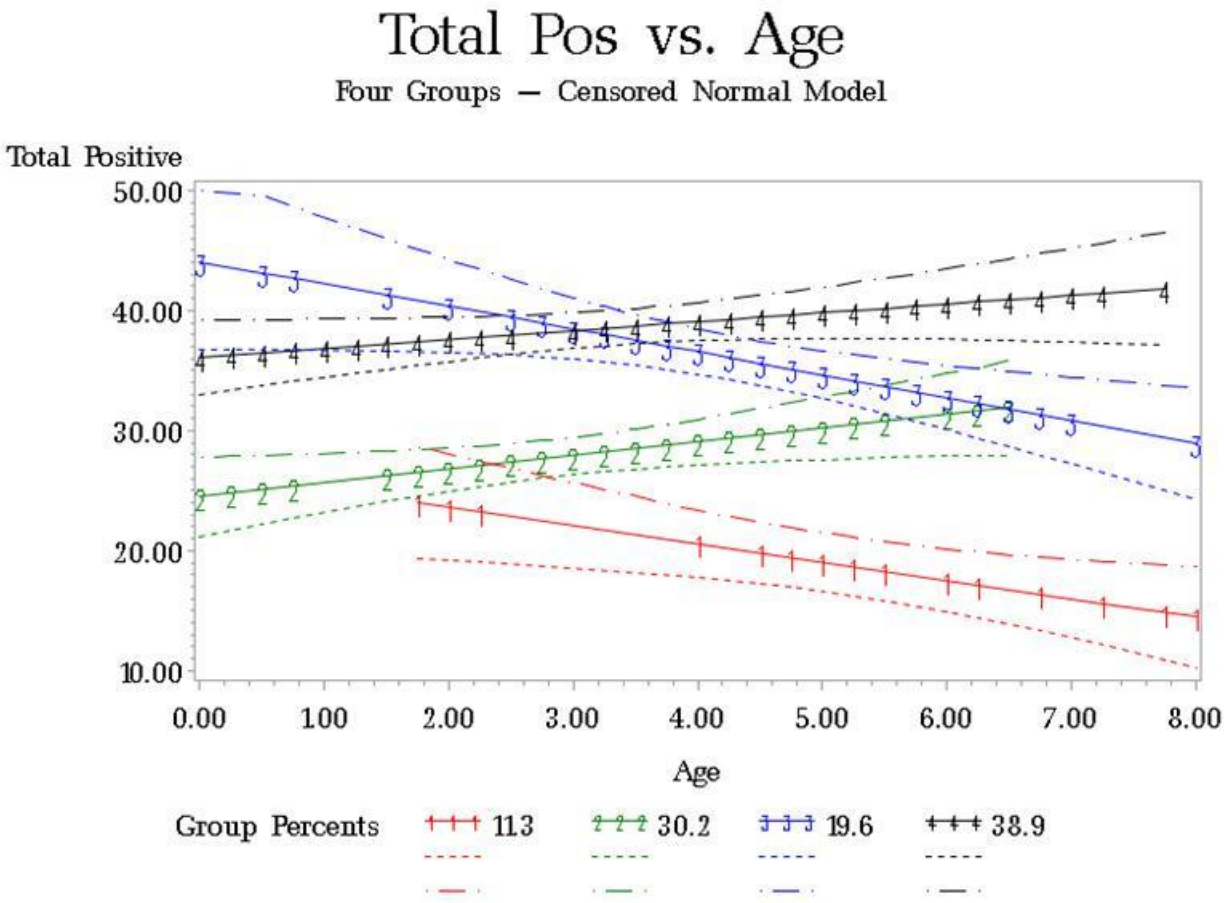


Figure 31. Four trajectory groups created from PA scale scores

Generally, the individuals who fell into each group created a coherent picture. Figure 32 presents all four groups separately with each participant's trajectory shown. An overall slope is also plotted for each group, which corresponds to the trajectories plotted in Figure 31. ProcTRAJ produces probability scores for each participant, which report the probability of being included in each of the four groups. With few exceptions, individuals' probability scores were above .99.

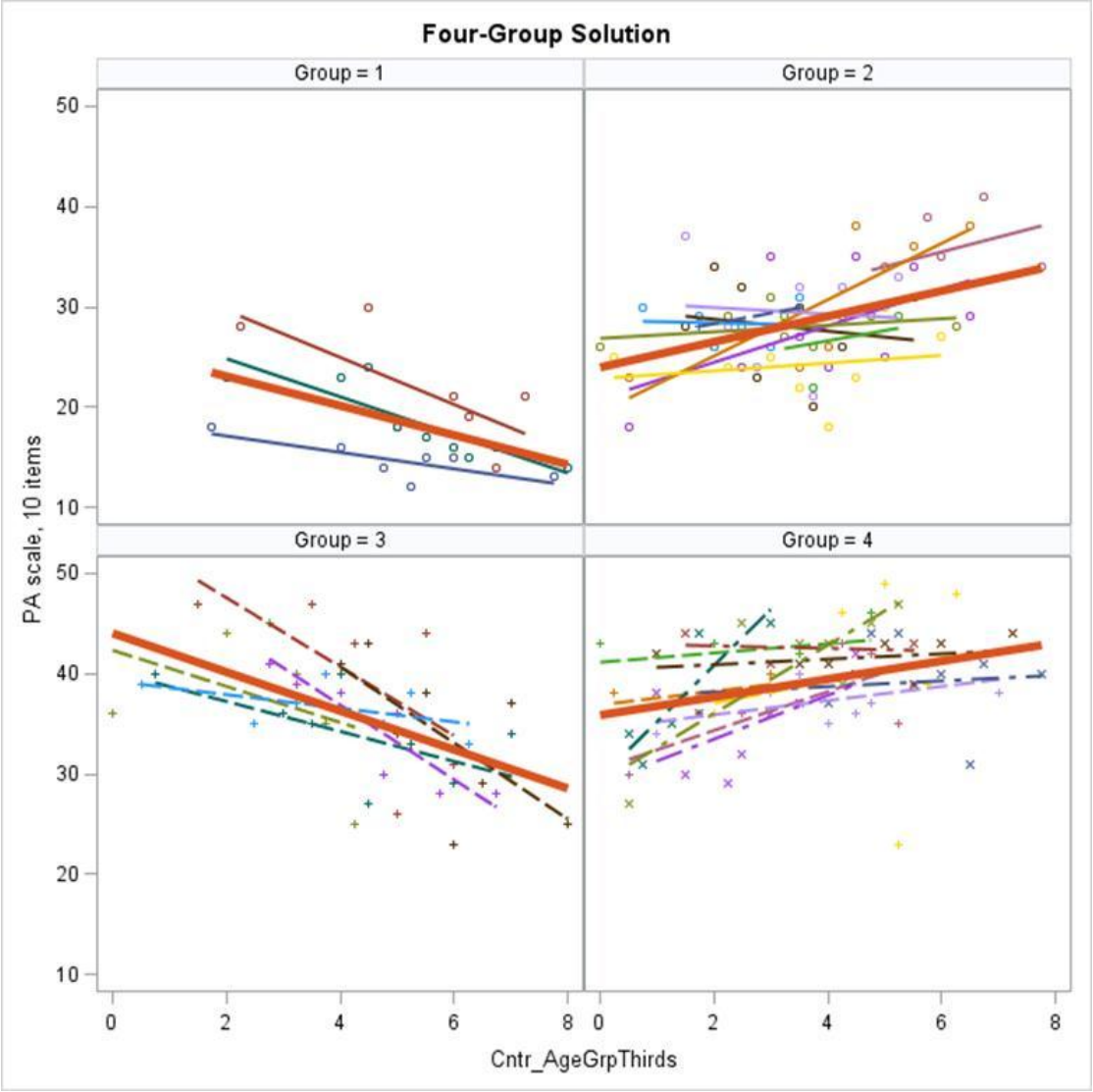


Figure 32. Individual subject trajectory plots for each PA-trajectory group

Negative Affect Scale

After running a series of models, two participants were removed from the analyses of the revised NA scale for a final sample size of 29. These two individuals continually showed poor fit with each derivation of the modelsd. The best fit for the NA scale data was a three-group solution (BIC = -616.83, *N* = 194 PANAS administrations from 29 individuals), with the

first group showing linear trend (n = 16, p =.03), the second group showing a cubic trend (n = 10, p = .01), and the third group showing a linear trend (n = 3, p <.01;). Figure 33 shows the three-group solution.

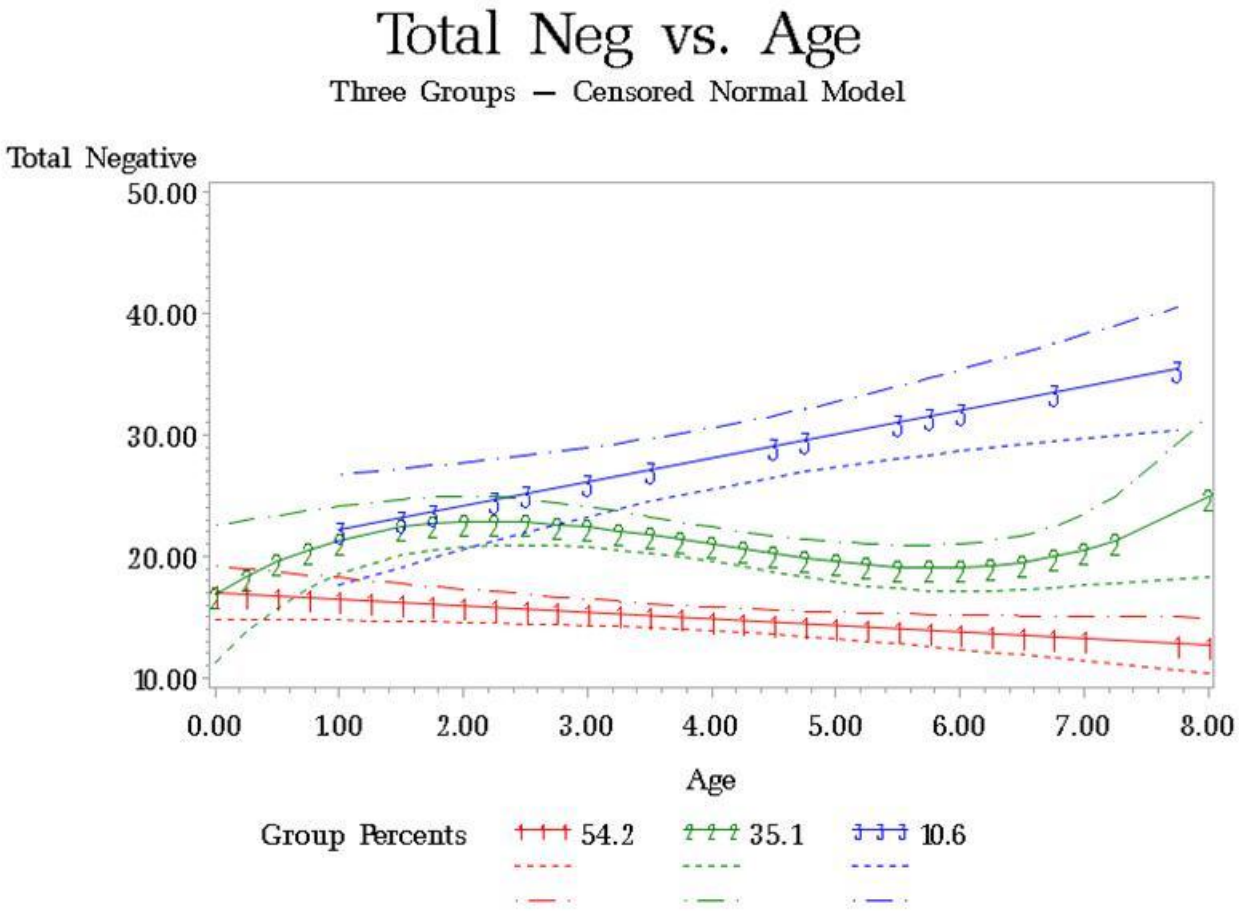


Figure 33. Three trajectory groups created from NA scale scores

All three groups shared similar low intercepts, although the third group was slightly higher than the first two (17.02, 16.91, and 20.22, respectively). The first group showed a modest negative linear trend over time. The second group, while sharing the low intercept of Group 1, increased in NA over the course of two years (until age 17), then showed a gradual decrease in their negative affect for about four years (until about age 21), at which point levels

of NA started to increase once again. Finally, the third group showed a steeper slope than Group 1, and in a positive direction, demonstrating an increase in negative affect over time for a small portion of the sample. Again, the majority of the probabilities for group membership exceeded .99. Because ProcTRAJ models groups are based on intercept, as well as slope, these individuals were included in the group for which their intercepts were most alike. The probability of group membership was more tenuous for these participants. Interestingly, while these outliers' slopes appear fairly steep in the group plots below (see Figure 34), the slopes were not significant.

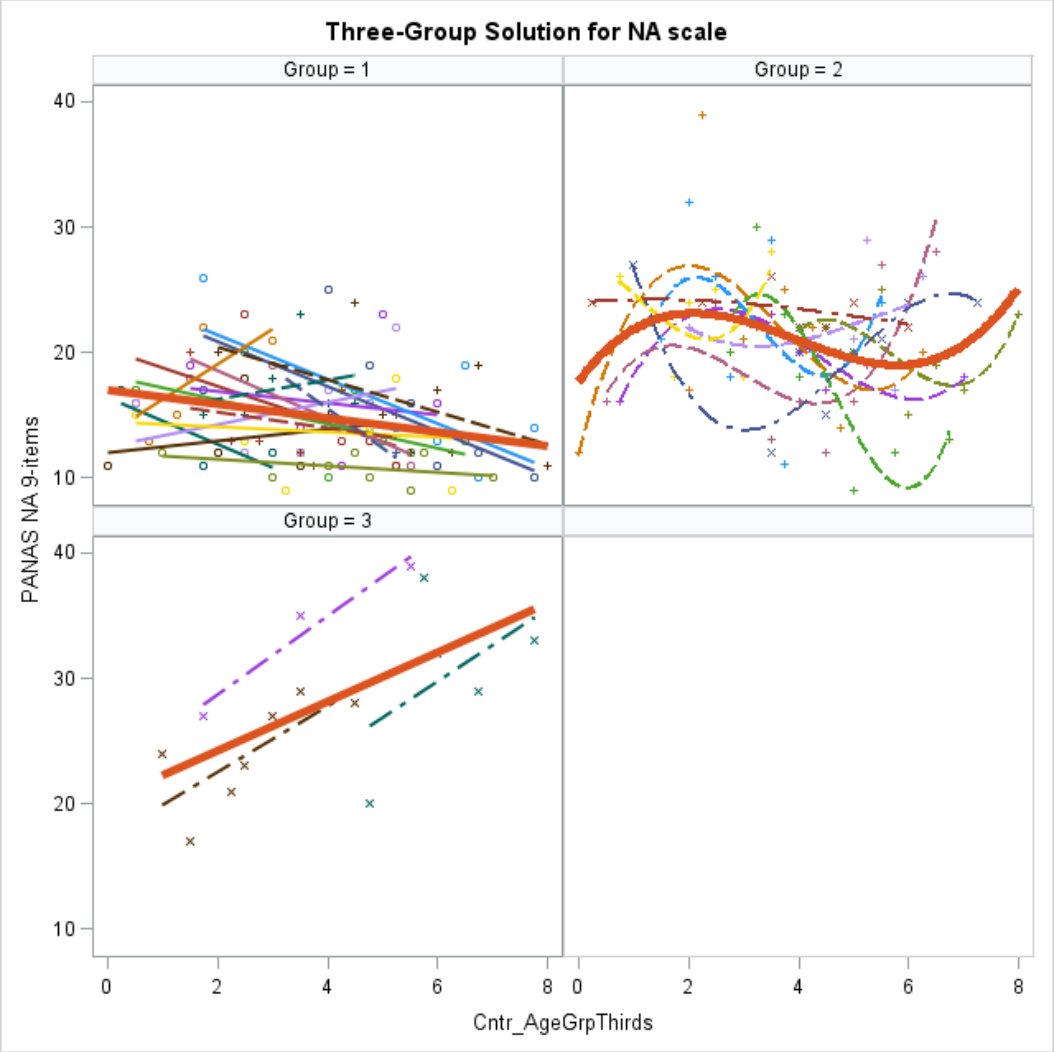


Figure 34. Individual trajectory plots for each NA trajectory group.

In summary, these results demonstrate the linear nature of PA scale scores over time, with two groups increasing in PA over time (varying by intercept), and two groups decreasing in PA (varying by intercept). Additionally, the NA scale data were best fitted with a three-group solution, with two linear groups (one increasing and one decreasing), and another group with a cubic trend (peaking at age 17, dropping until age 21, and then increasing again).

Group Comparison Analyses

After these trajectory groups were established, follow-up analyses were run to investigate group differences on a number of variables of interest relating to participant characteristics, internalizing symptomatology, and friendship. Due to the small sample sizes, there was not enough power to include 'risk factors' in the ProcTRAJ models which would compute probabilities of group membership based on other variables of interest. Rather, basic ANOVAs were run to investigate potential differences between the groups. First, the groups were compared on ADOS and ADI domain scores, Vineland standard scores, and IQ scores, which were all collected at face-to-face assessments around the ages of 9 and 18 years.

Positive affect scale

For the PA scale, the only variable on which the groups differed at age 9 was the 'Restricted, Repetitive, and Stereotyped Patterns of Behavior' (RRB) Total score from the ADI-R. Specifically Group 4 (PA starts high, increases) showed significantly higher levels of RRBs (M =8.13) than Group 1 (PA starts low, decreases; M = 2.0, p =.02). No significant differences emerged between any of the other group pairs. At age 18, the groups differed significantly on several variables, primarily VABS and ADOS scores (see Table 24). Overall, these results show that Group 2 demonstrated significantly poorer adaptive behavior skills at

age 18 than Group 3 (starts high, decreases) and Group 4 (starts high, increases). Note that the standardized mean for the VABS is 100 (SD = 15), and that on average Group 2 participants performed at least one standard deviation below the mean on all domains of adaptive functioning measured by the VABS. The ADOS, on the other hand, highlighted the greater severity of social symptoms present in Group 1 (starts low, decreases). Higher scores on the ADOS imply greater severity. This trend was also apparent in the VABS socialization domain, with Group 1 falling more than two standard deviations below the mean. These results from the 18-year assessments also highlight the relatively less impaired Group 4, showing the highest VABS scores and the lowest ADOS scores. Interestingly, this is the same group that showed significantly more RRBs at the age 9 assessments. Again, caution is urged in ascribing significance to these findings given the small sample sizes, especially for Group 1 ($n = 3$).

Table 24

Descriptives for Variables on which PA Scale Groups Showed Significant Differences at Age 18

Scale	Group	*N*	*Mean*	*SD*	Scale	Group	*n*	*Mean*	*SD*
VABS Composite Score	1	3	70.00[a,b]	14.00	VABS Socialization Std Score	1	3	55.00[b]	16.46
	2	9	65.89[b]	14.24		2	9	67.67[a,b]	13.79
	3	6	83.83[a,b]	11.27		3	6	84.67[a,b]	15.60
	4	11	89.09[a]	15.30		4	11	87.18[a]	20.94
	Total	29	78.83	16.95		Total	29	77.28	20.17
VABS Comm. Std Score	1	3	86.00[a,b]	12.17	ADOS Social Total	1	3	10.33[a]	3.51
	2	9	72.89[b]	16.08		2	8	7.25	2.77
	3	6	91.00[a,b]	9.03		3	6	7.00	1.79
	4	11	95.64[a]	14.30		4	11	4.82[b]	2.52
	Total	29	86.62	16.39		Total	28	6.57	2.97
VABS Daily Living Std Score	1	3	78.67[a,b]	17.16	ADOS Comm & Social Total	1	3	13.67[a]	5.13
	2	9	64.44[b]	16.52		2	8	10.63	4.00
	3	6	84.83[a]	11.75		3	6	10.17	1.60
	4	11	90.00[a]	10.09		4	11	6.73[b]	3.20
	Total	29	79.83	16.80		Total	28	9.32	3.98

Note. VABS = Vineland Adaptive Behavior Scales; Comm. = Communication. Each subscript letter denotes group means that do not significantly differ from each other at the .05 level.

Negative affect scale

Results for the NA scale showed fewer significant group differences. None of the groups differed from one another on IQ, the VABS, ADOS, or ADI-R variables at the age 9 assessments. However, at age 18, the group differences on two of the VABS domains reached significance, while the other two approached significance. Group 3 (starts higher, increases; n = 3), emerged as the most impaired, with scores on the VABS Composite score and Communication domain about two standard deviations below the normed mean. Nonverbal IQ scores for Group 3 were also significantly lower than the NVIQs for Groups 1 and 2. In fact, this nonverbal mean fell within the mild intellectual impairment range. Upon deeper investigation, this mean was largely influenced by a single participant who demonstrated a very low NVIQ at age 18. The other two participants in this group had NVIQs in the low normal range. Therefore, a low NVIQ should not be considered as representative of this third group. Two of the three individuals in Group 3 for the NA scale also appeared in the most impaired Group for the PA scale (Group 2). Across all variables evaluated, Group 2 (cubic trend) participants fell in the middle of Groups 1 and 3.

Table 25

Descriptives for Variables on which NA Scale Groups Showed Significant Differences at Age 18

Scale	Group	*n*	*Mean*	*SD*
VABS Composite Score	1	16	83.94[a]	14.05
	2	9	76.22[a,b]	14.68
	3	3	59.33[b]	21.22
	Total	28	78.82	16.34
VABS Comm. Std Score	1	16	90.88[a]	12.19

	2	9	87.33[a]	15.48
	3	3	61.67[b]	22.19
	Total	28	86.61	16.43
NVIQ				
	1	16	101.81[a]	20.49
	2	9	99.89[a]	18.67
	3	3	58.67[b]	30.04
	Total	28	96.57	24.15

Note. VABS = Vineland Adaptive Behavior Scales; Comm = Communication. Each subscript letter denotes group means that do not significantly differ from each other at the .05 level.

Analyses of ADI-R Friendship Item

Positive affect scale

To further investigate the effect of social variables on the positive and negative affect outcomes for these groups, the responses to Friendship item from the ADI-R were evaluated. Like the ADOS, higher scores on the ADI-R imply more severe symptoms. Due to the small range of response options and the true categorical nature of the ADI-R scores, frequencies were computed rather than central tendency statistics. For the Age 9 PA scale data, Groups 1 and 2 presented a greater proportion of 2 and 3 scores on the Friendship item than Groups 3 and 4, which is consistent with the results presented for the VABS and ADOS above. See Appendix F for a description of each ADI-R code on the Friendship item.

Table 25

Crosstabulation of PA-trajectory groups and ADI-R friendship item scores at Age 9

PAgroup * current: friendships(age 5.0 +) Crosstabulation

			current: friendships(age 5.0 +)				
			0	1	2	3	Total
PAgroup	1.00	Count	0a	0a	1a	2a	3
		% within PAgroup	0.0%	0.0%	33.3%	66.7%	100.0%
		% of Total	0.0%	0.0%	3.4%	6.9%	10.3%
	2.00	Count	3a	1a	2a	3a	9
		% within PAgroup	33.3%	11.1%	22.2%	33.3%	100.0%
		% of Total	10.3%	3.4%	6.9%	10.3%	31.0%
	3.00	Count	3a	1a	2a	0a	6
		% within PAgroup	50.0%	16.7%	33.3%	0.0%	100.0%
		% of Total	10.3%	3.4%	6.9%	0.0%	20.7%
	4.00	Count	4a	1a	6a	0a	11
		% within PAgroup	36.4%	9.1%	54.5%	0.0%	100.0%
		% of Total	13.8%	3.4%	20.7%	0.0%	37.9%
Total		Count	10	3	11	5	29
		% within PAgroup	34.5%	10.3%	37.9%	17.2%	100.0%
		% of Total	34.5%	10.3%	37.9%	17.2%	100.0%

Each subscript letter denotes a subset of current: friendships(age 5.0 +) categories whose column proportions do not differ significantly from each other at the .05 level.

For the age 18 assessments, the distribution of scores was wider for most of the four groups; however, Groups 1 and 2 again emerged with high rates of 2 and 3 codes. Interestingly, over half of Group 4, which showed the highest level of adaptive skills, were reported to only have social interaction in contrived group situations (e.g., church, clubs; score of 2 on ADI-R Friendship item). Group 3 (NA starts high, decreases) had the greatest proportion of 0 and 1 codes, demonstrating the presence of meaningful friendships, as defined by the ADI-R. While this result does not imply causation, it lends support to the theory that friendship is associated with positive affect.

Table 26

Crosstabulation of PA-trajectory groups and ADI-R friendship item scores at Age 18

PAgroup * current: friendships(age 5.0 +) Crosstabulation

			current: friendships(age 5.0 +)				
			0	1	2	3	Total
PAgroup	1.00	Count	0a	0a	1a	2a	3
		% within PAgroup	0.0%	0.0%	33.3%	66.7%	100.0%
		% of Total	0.0%	0.0%	3.4%	6.9%	10.3%
	2.00	Count	3a	1a	2a	3a	9
		% within PAgroup	33.3%	11.1%	22.2%	33.3%	100.0%
		% of Total	10.3%	3.4%	6.9%	10.3%	31.0%
	3.00	Count	3a	1a	2a	0a	6
		% within PAgroup	50.0%	16.7%	33.3%	0.0%	100.0%
		% of Total	10.3%	3.4%	6.9%	0.0%	20.7%
	4.00	Count	4a	1a	6a	0a	11
		% within PAgroup	36.4%	9.1%	54.5%	0.0%	100.0%
		% of Total	13.8%	3.4%	20.7%	0.0%	37.9%
Total		Count	10	3	11	5	29
		% within PAgroup	34.5%	10.3%	37.9%	17.2%	100.0%
		% of Total	34.5%	10.3%	37.9%	17.2%	100.0%

Each subscript letter denotes a subset of current: friendships(age 5.0 +) categories whose column proportions do not differ significantly from each other at the .05 level.

Negative affect scale

No significant group differences emerged between the three NA trajectory groups on the ANOVA with the age 9 data; however, when investigating the single ADI-R Friendship item, some group differences were noted. The distribution of codes showed a greater proportion of 2 and 3 codes in Group 2 (57.2%) as opposed to Group 1 (35.7%), possibly suggesting poorer social relationships in Group 2 (cubic trend). However, it should be noted that the 20%

difference was based on just one individual. Additionally, data was available for only one participant in Group 3; therefore, the results from this group could not be interpreted.

Table 27

ADI-R Friendship Item for Age 9 Assessments: NA Scale Groups

NAgroup * current: friendships (age 5.0 +) Crosstabulation

			current: friendships(age 5.0 +)				
			0	1	2	3	Total
NAgroup	1.00	Count	3a	6a	5a	0a	14
		% within NAgroup	21.4%	42.9%	35.7%	0.0%	100.0%
		% of Total	13.6%	27.3%	22.7%	0.0%	63.6%
	2.00	Count	2a	1a	3a	1a	7
		% within NAgroup	28.6%	14.3%	42.9%	14.3%	100.0%
		% of Total	9.1%	4.5%	13.6%	4.5%	31.8%
	3.00	Count	0a	0a	1a	0a	1
		% within NAgroup	0.0%	0.0%	100.0%	0.0%	100.0%
		% of Total	0.0%	0.0%	4.5%	0.0%	4.5%
Total		Count	5	7	9	1	22
		% within NAgroup	22.7%	31.8%	40.9%	4.5%	100.0%
		% of Total	22.7%	31.8%	40.9%	4.5%	100.0%

Each subscript letter denotes a subset of current: friendships (age 5.0 +) categories whose column proportions do not differ significantly from each other at the .05 level.

For the Age 18 assessments, the NA groups showed similar patterns in their distribution of ADI-R Friendship items scores. Specifically, codes of 0 and 2 were more common than scores of 1 or 3. Overall, 50 to 67% of participants across the three groups were reported as having limited or no friends.

Table 28

ADI-R Friendship Item for Age 18 Assessments: NA Scale Groups

NAgroup * current: friendships(age 5.0 +) Crosstabulation

			current: friendships(age 5.0 - 9 years and 11 months)				
			0	1	2	3	Total
NAgroup	1.00	Count	6a	2a	6a	2a	16
		% within NAgroup	37.5%	12.5%	37.5%	12.5%	100.0%
		% of Total	21.4%	7.1%	21.4%	7.1%	57.1%
	2.00	Count	3a	1a	3a	2a	9
		% within NAgroup	33.3%	11.1%	33.3%	22.2%	100.0%
		% of Total	10.7%	3.6%	10.7%	7.1%	32.1%
	3.00	Count	1a	0a	1a	1a	3
		% within NAgroup	33.3%	0.0%	33.3%	33.3%	100.0%
		% of Total	3.6%	0.0%	3.6%	3.6%	10.7%
Total		Count	10	3	10	5	28
		% within NAgroup	35.7%	10.7%	35.7%	17.9%	100.0%
		% of Total	35.7%	10.7%	35.7%	17.9%	100.0%

Each subscript letter denotes a subset of current: friendships (age 5.0 +) categories whose column proportions do not differ significantly from each other at the .05 level.

Conclusion: ADI-R Friendship Item Analyses

Taking all four of these cross-tabulation results into account, there is not clear support for the ADI-R friendship item being able to differentiate between the trajectory groups created from the PA and NA scales through ProcTRAJ. It appears that, although some of the groups demonstrated higher adaptive functioning skills, their social skills—specifically in relation to friendships, as measured by the ADI-R—were still essentially equally and negatively affected. Although these results contradict the hypothesis, it is perhaps not surprising, considering the substantial social impairments associated with all levels of functioning on the autism spectrum. Additionally, when NA trajectory group differences were investigated for the CBCL social items (i.e., Social Competence Scale [6-18], Social Problems Syndrome Scale [6-18], and Friends

Adaptive Functioning Scale [18-59]), no group differences were found between the three NA groups, further suggesting that these groups do not differ significantly in their levels of social impairment despite their varying levels of negative affect. When data from the four PA trajectory groups were analyzed, group means on the Social Competence and Social Problems Syndrome scale were statistically equivalent for all groups. However, group differences did emerge for the Friends Adaptive Functioning Scale. Specifically, Group 1 (PA starts low, decreases) showed lower levels of Friendship scores than the other three groups, a difference that was statistically significant for all but Group 2 ($p = .07$; see Table 24). While the sample sizes preclude generalization of these results to a broader sample, these results do lend potential support to the association between friendship and positive affect.

Analyses of Internalizing and Social Variables

Lastly, analyses comparing the ProcTRAJ groups were run with the internalizing symptom scales to investigate whether the groups differed on the levels of anxiety or depression symptoms reported over time. Additionally, a number of variables of interest were evaluated in the ANOVAs that were considered as potential group discriminators. See Tables X and X for the full results. Variables of interest included the numbers of positive and negative life events experienced, additional CBCL subscales, the Aberrant Behavior Checklist, the Asher Loneliness Scale, and the Quality of Life Questionnaire. Again, no concrete hypotheses were proposed for group differences, although trends supporting the tripartite model were expected within groups.

Negative affect scale.

For the NA scale groups (decreasing, cubic, increasing), a number of interesting group differences were found (see Table 30). First, when grouped based on the NA scale, the PA scores were similar for all trajectories. This provides some evidence in support of NA and PA being

distinct constructs, as one might expect the NA and PA score to show opposite trends if they were in fact representative of opposite ends of a single spectrum. For example, Group 3 showed the highest level of NA and also the highest level of PA. If NA and PA were extremes of a unipolar dimension, then it would be expected that the PA scores for Group 3 would be low, because based on this theory it is impossible to concurrently show high levels of both negative and positive affect. However, these ANOVAs contradict that assumption.

Overall, a trend emerged showing the most impairment across measures for Group 3 (increasing NA; $n = 3$), and the least impairment for Group 1 (decreasing NA; $n = 16$). Several of the subscales on which no group differences were found are not reported in the Table below (e.g., Quality of Life competence and independence subscales). All three groups differed significantly from one another on two CBCL scales: the Anxious Syndrome Scale and the DSM-Oriented Antisocial Personality Problems Scale (only administered for 18-59 year olds; e.g., argues, breaks rules, lies/cheats, damages others' property), on which Group 3 showed the highest T scores falling in the 'Borderline' range and Groups 1 and 2 showed T scores in the normal range (mean for Group 2 was significantly higher than mean for Group 1). Groups 3 and 1 differed primarily on internalizing symptom variables measured by the CBCL (i.e., anxious syndrome scale, somatic complaints, internalizing problems, DSM-oriented depressive problems, and DSM-oriented antisocial personality problems). Groups 3 and 2 were also differentiated primarily by internalizing symptom scales from the CBCL (anxious syndrome scale, somatic complaints, DSM-oriented depressive problems, and DSM-oriented antisocial personality problems). However, Group 2 and Group 1 showed significant differences on a number of other measures (i.e., BDI total, ABC scales: stereotypy, hyperactivity, and inappropriate speech), in addition to the CBCL scales (i.e., anxious syndrome scale, internalizing problems, and DSM-

oriented antisocial personality problems). Means for Group 2 were significantly higher (more impaired) than means for Group 1. Finally, the least impaired Group 1 showed significantly higher scores for the 'satisfaction with life' subscale of the Quality of Life questionnaire (QoL.Q), but the groups did not differ on the other subscales (see Appendix B for a full version of the QoL.Q).

Perhaps equally as interesting are the several scales on which the groups did not differ. Specifically, four scales related to depressive symptoms (CBCL withdrawn/depressed syndrome scale, CBCL DSM-oriented avoidant personality problems, ABC lethargy, and Asher loneliness scale) showed similar means across groups. Upon examination of the items comprising these subscales, a substantial overlap with ASD symptoms was apparent (see Appendices for full versions of the measures). For example, items on the ABC lethargy scale include 'difficult to reach, contact, get through to', 'shows few social reactions to others', 'withdrawn, prefers solitary activities', among others. Items on the CBCL DSM-oriented Avoidant Personality Problems scale includes items such as 'no friends', 'rather be alone', and withdrawn'. With such significant overlap in symptoms, it is not surprising that the groups, all of whom have ASD diagnoses, did not differ on these subscales.

In summary, these analyses again revealed the greatest impairment—in several domains—for Group 3, and the least impairment in Group 1 when dividing the sample based on NA trajectories. However, due to the extremely small sample size in this group ($n = 3$), replication will be necessary to evaluate the whether those who show increases in NA over time in fact show significantly more anxious and depressive symptoms than groups who decrease in NA or fluctuate in levels of reported NA across time, or whether this was simply a function of these three individuals. Also of note in these findings were the differences in behavioral

symptoms reported on the ABC between Groups 1 and 2 (Group 2 was more symptomatic on stereotypy, hyperactivity, and inappropriate speech). Aside from the Life Satisfaction subscale of the QoL.Q, none of the groups differed on the QoL.Q subscales. Lastly, the groups did not differ significantly on the number of positive or negative life events reported.

Table 30
Multiple Comparisons with Bonferroni Correction for NA Scale ProcTRAJ Groups

Dependent Variable		Mean	SD	*n*	Group Comparisons		Mean Difference (I-J)	Std. Error	Sig.
PA total	1 (decrease)	33.19	9.55	98	1	2	1.32	1.28	.907
						3	-2.27	2.34	.999
	2 (cubic)	31.87	7.24	79	2	1	-1.32	1.28	.907
						3	-3.59	2.38	.397
	3 (increase)	35.47	6.20	15	3	1	2.27	2.34	.999
						2	3.59	2.38	.397
NA total	1	14.84	3.89	100	1	2	-6.02*	.71	.000
						3	-13.29*	1.31	.000
	2	20.86	5.26	79	2	1	6.02*	.71	.000
						3	-7.27*	1.33	.000
	3	28.13	6.49	15	3	1	13.29*	1.31	.000
						2	7.27*	1.33	.000
CBCL Anxious/Depressed Syndrome Scale	1	55.94	6.16	47	1	2	-5.58*	1.72	.005
						3	-14.51*	3.05	.000
	2	61.52	9.82	48	2	1	5.58*	1.72	.005
						3	-8.92*	3.05	.013
	3	70.44	10.26	9	3	1	14.51*	3.05	.000
						2	8.92*	3.05	.013
CBCL Somatic Complaints Syndrome Scale	1	52.28	3.54	47	1	2	-2.20	1.33	.300
						3	-8.06*	2.35	.003
	2	54.48	7.05	48	2	1	2.20	1.33	.300
						3	-5.85*	2.35	.043
	3	60.33	12.80	9	3	1	8.06*	2.35	.003
						2	5.85*	2.35	.043
CBCL Withdrawn/Depressed Syndrome Scale	1	62.70	11.27	47	1	2	-.99	2.11	1.000
						3	3.70	3.74	.973
	2	63.69	9.83	48	2	1	.99	2.11	1.000

						3	4.69	3.73	.636
	3	59.00	5.81	9	3	1	-3.70	3.74	.973
						2	-4.69	3.73	.636
CBCL Internalizing Problems Scale	1	55.62	10.22	47	1	2	-5.28*	2.11	.042
						3	-10.38*	3.74	.020
	2	60.90	10.27	48	2	1	5.28*	2.11	.042
						3	-5.10	3.73	.524
	3	66.00	10.69	9	3	1	10.38*	3.74	.020
						2	5.10	3.73	.524

NA Scale Group Differences (cont.)

Dependent Variable		Mean	SD	*n*	Group Comparisons		Mean Difference (I-J)	Std. Error	Sig.
BDI Total	1 (decrease)	7.11	6.80	28	1	2	-6.16*	2.28	.026
						3	-12.23	5.55	.093
	2 (cubic)	13.26	10.58	38	2	1	6.16*	2.28	.026
						3	-6.07	5.48	.816
	3 (increase)	19.33	7.77	3	3	1	12.23	5.55	.093
						2	6.07	5.48	.816
ABC LETHARGY	1	6.70	6.81	46	1	2	-2.79	1.87	.418
						3	-5.02	3.54	.478
	2	9.49	9.22	41	2	1	2.79	1.87	.418
						3	-2.23	3.57	1.000
	3	11.71	15.42	7	3	1	5.02	3.54	.478
						2	2.23	3.57	1.000
ABC STEREOTYPY	1	1.61	2.40	46	1	2	-2.95*	.95	.007
						3	-2.39	1.79	.552
	2	4.56	5.82	41	2	1	2.95*	.95	.007
						3	.56	1.80	1.000
	3	4.00	5.00	7	3	1	2.39	1.79	.552
						2	-.56	1.80	1.000
ABC HYPERACTIVITY	1	2.72	3.31	46	1	2	-7.04*	1.71	.000
						3	-7.14	3.23	.089
	2	9.76	10.30	41	2	1	7.04*	1.71	.000
						3	-.10	3.26	1.000
	3	9.86	13.08	7	3	1	7.14	3.23	.089
						2	.10	3.26	1.000
ABC INAPPROPRIATE SPEECH	1	1.15	2.03	46	1	2	-2.90*	.64	.000
						3	-.85	1.22	1.000
	2	4.05	3.75	41	2	1	2.90*	.64	.000
						3	2.05	1.23	.296
	3	2.00	3.46	7	3	1	.85	1.22	1.000
						2	-2.05	1.23	.296
Asher Loneliness Scale Total	1	55.16	10.78	32	1	2	3.64	2.45	.426
						3	.16	5.86	1.000
	2	51.52	8.73	31	2	1	-3.64	2.45	.426

						3	-3.48	5.87	1.000
	3	55.00	5.29	3	3	1	-.16	5.86	1.000
						2	3.48	5.87	1.000

NA Scale Group Differences (cont.)

Dependent Variable		Mean	SD	*n*	Group Comparisons		Mean Difference (I-J)	Std. Error	Sig.
positive life event count, only data for waves 11, 14, 17, 20	1 (decrease)	3.55	2.17	40	1	2	.59	.56	.899
						3	.05	1.60	1.000
	2 (cubic)	2.96	2.28	25	2	1	-.59	.56	.899
						3	-.54	1.63	1.000
	3 (increase)	3.50	2.12	2	3	1	-.05	1.60	1.000
						2	.54	1.63	1.000
negative life events count, only data for waves 11, 14, 17, 20	1	2.38	2.38	40	1	2	-.75	.75	.965
						3	-.63	2.12	1.000
	2	3.12	3.69	25	2	1	.75	.75	.965
						3	.12	2.15	1.000
	3	3.00	0.00	2	3	1	.63	2.12	1.000
						2	-.12	2.15	1.000
self-report Quality of Life Q, Satisfaction subscale, items 1-10	1	23.58	3.40	33	1	2	2.99*	.79	.001
						3	1.91	2.01	1.000
	2	20.59	3.30	39	2	1	-2.99*	.79	.001
						3	-1.08	1.99	1.000
	3	21.67	2.52	3	3	1	-1.91	2.01	1.000
						2	1.08	1.99	1.000
self-report Quality of Life Q, social belonging subscale, items 31-40	1	20.07	4.01	28	1	2	-2.08	1.16	.234
						3	-3.43	3.32	.917
	2	22.15	4.91	34	2	1	2.08	1.16	.234
						3	-1.35	3.30	1.000
	3	23.50	4.95	2	3	1	3.43	3.32	.917
						2	1.35	3.30	1.000
CBCL Social Competence Scale (6-18)	1	42.20	12.10	15	1	2	1.89	4.17	1.000
						3	-13.13	7.33	.249
	2	40.31	11.82	16	2	1	-1.89	4.17	1.000
						3	-15.02	7.30	.144
	3	55.33	3.51	3	3	1	13.13	7.33	.249
						2	15.02	7.30	.144
CBCL Social Problems Syndrome Scale (6-18)	1	57.07	7.21	15	1	2	-5.56	3.09	.245
						3	-3.60	5.44	1.000
	2	62.63	10.16	16	2	1	5.56	3.09	.245
						3	1.96	5.41	1.000
	3	60.67	2.52	3	3	1	3.60	5.44	1.000
						2	-1.96	5.41	1.000
CBCL Friends (18-59)	1	36.27	13.15	33	1	2	-1.02	3.25	1.000
						3	-10.06	5.76	.257
	2	37.29	13.73	31	2	1	1.02	3.25	1.000
						3	-9.04	5.79	.370
	3	46.33	4.76	6	3	1	10.06	5.76	.257
						2	9.04	5.79	.370

NA Scale Group Differences (cont.)

Dependent Variable		Mean	SD	*n*	Group Comparisons		Mean Difference (I-J)	Std. Error	Sig.
CBCL DSM-Oriented Scale: Depressive Problems	1 (decrease)	55.94	5.19	32	1	2	-3.22	1.77	.221
						3	-12.06*	3.15	.001
	2 (cubic)	59.16	7.25	32	2	1	3.22	1.77	.221
						3	-8.84*	3.15	.020
	3 (increase)	68.00	13.39	6	3	1	12.06*	3.15	.001
						2	8.84*	3.15	.020
CBCL DSM-Oriented Scale: Avoidant Personality Problems (18-59)	1	64.31	9.74	32	1	2	-.22	2.30	1.000
						3	4.48	4.10	.835
	2	64.53	9.38	32	2	1	.22	2.30	1.000
						3	4.70	4.10	.767
	3	59.83	1.60	6	3	1	-4.48	4.10	.835
						2	-4.70	4.10	.767
CBCL DSM-Oriented Scale: Antisocial Personality Problems (18-59)	1	50.94	1.90	32	1	2	-6.00*	1.33	.000
						3	-14.23*	2.36	.000
	2	56.94	6.33	32	2	1	6.00*	1.33	.000
						3	-8.23*	2.36	.003
	3	65.17	10.34	6	3	1	14.23*	2.36	.000
						2	8.23*	2.36	.003

*. The mean difference is significant at the 0.05 level.

Positive affect scale

Next, the same set of variables was evaluated for the trajectory groups from the PA scale. Table 31 summarizes the results of the post hoc comparisons. The largest numbers of significant group differences were seen between Groups 2 (PA starts low, increases) and 4 (PA starts high, increases), with Group 2 showing consistently more impairment on all scales (i.e., CBCL, BDI, AMAS, ABC), with the exception of the Life Events Checklist on which no differences emerged. Group 2 also showed significantly more impairment compared to Group 3 (PA starts high, decreases) on the CBCL Anxious Syndrome Scale, the BDI total score, the ABC lethargy subscale, the QoL.Q Social Belonging Scale, and showed significantly fewer positive life events across time. Group 2 also showed significantly more impairment than Group 1 (PA starts low,

decreases) on the ABC inappropriate speech subscale and the CBCL Friendship scale (discussed previously).

In general, Group 4 emerged as the least impaired of the four groups created from the PA scale trajectories. In addition to the many group differences seen between Groups 4 and 2, Group 4 showed significantly less impairment than Groups 1 and 3 on several CBCL and ABC scales, as well as significantly higher scores on several social measures (i.e., QoL.Q life satisfaction, QoL.Q social belonging, and CBCL Friends Scale). Interestingly, Group 4 also showed the highest levels of reported loneliness, although the difference was only significant between the two most extreme groups (2 vs. 4).

Summary of Internalizing and Social Variables Analyses

Based on these results, it appears that the PA trajectory groups are best differentiated by the Withdrawn/Depressed Syndrome Scale of the CBCL, and less so by measures of anxiety. On the other hand, the NA trajectory groups were best differentiated with the Anxious/Depressed Syndrome Scale of the CBCL. These results are consistent with the tripartite model, with NA relating to both anxiety and depressive symptoms and PA relating to depressive symptoms only. Many group differences also emerged in relation to aberrant behaviors (ABC) and other CBCL scores, although none differentiated each group from one another in the way the Withdrawn/Depressed and Anxious/Depressed Syndrome Scales were able to do. As noted previously, it is possible that the ABC and some of the CBCL scales may have been identifying common ASD characteristics, thus making it less likely that the groups would be differentiated based on these variables.

Table 31
Multiple Comparisons with Bonferroni Correction for PA Scale ProcTRAJ Groups

Dependent Variable		*Mean*	*SD*	*n*	Group Comparisons		Mean Difference (I-J)	Std. Error	Sig.
PA total	1 (low, decrease)	18.26	4.75	23	1	2	-10.69*	1.35	.000
						3	-17.51*	1.43	.000
						4	-20.94*	1.35	.000
	2 (low, increase)	28.95	5.71	66	2	1	10.69*	1.35	.000
						3	-6.82*	1.08	.000
						4	-10.24*	.97	.000
	3 (high, decrease)	35.77	6.20	44	3	1	17.51*	1.43	.000
						2	6.82*	1.08	.000
						4	-3.42*	1.08	.011
	4 (high, increase)	39.20	5.22	66	4	1	20.94*	1.35	.000
						2	10.24*	.97	.000
						3	3.42*	1.08	.011
NA total	1	19.25	7.21	24	1	2	-1.73	1.50	1.000
						3	2.27	1.59	.934
						4	2.34	1.50	.727
	2	20.98	7.25	66	2	1	1.73	1.50	1.000
						3	4.01*	1.22	.007
						4	4.08*	1.10	.002
	3	16.98	5.28	45	3	1	-2.27	1.59	.934
						2	-4.01*	1.22	.007
						4	.07	1.22	1.000
	4	16.91	5.54	66	4	1	-2.34	1.50	.727
						2	-4.08*	1.10	.002
						3	-.07	1.22	1.000
CBCL Anxious/Depressed Syndrome Scale	1	59.64	7.01	14	1	2	-5.09	2.68	.362
						3	-.47	2.81	1.000
						4	5.04	2.76	.425
	2	64.73	10.85	37	2	1	5.09	2.68	.362
						3	4.62	2.16	.209
						4	10.13*	2.10	.000
	3	60.11	7.05	27	3	1	.47	2.81	1.000
						2	-4.62	2.16	.209
						4	5.51	2.26	.100
	4	54.60	6.97	30	4	1	-5.04	2.76	.425
						2	-10.13*	2.10	.000
						3	-5.51	2.26	.100

Paired Comparisons: PA Scale Trajectory Groups

Dependent Variable		*Mean*	*SD*	*n*	Group Comparisons		Mean Difference (I-J)	Std. Error	Sig.
CBCL Somatic Complaints Syndrome Scale	1	54.21	4.79	14	1	2	-1.57	2.06	1.000
						3	-.71	2.17	1.000
						4	2.81	2.13	1.000
	2	55.78	8.47	37	2	1	1.57	2.06	1.000
						3	.86	1.66	1.000
						4	4.38*	1.62	.047
	3	54.93	7.25	27	3	1	.71	2.17	1.000
						2	-.86	1.66	1.000
						4	3.53	1.74	.275
	4	51.40	2.93	30	4	1	-2.81	2.13	1.000
						2	-4.38*	1.62	.047
						3	-3.53	1.74	.275
CBCL Withdrawn/Depressed Syndrome Scale	1	75.64	8.79	14	1	2	9.53*	2.93	.009
						3	12.57*	3.07	.001
						4	19.71*	3.02	.000
	2	66.11	9.73	37	2	1	-9.53*	2.93	.009
						3	3.03	2.36	1.000
						4	10.17*	2.29	.000
	3	63.07	11.16	27	3	1	-12.57*	3.07	.001
						2	-3.03	2.36	1.000
						4	7.14*	2.47	.028
	4	55.93	6.91	30	4	1	-19.71*	3.02	.000
						2	-10.17*	2.29	.000
						3	-7.14*	2.47	.028
CBCL Internalizing Problems Scale	1	66.00	7.48	14	1	2	1.65	2.99	1.000
						3	6.11	3.14	.325
						4	16.13*	3.08	.000
	2	64.35	9.08	37	2	1	-1.65	2.99	1.000
						3	4.46	2.41	.403
						4	14.48*	2.34	.000
	3	59.89	10.33	27	3	1	-6.11	3.14	.325
						2	-4.46	2.41	.403
						4	10.02*	2.53	.001
	4	49.87	10.13	30	4	1	-16.13*	3.08	.000
						2	-14.48*	2.34	.000
						3	-10.02*	2.53	.001

Paired Comparisons: PA Scale Trajectory Groups

Dependent Variable		*Mean*	*SD*	*n*	Group Comparisons		Mean Difference (I-J)	Std. Error	Sig.
BDI Total	1	11.80	8.26	5	1	2	-4.85	4.45	1.000
						3	2.58	4.45	1.000
						4	4.70	4.51	1.000
	2	16.65	11.31	23	2	1	4.85	4.45	1.000
						3	7.43*	2.66	.041
						4	9.55*	2.76	.006
	3	9.22	8.07	23	3	1	-2.58	4.45	1.000
						2	-7.43*	2.66	.041
						4	2.12	2.76	1.000
	4	7.10	7.00	20	4	1	-4.70	4.51	1.000
						2	-9.55*	2.76	.006
						3	-2.12	2.76	1.000
self-report AMAS, Worry Subscale scores	1	7.00	4.55	4	1	2	-2.32	2.06	1.000
						3	-2.81	2.06	1.000
						4	.47	2.13	1.000
	2	9.32	3.85	22	2	1	2.32	2.06	1.000
						3	-.49	1.15	1.000
						4	2.78	1.27	.191
	3	9.81	3.31	21	3	1	2.81	2.06	1.000
						2	.49	1.15	1.000
						4	3.28	1.28	.078
	4	6.53	4.12	15	4	1	-.47	2.13	1.000
						2	-2.78	1.27	.191
						3	-3.28	1.28	.078
self-report AMAS, Social Concerns/Stress Subscale	1	2.50	1.73	4	1	2	-1.73	1.14	.804
						3	-1.21	1.14	1.000
						4	-.30	1.18	1.000
	2	4.23	2.43	22	2	1	1.73	1.14	.804
						3	.51	.64	1.000
						4	1.43	.70	.276
	3	3.71	2.00	21	3	1	1.21	1.14	1.000
						2	-.51	.64	1.000
						4	.91	.71	1.000
	4	2.80	1.70	15	4	1	.30	1.18	1.000
						2	-1.43	.70	.276
						3	-.91	.71	1.000

Paired Comparisons: PA Scale Trajectory Groups

Dependent Variable		*Mean*	*SD*	*n*	Group Comparisons		Mean Difference (I-J)	Std. Error	Sig.
self-report AMAS, Physiological Anxiety Subscale	1	4.50	2.52	4	1	2	-.41	1.31	1.000
						3	1.21	1.32	1.000
						4	2.50	1.36	.423
	2	4.91	3.01	22	2	1	.41	1.31	1.000
						3	1.62	.74	.188
						4	2.91*	.81	.004
	3	3.29	1.93	21	3	1	-1.21	1.32	1.000
						2	-1.62	.74	.188
						4	1.29	.82	.721
	4	2.00	1.96	15	4	1	-2.50	1.36	.423
						2	-2.91*	.81	.004
						3	-1.29	.82	.721
self-report AMAS, Total score	1	14.00	7.39	4	1	2	-4.45	3.94	1.000
						3	-2.81	3.96	1.000
						4	2.67	4.08	1.000
	2	18.45	8.69	22	2	1	4.45	3.94	1.000
						3	1.65	2.21	1.000
						4	7.12*	2.43	.029
	3	16.81	6.19	21	3	1	2.81	3.96	1.000
						2	-1.65	2.21	1.000
						4	5.48	2.45	.177
	4	11.33	6.21	15	4	1	-2.67	4.08	1.000
						2	-7.12*	2.43	.029
						3	-5.48	2.45	.177
ABC IRRITABILITY	1	5.08	5.14	12	1	2	-2.56	2.62	1.000
						3	-3.60	2.76	1.000
						4	3.27	2.61	1.000
	2	7.65	11.34	31	2	1	2.56	2.62	1.000
						3	-1.04	2.15	1.000
						4	5.83*	1.94	.020
	3	8.68	7.27	22	3	1	3.60	2.76	1.000
						2	1.04	2.15	1.000
						4	6.87*	2.13	.011
	4	1.81	2.89	32	4	1	-3.27	2.61	1.000
						2	-5.83*	1.94	.020
						3	-6.87*	2.13	.011

Paired Comparisons: PA Scale Trajectory Groups

Dependent Variable		Mean	SD	*n*	Group Comparisons		Mean Difference (I-J)	Std. Error	Sig.
ABC LETHARGY	1	14.00	8.88	12	1	2	.90	2.75	1.000
						3	7.32	2.90	.080
						4	10.25*	2.74	.002
	2	13.10	9.54	31	2	1	-.90	2.75	1.000
						3	6.41*	2.25	.033
						4	9.35*	2.04	.000
	3	6.68	9.14	22	3	1	-7.32	2.90	.080
						2	-6.41*	2.25	.033
						4	2.93	2.24	1.000
	4	3.75	4.85	32	4	1	-10.25*	2.74	.002
						2	-9.35*	2.04	.000
						3	-2.93	2.24	1.000
ABC STEREOTYPY	1	1.17	1.70	12	1	2	-2.58	1.44	.463
						3	-4.47*	1.52	.025
						4	-.05	1.43	1.000
	2	3.74	4.46	31	2	1	2.58	1.44	.463
						3	-1.89	1.18	.673
						4	2.52	1.07	.121
	3	5.64	6.54	22	3	1	4.47*	1.52	.025
						2	1.89	1.18	.673
						4	4.42*	1.17	.002
	4	1.22	2.14	32	4	1	.05	1.43	1.000
						2	-2.52	1.07	.121
						3	-4.42*	1.17	.002
ABC HYPERACTIVITY	1	3.67	3.08	12	1	2	-4.43	2.71	.632
						3	-6.92	2.86	.104
						4	1.26	2.70	1.000
	2	8.10	9.50	31	2	1	4.43	2.71	.632
						3	-2.49	2.22	1.000
						4	5.69*	2.01	.034
	3	10.59	10.76	22	3	1	6.92	2.86	.104
						2	2.49	2.22	1.000
						4	8.18*	2.21	.002
	4	2.41	4.61	32	4	1	-1.26	2.70	1.000
						2	-5.69*	2.01	.034
						3	-8.18*	2.21	.002

Paired Comparisons: PA Scale Trajectory Groups

Dependent Variable		Mean	SD	*n*	Group Comparisons		Mean Difference (I-J)	Std. Error	Sig.
ABC INAPPROPRIATE SPEECH	1	.58	1.08	12	1	2	-2.97*	1.01	.025
						3	-3.37*	1.06	.012
						4	-.32	1.00	1.000
	2	3.55	3.62	31	2	1	2.97*	1.01	.025
						3	-.41	.83	1.000
						4	2.64*	.75	.004
	3	3.95	3.51	22	3	1	3.37*	1.06	.012
						2	.41	.83	1.000
						4	3.05*	.82	.002
	4	.91	2.20	32	4	1	.32	1.00	1.000
						2	-2.64*	.75	.004
						3	-3.05*	.82	.002
Asher Loneliness Scale	1	52.60	10.19	5	1	2	2.84	4.56	1.000
						3	.74	4.56	1.000
						4	-5.08	4.54	1.000
	2	49.76	10.53	21	2	1	-2.84	4.56	1.000
						3	-2.10	2.83	1.000
						4	-7.92*	2.80	.037
	3	51.86	8.96	21	3	1	-.74	4.56	1.000
						2	2.10	2.83	1.000
						4	-5.82	2.80	.247
	4	57.68	7.62	22	4	1	5.08	4.54	1.000
						2	7.92*	2.80	.037
						3	5.82	2.80	.247
positive life event count, only data for waves 11, 14, 17, 20	1	1.89	1.83	9	1	2	-.41	.85	1.000
						3	-2.80*	.88	.014
						4	-2.03	.82	.093
	2	2.30	1.72	20	2	1	.41	.85	1.000
						3	-2.39*	.71	.008
						4	-1.62	.63	.073
	3	4.69	2.55	16	3	1	2.80*	.88	.014
						2	2.39*	.71	.008
						4	.76	.67	1.000
	4	3.92	2.19	26	4	1	2.03	.82	.093
						2	1.62	.63	.073
						3	-.76	.67	1.000

Paired Comparisons: PA Scale Trajectory Groups

Dependent Variable		*Mean*	*SD*	*n*	Group Comparisons		Mean Difference (I-J)	Std. Error	Sig.
negative life events count, only data for waves 11, 14, 17, 20	1	1.00	.87	9	1	2	-1.25	1.12	1.000
						3	-2.81	1.16	.109
						4	-1.88	1.08	.511
	2	2.25	2.07	20	2	1	1.25	1.12	1.000
						3	-1.56	.94	.597
						4	-.63	.83	1.000
	3	3.81	4.26	16	3	1	2.81	1.16	.109
						2	1.56	.94	.597
						4	.93	.89	1.000
	4	2.88	2.53	26	4	1	1.88	1.08	.511
						2	.63	.83	1.000
						3	-.93	.89	1.000
self-report Quality of Life Q, Satisfaction subscale, items 1-10	1	21.29	3.20	7	1	2	.97	1.40	1.000
						3	-.03	1.43	1.000
						4	-2.93	1.42	.253
	2	20.32	4.57	25	2	1	-.97	1.40	1.000
						3	-1.00	.96	1.000
						4	-3.90*	.95	.001
	3	21.32	2.34	22	3	1	.03	1.43	1.000
						2	1.00	.96	1.000
						4	-2.90*	.98	.025
	4	24.22	2.24	23	4	1	2.93	1.42	.253
						2	3.90*	.95	.001
						3	2.90*	.98	.025
self-report Quality of Life Q, competence subscale, items 11-20	1	18.29	6.97	7	1	2	-1.81	2.97	1.000
						3	-.54	3.04	1.000
						4	-2.94	3.02	1.000
	2	20.10	6.76	20	2	1	1.81	2.97	1.000
						3	1.28	2.23	1.000
						4	-1.12	2.20	1.000
	3	18.82	6.33	17	3	1	.54	3.04	1.000
						2	-1.28	2.23	1.000
						4	-2.40	2.29	1.000
	4	21.22	7.11	18	4	1	2.94	3.02	1.000
						2	1.12	2.20	1.000
						3	2.40	2.29	1.000

Paired Comparisons: PA Scale Trajectory Groups

Dependent Variable		*Mean*	*SD*	*n*	Group Comparisons		Mean Difference (I-J)	Std. Error	Sig.
self-report Quality of Life Q, independence subscale, items 21-30	1	23.71	4.15	7	1	2	2.31	1.52	.795
						3	.56	1.56	1.000
						4	.03	1.57	1.000
	2	21.40	3.64	25	2	1	-2.31	1.52	.795
						3	-1.75	1.07	.632
						4	-2.28	1.08	.231
	3	23.15	3.20	20	3	1	-.56	1.56	1.000
						2	1.75	1.07	.632
						4	-.53	1.14	1.000
	4	23.68	3.58	19	4	1	-.03	1.57	1.000
						2	2.28	1.08	.231
						3	.53	1.14	1.000
self-report Quality of Life Q, social belonging subscale, items 31-40	1	15.00	2.53	6	1	2	-3.47	1.72	.289
						3	-7.50*	1.67	.000
						4	-8.62*	1.68	.000
	2	18.47	3.06	17	2	1	3.47	1.72	.289
						3	-4.03*	1.17	.006
						4	-5.15*	1.18	.000
	3	22.50	4.42	22	3	1	7.50*	1.67	.000
						2	4.03*	1.17	.006
						4	-1.12	1.11	1.000
	4	23.62	3.34	21	4	1	8.62*	1.68	.000
						2	5.15*	1.18	.000
						3	1.12	1.11	1.000
CBCL Social Competence Scale (6-18)	1	27.00	8.72	3	1	2	-12.58	7.22	.545
						3	-15.14	7.71	.350
						4	-20.93*	7.11	.036
	2	39.58	13.52	12	2	1	12.58	7.22	.545
						3	-2.56	5.32	1.000
						4	-8.35	4.40	.401
	3	42.14	9.14	7	3	1	15.14	7.71	.350
						2	2.56	5.32	1.000
						4	-5.79	5.17	1.000
	4	47.93	10.13	14	4	1	20.93*	7.11	.036
						2	8.35	4.40	.401
						3	5.79	5.17	1.000

Paired Comparisons: PA Scale Trajectory Groups

Dependent Variable		*Mean*	*SD*	*n*	Group Comparisons		Mean Difference (I-J)	Std. Error	Sig.
CBCL Social Problems Syndrome Scale (6-18)	1	61.67	7.09	3	1	2	-3.33	5.27	1.000
						3	4.67	5.63	1.000
						4	4.67	5.19	1.000
	2	65.00	10.30	12	2	1	3.33	5.27	1.000
						3	8.00	3.88	.285
						4	8.00	3.21	.109
	3	57.00	7.05	7	3	1	-4.67	5.63	1.000
						2	-8.00	3.88	.285
						4	0.00	3.78	1.000
	4	57.00	6.61	14	4	1	-4.67	5.19	1.000
						2	-8.00	3.21	.109
						3	0.00	3.78	1.000
CBCL Friends (18-59)	1	25.55	5.72	11	1	2	-11.13	4.33	.074
						3	-12.61*	4.53	.042
						4	-19.14*	4.68	.001
	2	36.68	11.99	25	2	1	11.13	4.33	.074
						3	-1.48	3.64	1.000
						4	-8.01	3.83	.241
	3	38.16	14.01	19	3	1	12.61*	4.53	.042
						2	1.48	3.64	1.000
						4	-6.53	4.06	.673
	4	44.69	12.30	16	4	1	19.14*	4.68	.001
						2	8.01	3.83	.241
						3	6.53	4.06	.673
CBCL DSM-Oriented Scale: Depressive Problems	1	63.73	8.73	11	1	2	.21	2.49	1.000
						3	5.43	2.59	.238
						4	12.79*	2.70	.000
	2	63.52	8.69	25	2	1	-.21	2.49	1.000
						3	5.22	2.07	.084
						4	12.58*	2.21	.000
	3	58.30	5.67	20	3	1	-5.43	2.59	.238
						2	-5.22	2.07	.084
						4	7.36*	2.31	.013
	4	50.94	1.77	16	4	1	-12.79*	2.70	.000
						2	-12.58*	2.21	.000
						3	-7.36*	2.31	.013

Paired Comparisons: PA Scale Trajectory Groups

Dependent Variable		*Mean*	*SD*	*n*	Group Comparisons		Mean Difference (I-J)	Std. Error	Sig.
CBCL DSM-Oriented Scale: Avoidant Personality Problems (18-59)	1	74.18	5.29	11	1	2	7.54	2.96	.079
						3	10.53*	3.07	.006
						4	16.49*	3.20	.000
	2	66.64	9.36	25	2	1	-7.54	2.96	.079
						3	2.99	2.45	1.000
						4	8.95*	2.62	.006
	3	63.65	9.26	20	3	1	-10.53*	3.07	.006
						2	-2.99	2.45	1.000
						4	5.96	2.74	.199
	4	57.69	5.97	16	4	1	-16.49*	3.20	.000
						2	-8.95*	2.62	.006
						3	-5.96	2.74	.199
CBCL DSM-Oriented Scale: Antisocial Personality Problems (18-59)	1	52.91	2.55	11	1	2	-4.81	2.24	.213
						3	-3.04	2.33	1.000
						4	2.16	2.43	1.000
	2	57.72	9.11	25	2	1	4.81	2.24	.213
						3	1.77	1.86	1.000
						4	6.97*	1.98	.005
	3	55.95	5.30	20	3	1	3.04	2.33	1.000
						2	-1.77	1.86	1.000
						4	5.20	2.08	.089
	4	50.75	1.18	16	4	1	-2.16	2.43	1.000
						2	-6.97*	1.98	.005
						3	-5.20	2.08	.089

*. The mean difference is significant at the 0.05 level.

Friendship intervention study.

To investigate the relations between the revised PANAS-C scales and social variables, basic descriptives, correlations, and regressions were run for each age group separately (6 to 7 years, 8 to 11 years, and 11 to 17 years). Further analyses evaluated the relations between PA and NA scales, internalizing symptom scores, and social variables. These analyses are presented in the relevant sections below. All analyses were completed using SPSS software (v20). As stated previously, the purpose of this dissertation was not to evaluate the school-based intervention administered to these individuals with ASD, but rather to evaluate the effectiveness of the PANAS-C for children and teens with autism spectrum disorders and to assess the levels of internalizing symptoms present. Therefore, little time was spent on the differences pre- and post-intervention.

Group 1: 6 to 7 year olds

Preliminary analyses showed no significant differences between scores on variables of interest across timepoints for the 6 to 7 year olds. Therefore, data across all three timepoints were merged to evaluate relations between variables of interest. This resulted in 39 cases out of the total 63 possible (three timepoints for each of 21 individuals aged 6 to 7 years).

Correlation Analyses

Based on existing research regarding the theoretical relations between friendship, social engagement, and internalizing symptoms, it was expected that those with elevated levels of internalizing symptoms would show lower friendship quality, less time engaged with peers, and more negative scores on the social network measure than those with average levels of internalizing symptoms. Correlations were run with each age group to evaluate the overall

associations between NA, PA, internalizing measures, and social variables (e.g., FQS, QPQ, POPE, SNC).

The results for correlation analyses are summarized in Table 32, and show partial support of the hypothesized relationships between the variables. Not surprisingly, the scores on the Loneliness Questionnaire were strongly correlated with PA-Happy/Sad scores in the expected negative direction. A small positive correlation was found between the NA-Fear scale and the Loneliness Questionnaire. Negative associations were found between the Loneliness Questionnaire scores and all three parent-report BASC subscales, with the strongest correlation with the Anxiety subscale. These associations were unexpected, as higher anxiety symptoms have been shown to be associated with increased levels of loneliness in individuals with ASD (White & Roberson-Nay, 2009).

On the Friendship Qualities Scale (FQS), a significant positive correlation was found between NA-Fear scores and the levels of conflict with a best friend reported by the participants, suggesting that as NA increases more conflict between friends is reported. Significant positive associations were found between PA scores and the Companionship and Closeness scales of the FQS, while the correlation was marginally significant between the PA-Happy/Sad scale and the FQS Security scale. Additionally, negative correlations were found between PA scores and FQS levels of conflict, as well as QPQ levels of disengagement. These associations are in line with expectations. Contrary to predictions, the percent of time spent jointly engaged with peers on the playground was positively correlated with parent reported levels of depression and anxiety on the BASC-2; however these BASC-2 scores were, as expected, negatively correlated with the number of play dates with peers. This association between the parent-report BASC scores and the QPQ playdates was particularly strong for the Anxiety subscale.

Table 32
Group 1 (under 8 years): Correlations Between Primary Internalizing Measures and Social Measures

Scale	NA Fear	PA Happy/Sad	P-BASC Anxiety	P-BASC Depression	P-BASC Intern Comp
Loneliness Q.	.32	-.59**	-.59*	-.36	-.47[a]
SNC score	-.24	.14	.23	.07	.15
SN # Rejections	-.25	.07	-.17	.07	-.07
POPE % Joint Engage	-.05	-.01	.33[a]	.52**	.37[a]
FQS Companionship	-.20	.38[a]	.12	.34	.20
FQS Conflict	.56*	-.56*	-.19	-.14	-.25
FQS Help	-.13	.22	.15	.11	.14
FQS Security	.20	.41[a]	-.19	.03	.00
FQS Closeness	-.05	.75**	.08	.27	.32
QPQ Engaged	-.09	.40[a]	-.11	-.11	-.06
QPQ Conflict	-.02	.05	-.38[a]	-.11	-.25
QPQ Disengaged	-.04	-.49*	-.33	-.35	-.43[a]
QPQ Play Dates Away	.02	.21	-.51*	-.36	-.44*
QPQ Play Dates Home	.19	.07	-.45*	-.13	-.33
QPQ Total Play Dates	.09	.17	-.52*	-.28	-.43[a]

Note. SNC = social network centrality; SN = Social Network measure; POPE = Playground Observation of Peer Engagement; FQS = Friendship Quality Scale; QPQ = Quality of Play Questionnaire. [a] p =< .10; * p =< .05; ** p =< .01

Group Comparisons

In an effort to evaluate the applicability of the tripartite model to this young age group from a different vantage point, two subgroups were created which corresponded to potential diagnoses of depression and anxiety. These groups were created based on recommendations from the author of the PANAS-C (J. Laurent, personal communication, February 12, 2010) to use one standard deviation above the NA cutoff and one standard deviation below the PA cutoff as a screening tool for potential depression. Participants were included in the depression risk group (DEPR) if the NA-FEAR score was 18 or higher and if the PA-Happy/Sad score was 27 or lower. For the anxiety risk group (ANX), the same NA score of 18 was used, but the PA score was permitted to be just one half of a standard deviation below the mean (i.e., 31 and greater), due to the theoretical assumption that PA is less associated with anxiety. In addition to these

groups, a third group emerged which demonstrated PA scores under the cutoff of 27 points and relatively low NA scores that did not meet the NA cutoff for the depression. Theoretically speaking, this was an interesting subgroup, which seemed to be showing a relatively low/flat level of affect in general—a common characteristic of individuals on the autism spectrum (LOWAFFECT). A fourth group was created to represent individuals for whom an internalizing diagnosis would not be expected; specifically, this group showed PA scores in the upper 25% and NA scores in the lower 25% (NoDX). Lastly, the participants who did not fit any category were grouped together (OTHER) for the analyses.

Table 33 presents descriptive statistics for the variables of interest and Table 34 presents the significant post hoc comparisons. It was expected that those in the DEPR and ANX groups would show lower scores on social variables in comparison to the NoDX group. No specific predictions were made for the other two groups (LOWAFFECT, OTHER). Due to the extremely small sample sizes in each of these subgroups, post hoc comparison tests could not be run for some of the variables. However, with an exploratory lens, means and difference scores were evaluated in their absence, and variables for which the omnibus ANOVA was significant are indicated in Table 33.

None of the participants in this age group were categorized in the ANX group; therefore only four groups were compared in the following analyses (DEPR, LOWAFFECT, OTHER, NoDX). No significant group differences were found for the participant characteristic variables (i.e., FSIQ, ADOS, SCQ). However, the DEPR group consisted of a single participant for these variables, thus interpretation of the scores is difficult (i.e., low IQ, high ADOS scores), and results should be considered preliminary on

Table 33
Group 1: Descriptives for Affect Groups

Scale		N	Mean	SD	Scale		N	Mean	SD
NA*	OTHER	28	14.00	4.21	pBASC Anx	OTHER	18	56.94	12.01
	NoDX	5	7.00	1.41		NoDX	5	53.20	18.27
	DEPR	2	19.50	2.12		DEPR	2	48.50	4.95
	LOWAFFECT	4	13.25	3.40		LOWAFFECT	2	44.00	1.41
PA*	OTHER	28	36.21	5.76	pBASC Dep	OTHER	18	55.83	10.44
	NoDX	5	42.20	1.30		NoDX	5	52.60	9.53
	DEPR	2	23.50	.71		DEPR	2	49.00	2.83
	LOWAFFECT	4	23.25	3.86		LOWAFFECT	2	45.00	2.83
FSIQ	OTHER	9	93.00	18.49	pBASC Intern Comp	OTHER	18	57.94	12.58
	NoDX	4	117.25	15.37		NoDX	5	53.60	15.14
	DEPR	1	88.00			DEPR	2	44.50	2.12
	LOWAFFECT	2	113.50	19.09		LOWAFFECT	2	41.00	2.83
SCQ total score	OTHER	9	26.00	7.45	Loneliness Q	OTHER	11	39.09	16.14
	NoDX	4	26.25	4.03		NoDX	3	26.00	6.00
	DEPR	1	15.00			DEPR	1	43.00	
	LOWAFFECT	0				LOWAFFECT	3	48.67	10.26
ADOS comm total	OTHER	9	3.67	1.73	POPE % JE	OTHER	17	38.61	31.43
	NoDX	4	3.50	1.00		NoDX	4	42.67	13.67
	DEPR	1	7.00			DEPR	2	50.57	9.29
	LOWAFFECT	2	2.50	.71		LOWAFFECT	4	46.50	38.10
ADOS social total	OTHER	9	8.89	2.32	SNC score	OTHER	13	1.23	.93
	NoDX	4	8.75	2.87		NoDX	3	1.00	1.00
	DEPR	1	13.00			DEPR	2	.50	.71
	LOWAFFECT	2	7.50	.71		LOWAFFECT	3	1.33	.58
ADOS comm + social total	OTHER	9	12.56	3.61	SN: Rejects	OTHER	13	1.31	1.65
	NoDX	4	12.25	3.50		NoDX	3	1.33	.58
	DEPR	1	20.00			DEPR	2	.00	.00
	LOWAFFECT	2	10.00	1.41		LOWAFFECT	3	1.00	1.00
ADOS RRB total	OTHER	9	2.00	1.22					
	NoDX	4	2.25	1.89					
	DEPR	1	1.00						
	LOWAFFECT	2	1.00	1.41					

Group 1: Descriptives for Affect Groups (cont.)

Scale		N	Mean	SD	Scale		N	Mean	SD
FQS Companionship	OTHER	12	11.83	3.21	QPQ Engaged	OTHER	13	3.92	2.53
	NoDX	4	14.75	1.50		NoDX	4	6.50	1.29
	DEPR	2	13.00	.00		DEPR	2	3.50	2.12
	LOWAFFECT	3	11.00	3.00		LOWAFFECT	2	3.50	2.12
FQS Conflict[a]	OTHER	11	8.00	3.66	QPQ Conflict	OTHER	13	2.15	2.34
	NoDX	4	6.00	3.37		NoDX	4	4.50	4.20
	DEPR	2	14.00	1.41		DEPR	2	3.50	4.95
	LOWAFFECT	3	9.00	3.00		LOWAFFECT	2	6.00	1.41
FQS Help	OTHER	11	15.27	3.32	QPQ Disengaged	OTHER	13	2.92	2.36
	NoDX	4	17.25	3.50		NoDX	4	3.75	2.06
	DEPR	2	15.00	4.24		DEPR	2	5.50	2.12
	LOWAFFECT	3	14.67	6.81		LOWAFFECT	2	5.50	.71
FQS Security	OTHER	11	14.91	4.76	QPQ Playdates Away	OTHER	13	.92	1.32
	NoDX	4	14.50	6.40		NoDX	4	2.75	4.27
	DEPR	2	12.50	2.12		DEPR	2	1.50	.71
	LOWAFFECT	3	11.00	4.58		LOWAFFECT	2	1.00	1.41
FQS Closeness*	OTHER	12	18.50	3.94	QPQ Playdates Home	OTHER	13	1.23	1.24
	NoDX	4	21.00	3.37		NoDX	4	2.00	2.31
	DEPR	2	14.50	3.54		DEPR	2	2.50	.71
	LOWAFFECT	3	13.00	2.65		LOWAFFECT	2	1.50	.71
					QPQ Total Playdates	OTHER	13	2.15	2.38
						NoDX	4	4.75	6.18
						DEPR	2	4.00	1.41
						LOWAFFECT	2	2.50	.71

Note. * Omnibus ANOVA $p < .05$;

Very few differences emerged between the parent-report BASC scores for internalizing symptoms in this age group. Parents of individuals in the OTHER and NoDX groups were reported to have slightly higher mean levels of Internalizing Symptoms than the DEPR and LOWAFFECT groups, but all scores fell within the normal range and differences were not significant. Loneliness scores showed the opposite trend, with the DEPR and LOWAFFECT groups showing higher levels of self-reported loneliness than those in the OTHER or NoDX groups. Although a 22 point difference emerged between the mean Loneliness scores for the NoDX and LOWAFFECT groups, the difference was not found to be significant, likely due to the small sample sizes.

Group differences were fairly small for the Engaged, Conflict, and Disengaged subscales of the QPQ, and no discernible pattern emerged across groups. The NoDX group reported higher levels of positive friendship qualities (i.e., companionship, help, closeness, security) and a lower level of negative friendship qualities (i.e., conflict) than those in the DEPR and LOWAFFECT groups on the FQS. Significant differences were found between the groups for two of these FQS subscales: Conflict and Closeness. On the Conflict subscale, the DEPR group showed marginally significantly greater levels of reported conflict with a best friend than the NoDX group. The NoDX group showed marginally significantly greater levels of reported closeness with a best friend than the LOWAFFECT group. The differences in closeness scores between the remainder of the groups were non-significant.

Specific attention is given here to examine the trends in the LOWAFFECT group that emerged as having PA scores below the cutoff, but average or low levels of NA. As stated previously, this 'flat affect' reported by some participants on the PANAS-C is demonstrative of one of the primary characteristics of ASD. One potential descriptor of this group could be 'ASD

without comorbid internalizing symptoms.' Interestingly, across all groups, the LOWAFFECT (n = 2) group showed the lowest ADOS scores, suggesting less severity in ASD symptoms. Internalizing scores as reported by parents on the BASC-2 were in the average range, although T-scores were lower for this LOWAFFECT group than for any of the other groups. While the social network centrality (SNC) score was the highest for this group and the percentage of time spent in joint engagement on the playground was observed to be near 50%, the scores on the FQS and QPQ subscales for this group did not differ substantially from the others. In fact, the QPQ and FQS scores for the LOWAFFECT group were often quite close to those in the DEPR group. At first glance, these results seem counterintuitive—greater levels of classroom integration and engaged play would be expected to translate into higher functioning friendships. Despite the comparatively high SNC and percentage of time spent in jointly engaged play, the social network status associated with the average score for the LOWAFFECT group was only between 'peripheral' and 'secondary' (M = 1.3). The implications of these results across groups will be discussed at a later point.

Table 34

Group 1: Significant Post Hoc Paired Comparisons for Affect Subgroups

Paired Comparisons			Mean Difference	Std. Error	Sig.	Paired Comparisons			Mean Difference	Std. Error	Sig.
NA-Fear	OTHER	NoDX	7.00	1.88	.00	FQS Conflict	OTHER	NoDX	2.00	2.00	1.00
		DEPR	-5.50	2.84	.36			DEPR	-6.00	2.63	.22
		LowAffect	.75	2.07	1.00			LowAffect	-1.00	2.23	1.00
	NoDX	OTHER	-7.00	1.88	.00		NoDX	OTHER	-2.00	2.00	1.00
		DEPR	-12.50	3.24	.00			DEPR	-8.00	2.97	.10
		LowAffect	-6.25	2.60	.13			LowAffect	-3.00	2.62	1.00
	DEPR	OTHER	5.50	2.84	.36		DEPR	OTHER	6.00	2.63	.22
		NoDX	12.50	3.24	.00			NoDX	8.00	2.97	.10
		LowAffect	6.25	3.35	.43			LowAffect	5.00	3.13	.78
	LowAffect	OTHER	-.75	2.07	1.00		LowAffect	OTHER	1.00	2.23	1.00
		NoDX	6.25	2.60	.13			NoDX	3.00	2.62	1.00
		DEPR	-6.25	3.35	.43			DEPR	-5.00	3.13	.78
PA-Happy/Sad	OTHER	NoDX	-5.99	2.53	.14	FQS Closeness	OTHER	NoDX	-2.50	2.13	1.00
		DEPR	12.71	3.81	.01			DEPR	4.00	2.82	1.00
		LowAffect	12.96	2.78	.00			LowAffect	5.50	2.38	.20
	NoDX	OTHER	5.99	2.53	.14		NoDX	OTHER	2.50	2.13	1.00
		DEPR	18.70	4.35	.00			DEPR	6.50	3.20	.35
		LowAffect	18.95	3.49	.00			LowAffect	8.00	2.82	.07
	DEPR	OTHER	-12.71	3.81	.01		DEPR	OTHER	-4.00	2.82	1.00
		NoDX	-18.70	4.35	.00			NoDX	-6.50	3.20	.35
		LowAffect	.25	4.50	1.00			LowAffect	1.50	3.37	1.00
	LOWAFFECT	OTHER	-12.96	2.78	.00		LOWAFFECT	OTHER	-5.50	2.38	.20
		NoDX	-18.95	3.49	.00			NoDX	-8.00	2.82	.07
		DEPR	-.25	4.50	1.00			DEPR	-1.50	3.37	1.00

Note. NA = Negative Affect Scale; PA = Positive Affect Scale; FQS = Friendship Qualities Scale

Group 2: 8-11 year olds

Correlation Analyses

Trends for the correlation analyses were generally in line with predictions, although few associations were found to be statistically significant (see Table 35). Consistent with other findings in this dissertation, the self-report Loneliness Questionnaire scores showed virtually no association with the parent-report BASC-2 Internalizing symptoms scales, while the correlations between the revised PANAS-C scales and the Loneliness Questionnaire were larger and in the expected directions (albeit non-significant). Similar to the results from the younger age group, positive associations were shown between the parent-report BASC internalizing symptom scales and the percent of time the child spent in a state of joint engagement on the playground. Interestingly, significant positive correlations were also found between the BASC-2 internalizing symptom scales and the number of invited playdates (outside of the home) the participants' parents reported.

In line with expectations, the PA scale scores were significantly and negatively associated with both the amount of best-friend conflict reported by the participants on the FQS and the level of disengagement reported by parents on the QPQ. The PA scale scores were also significantly and positively associated with the FQS Closeness score and the number of invited playdates outside of the home.

The NA scale scores showed several unexpected correlations with the social variables. Specifically, positive associations were found between NA scores and the FQS Security subscale, QPQ Engaged scale, and the percent of time spent in a state of joint engagement with peers. Correlations in the expected positive direction were found between the NA scale and the

FQS and QPQ Conflict scales, but they did not reach significance. Possible explanations for the unexpected trends will be discussed at a later point.

Table 35
Group 1 (under 8 years): Correlations Between Primary Internalizing Measures and Social Measures

Scale	NA	PA	P-BASC Anxiety	P-BASC Depression	P-BASC Intern Comp
Loneliness Q.	.24	-.16	-.02	.03	-.03
SNC score	.12	-.05	.26	.18	.14
SN # Rejections	.08	-.18	.22	.15	.13
POPE % Joint Engage	.27[a]	-.03	.19	.36[*]	.34[*]
FQS Companionship	.15	.08	.09	-.17	-.07
FQS Conflict	.21	-.42[**]	.18	.22	.31[a]
FQS Help	.15	.13	.19	-.08	.14
FQS Security	.26[a]	-.18	.25	-.13	.05
FQS Closeness	.03	.43[**]	.22	-.02	.15
QPQ Engaged	.36[*]	.08	.37[*]	.12	.17
QPQ Conflict	.20	-.16	.17	.24	.16
QPQ Disengaged	.16	-.30[*]	-.09	.15	-.08
QPQ Play Dates Away	.22	-.11	.33[*]	.40[*]	.28[a]
QPQ Play Dates Home	-.11	.35[*]	.24	.03	-.07
QPQ Total Play Dates	-.02	.26	.31[a]	.17	.04

Note. SNC = social network centrality; SN = Social Network measure; POPE = Playground Observation of Peer Engagement; FQS = Friendship Quality Scale; QPQ = Quality of Play Questionnaire. [a] p =< .10; * p =< .05; ** p =< .01

Group Comparisons

The same five categories that were created in the previous exploratory section were used for these analyses as well, although the cutoff scores were specific to this age group. Specifically, participants were included in the depression risk group (DEPR) if the NA (11-items) score was 30 or higher and if the PA (8-items) score was 20 or lower. For the anxiety risk group (ANX), the same NA score of 30 was used, but the PA score was permitted to be just one half of a standard deviation below the mean (i.e., 25 and greater), due to the theoretical assumption that PA is less associated with anxiety. The LOWAFFECT group emerged in this age group as well, demonstrating PA scores under the cutoff of 20 points and relatively low NA

scores that did not meet the NA cutoff for the depression. The NoDX group was also created for this age group, comprised of PA scores equal to or greater than 37 and NA scores equal to or less than 16. Lastly, the participants who did not fit any category were grouped together (OTHER) for the analyses.

Small subgroup sample sizes resulted in many post hoc comparisons being impossible. Table 36 summarizes the descriptive statistics for the variables of interest (significant omnibus tests designated with asterisks), and Table 37 presents the few significant post hoc comparisons. In terms of participant characteristics, the ANX group showed slightly higher ADOS domain scores as well as a lower FSIQ, which fell more than one standard deviation below the mean of 100, while the FSIQ for the ANX group was close to average. The DEPR group showed a mean SCQ score several points higher than that of the ANX group.

While the LOWAFFECT group may seem redundant in addition to the NoDX group, these two groups demonstrated mean differences on all ADOS domain scores (again, group differences were not significant). Evaluation of the means revealed lower scores (i.e., less symptom severity) for the LOWAFFECT group on the Communication and Social domains, but these individuals were reported to have greater levels of restricted, repetitive behaviors (RRBs) than the NoDX group. The LOWAFFECT group also showed higher mean levels of RRBs than the OTHER group, as well as higher SCQ scores. Overall, the NoDX group emerged as the most impaired of the three more ambiguous affect groups, followed by the OTHER and LOWAFFECT groups which showed mixed levels of severity as reported on the ADOS and SCQ. Specifically, the OTHER group showed more elevated scores on the ADOS, whereas the LOWAFFECT group showed more elevated scores on the SCQ.

Beyond NA and PA, which were used to create the groups and therefore different for each group, the FQS Conflict scale was the only variable to show significant group differences. Specifically, the DEPR group reported higher levels of conflict with their best friend than the other four groups. These differences reached significance for the OTHER and NoDX groups. The difference was only marginally significant between the DEPR and ANX groups (p =.10). Interestingly, very little difference was seen between the DEPR and LOWAFFECT groups on the amount of conflict reported.

For the remainder of the variables, trends in the means were evaluated; however, it should be noted that none of these comparisons reached significance; these reports are of a purely exploratory nature, with the aim of informing future research. Regarding internalizing symptom scales, the DEPR group showed the highest levels of parent-reported anxiety of all five groups, followed by the ANX group. The DEPR group was also reported to have the highest level of depressive symptoms, while the ANX group was shown to have the lowest reported levels of depressive symptoms. This same pattern was seen for the BASC Internalizing Composite score. As expected, the DEPR group showed the highest levels of self-reported loneliness. The ANX group showed equivalent (i.e., lower) levels of loneliness to the other three groups.

Regarding the social variables, all of the groups showed nearly equivalent SNC scores demonstrating a 'peripheral' status in the classroom. The DEPR group received the largest number of rejection nominations (i.e., listed as someone other kids do not like to hang out with), while the participants in the ANX group received the fewest number of rejections. Surprisingly, the DEPR and ANX groups were observed to have the highest proportions of joint engagement

on the playground, followed by the OTHER and NoDX groups, and the LOWAFFECT group showed substantially less time in a state of joint engagement with peers.

Table 36
Group 2: Descriptives for Affect Subgroups

Scale		*n*	Mean	SD	Scale		*n*	Mean	SD
NA*	OTHER	47	20.19	5.28	pBASC Anxiety	OTHER	33	54.12	8.01
	NoDX	5	14.60	2.19		NoDX	5	52.20	6.26
	DEPR	3	43.67	5.77		DEPR	2	62.00	2.83
	ANX	3	40.33	12.70		ANX	3	59.67	12.50
	LOWAFFECT	7	19.00	5.72		LOWAFFECT	6	53.33	19.50
PA*	OTHER	47	31.77	5.75	pBASC Depression	OTHER	32	60.72	14.01
	NoDX	5	39.60	.89		NoDX	5	59.80	12.24
	DEPR	3	13.33	5.51		DEPR	2	61.50	17.68
	ANX	3	30.67	2.52		ANX	3	56.67	12.58
	LOWAFFECT	7	13.29	1.98		LOWAFFECT	7	59.14	14.76
FSIQ	OTHER	26	92.27	16.59	pBASC Internalizing Composite	OTHER	33	55.52	12.10
	NoDX	4	97.00	22.05		NoDX	5	57.20	11.05
	DEPR	1	97.00	.		DEPR	2	62.00	7.07
	ANX	2	80.50	2.12		ANX	3	55.00	12.49
	LOWAFFECT	1	97.00	.		LOWAFFECT	6	55.17	16.49
SCQ	OTHER	26	21.96	6.65	Loneliness Total	OTHER	27	36.56	12.25
	NoDX	4	23.25	10.21		NoDX	4	43.50	23.98
	DEPR	1	21.00	.		DEPR	2	58.00	24.04
	ANX	1	18.00	.		ANX	2	38.00	14.14
	LOWAFFECT	1	26.00	.		LOWAFFECT	6	37.00	24.48
ADOS Comm Total	OTHER	27	3.96	.98	POPE % JE	OTHER	33	42.21	33.12
	NoDX	4	4.25	1.50		NoDX	5	35.70	29.35
	DEPR	1	3.00	.		DEPR	3	55.67	35.44
	ANX	2	3.00	2.83		ANX	3	55.87	30.59

	LOWAFFECT	1	3.00	.		LOWAFFECT	5	26.53	23.29

Group 2: Descriptives for Affect Subgroups (cont.)

Scale		*n*	Mean	SD	Scale		*n*	Mean	SD
ADOS Social Total	OTHER	27	8.52	2.26	SNC	OTHER	26	.92	.80
	NoDX	4	9.50	1.91		NoDX	4	1.00	.82
	DEPR	1	5.00	.		DEPR	3	1.00	.00
	ANX	2	10.50	3.54		ANX	2	1.00	.00
	LOWAFFECT	1	8.00	.		LOWAFFECT	6	1.17	.75
ADOS Comm + Social Total	OTHER	27	12.48	2.89	SN Rejected	OTHER	26	2.50	2.47
	NoDX	4	13.75	3.40		NoDX	4	3.25	1.71
	DEPR	1	8.00	.		DEPR	3	4.67	3.06
	ANX	2	13.50	6.36		ANX	2	1.50	2.12
	LOWAFFECT	1	11.00	.		LOWAFFECT	6	2.83	3.19
ADOS RRB total	OTHER	27	1.78	1.83	FQS Help	OTHER	25	15.04	4.61
	NoDX	4	3.00	1.83		NoDX	4	15.75	7.37
	DEPR	1	1.00	.		DEPR	3	14.67	8.50
	ANX	2	2.50	.71		ANX	3	19.00	5.57
	LOWAFFECT	1	5.00	.		LOWAFFECT	7	14.29	8.44
FQS Companionship	OTHER	28	12.71	3.26	FQS: Security	OTHER	29	14.55	3.76
	NoDX	4	14.50	2.38		NoDX	4	14.25	2.22
	DEPR	3	12.00	5.57		DEPR	3	17.33	6.35
	ANX	3	15.33	3.06		ANX	3	18.33	2.31
	LOWAFFECT	7	15.14	5.05		LOWAFFECT	7	17.00	5.32
FQS Conflict*	OTHER	29	6.76	2.82	FQS Closeness	OTHER	29	19.76	4.48
	NoDX	3	8.00	4.00		NoDX	4	23.25	1.71
	DEPR	3	14.00	3.46		DEPR	3	18.67	6.51
	ANX	3	5.67	1.53		ANX	3	21.33	4.04

	LOWAFFECT	7	10.43	5.26		LOWAFFECT	7	16.71	5.74

Group 2: Descriptives for Affect Subgroups (cont.)

Scale		*n*	Mean	SD	Scale		*n*	Mean	SD
QPQ Conflict	OTHER	29	3.10	4.07	QPQ Disengaged	OTHER	29	2.86	2.49
	NoDX	4	3.00	4.76		NoDX	4	4.50	2.08
	DEPR	1	6.00	.		DEPR	1	4.00	.
	ANX	3	3.67	5.51		ANX	3	3.67	1.53
	LOWAFFECT	6	5.00	3.29		LOWAFFECT	6	4.83	.98
QPQ Engaged	OTHER	29	4.07	2.66	QPQ Playdates Away	OTHER	29	1.38	1.47
	NoDX	4	5.00	1.83		NoDX	4	1.25	.96
	DEPR	1	5.00	.		DEPR	1	1.00	.
	ANX	3	7.33	1.53		ANX	3	1.67	1.53
	LOWAFFECT	6	4.50	2.07		LOWAFFECT	6	1.33	1.51
QPQ Playdates Home	OTHER	29	2.14	3.47	QPQ Total Playdates	OTHER	29	3.52	4.07
	NoDX	4	4.25	5.32		NoDX	4	5.50	6.03
	DEPR	1	.00	.		DEPR	1	1.00	.
	ANX	3	2.33	2.52		ANX	3	4.00	3.61
	LOWAFFECT	6	.67	.82		LOWAFFECT	6	2.00	2.28

Note. *Omnibus ANOVA $p < .05$

As reported above, the only FQS scale which significantly differentiated between any of the groups related to the amount of conflict the participants reported experiencing with their best friend (i.e., those in DEPR group showed significantly greater levels of conflict with friends). The ANX group showed relatively higher scores on the Companionship, Security, Helpfulness, and Closeness subscales, and the lowest scores on the Conflict scale. The DEPR group showed relatively low scores on the Companionship, Helpfulness, and Closeness subscales, with higher scores on the Security subscale. This relatively high Security score was unexpected in light of the high levels of conflict reported in this group. These results were somewhat replicated with the QPQ, showing the DEPR group with the highest level of conflict (as reported by parents), followed by the LOWAFFECT group; however none of the group differences were not statistically significant. The ANX group was reported to have high scores on the Engaged subscale of the QPQ and fairly low scores on the QPQ Disengaged scale. The DEPR group's (n = 1) scores on these two QPQ subscales fell in the middle of the other groups. Lastly, the number of playdates outside of the house was essentially equivalent for all groups; however, larger differences emerged for the number of playdates at home. Specifically, the NoDX group was reported to have the greatest number of playdates at home, whereas the DEPR group reported having zero at-home playdates (note that n =1 for the DEPR group on this measure).

Overall, these results show preliminary support for the ability of the tripartite model to distinguish between those with potential anxiety and depression diagnoses. However, due to the lack of a measure of physiological hyperarousal, it was not possible to pull out a group likely to have problems with both depression and anxiety. Laurent proposed that a group with both depression and anxiety problems would present with the same cutoffs for the depression group, but would also show elevated physiological hyperarousal (J. Laurent, personal communication,

February 12, 2010). Therefore, the DEPR group presented here likely includes those with only depression problems, as well as those with both depression *and* anxiety problems. This was apparent in the group means which showed the DEPR group with the highest level of parent-reported depression *and* anxiety scores, while the ANX group had elevated levels of anxiety scores, but the lowest levels of depression symptoms reported.

The LOWAFFECT group for the 8 to 11 year olds, which was tentatively identified as 'ASD without comorbid internalizing symptoms', showed scores on the BASC-2 internalizing symptom scales in the average range (depression scores higher than anxiety scores), along with very low levels of joint engagement on the playground, a 'peripheral' status in the classroom network, and moderate levels of rejections as reported on the Social Network questionnaire. The FQS and QPQ scores were also somewhat in line with what would be expected for a child with ASD: lower levels on FQS Closeness and Helpfulness scales and the QPQ Engaged scale, and high levels of FQS Conflict and QPQ Disengaged behavior. Similar patterns were presented through evaluation of both parent- and self-report measures.

Table 37
Group 2: Significant Post Hoc Paired Comparisons

Dependent Variable			Mean Difference	Std. Error	Sig.
NA	OTHER	NoDX	5.59	2.64	.38
		DEPR	-23.48	3.34	.00
		ANX	-20.14	3.34	.00
		LOWAFFECT	1.19	2.27	1.00
	NoDX	OTHER	-5.59	2.64	.38
		DEPR	-29.07	4.09	.00
		ANX	-25.73	4.09	.00
		LOWAFFECT	-4.40	3.28	1.00
	DEPR	OTHER	23.48	3.34	.00
		NoDX	29.07	4.09	.00
		ANX	3.33	4.58	1.00
		LOWAFFECT	24.67	3.87	.00

	ANX	OTHER	20.14	3.34	.00
		NoDX	25.73	4.09	.00
		DEPR	-3.33	4.58	1.00
		LOWAFFECT	21.33	3.87	.00
	LOWAFFECT	OTHER	-1.19	2.27	1.00
		NoDX	4.40	3.28	1.00
		DEPR	-24.67	3.87	.00
		ANX	-21.33	3.87	.00
PA	OTHER	NoDX	-7.83	2.44	.02
		DEPR	18.43	3.09	.00
		ANX	1.10	3.09	1.00
		LOWAFFECT	18.48	2.11	.00
	NoDX	OTHER	7.83	2.44	.02
		DEPR	26.27	3.80	.00
		ANX	8.93	3.80	.22
		LOWAFFECT	26.31	3.04	.00
	DEPR	OTHER	-18.43	3.09	.00
		NoDX	-26.27	3.80	.00
		ANX	-17.33	4.24	.00
		LOWAFFECT	.05	3.59	1.00
	ANX	OTHER	-1.10	3.09	1.00
		NoDX	-8.93	3.80	.22
		DEPR	17.33	4.24	.00
		LOWAFFECT	17.38	3.59	.00
	LOWAFFECT	OTHER	-18.48	2.11	.00
		NoDX	-26.31	3.04	.00
		DEPR	-.05	3.59	1.00
		ANX	-17.38	3.59	.00
FQS Conflict	OTHER	NoDX	-1.24	2.03	1.00
		DEPR	-7.24	2.03	.01
		ANX	1.09	2.03	1.00
		LOWAFFECT	-3.67	1.41	.13
	NoDX	OTHER	1.24	2.03	1.00
		DEPR	-6.00	2.74	.34
		ANX	2.33	2.74	1.00
		LOWAFFECT	-2.43	2.31	1.00
	DEPR	OTHER	7.24	2.03	.01
		NoDX	6.00	2.74	.34
		ANX	8.33	2.74	.04
		LOWAFFECT	3.57	2.31	1.00
	ANX	OTHER	-1.09	2.03	1.00
		NoDX	-2.33	2.74	1.00
		DEPR	-8.33	2.74	.04
		LOWAFFECT	-4.76	2.31	.46

LOWAFFECT	OTHER	3.67	1.41	.13
	NoDX	2.43	2.31	1.00
	DEPR	-3.57	2.31	1.00
	ANX	4.76	2.31	.46

Note. NA = negative affect scale; PA = positive affect scale; FQS = Friendship Qualities Scale.

Group 3: 11 to 17 year olds

The five groups previously mentioned were used for the following exploratory analyses (i.e., DEPR, ANX, LOWAFFECT, OTHER, NoDX). Cutoff scores for the groups were as follows: DEPR (NA $\geq$ 34 and PA $\leq$ 32), ANX (NA $\geq$ 34 and PA $\leq$ 38), LOWAFFECT (PA $\leq$ 32 and NoDx (PA $\geq$ 50 and NA $\leq$ 20). Again, small subgroup sample sizes precluded post hoc paired comparisons for a majority of the variables, but trends in the means were evaluated in an exploratory nature to identify any potential trends in the data that could be evaluated in future research. While specific hypotheses were not stated, it was expected that the ANX and DEPR groups would show higher levels of their respective internalizing symptoms than the other groups. These expectations are in line with the tripartite model of depression and anxiety, which claims discriminative power of the PANAS-C for anxiety and depression. In a related fashion, it was expected that the NoDX group would show the lowest levels of depression and anxiety symptoms, as the group was defined as having the highest levels of PA and the lowest levels of NA. Unique to this age group was the availability of self-report measures of internalizing symptoms (self-report BASC, CDI, and MASC), which allowed for (a) an evaluation of the relations between variables without the potential attenuation due to cross-informant measurement, and (2) the addition of a scale measuring physiological hyperarousal (MASC Physical Symptoms), permitting a truer evaluation of the tripartite model.

Correlation Analyses

The correlation analyses for the teenaged group presented an interesting contrast between the associations amongst variables for self- and parent-report measures. These contrasts were possible due to the inclusion of self-report internalizing symptom measures (i.e., CDI and MASC). In general, significant correlations were seen between the self-report BASC internalizing scale scores and the social variables, but not between the parent-report BASC scale scores and social variables. It is possible that the attenuation in the strength of the associations from self- to parent- report was due to the cross-informant nature of these scales; however, it is likely that other issues played a role as well (e.g., parents' ability to rate internalizing symptoms of their teenaged children).

Focusing on the associations between the social variables and the self-report BASC-2 scores, several interesting results emerged. Specifically, there was virtually no association between the internalizing scores and the proportion of time the teens spent engaged with their peers during lunch. This contradicts findings from established literature relating to the increased social withdrawal for individuals experiencing internalizing disorders (e.g. Strauss, Forehand, Smith, & Frame, 1986). The self-report BASC-2 internalizing scales also did not correlate significantly with the Harm Avoidance: Anxious Coping subscale of the MASC, perhaps suggesting that this is not a relevant type of anxiety for this ASD population, although this will be evaluated further in the following analyses. The self-report BASC Anxiety scale scores, but not the Depression scores, showed significant or marginally significant correlations with the MASC Harm Avoidance Perfectionism scores, Harm Avoidance Total scores, and the Social Anxiety Total scores. Additionally, the self-report BASC Depression scores, but not the Anxiety scores, showed a significant correlation with the MASC Physical Symptoms:

Somatic/Autonomic subscale. This was contrary to expectations, as Laurent et al. (2004) posited that elevated levels of physiological hyperarousal differentiated between those with anxiety and depression problems (see Appendix B for a list of the items include in the subscales).

Table 38

Group 3 (11 to 17 years): Correlations Between Primary Internalizing Measures and Social Measures

	NA	PA	pBASC Anxiety	pBASC Depression	pBASC Internalizing Problems	sBASC Anxiety	sBASC Depression	sBASC Internalizing Problems
Loneliness Total	.32**	-.51**	-.07	.14	-.02	.57**	.28*	.36**
POPE % JE	.09	-.04	-.05	-.15	-.05	.05	.05	.12
IPR Total	.50**	-.36**	.03	.05	.02	.42**	.65**	.53**
CDI Total	.45**	-.36**	.21	.26[a]	.16	.52**	.55**	.51**
CDI Negative Mood	.48**	-.23[a]	.26[a]	.16	.15	.33*	.64**	.51**
CDI Interpersonal Problems	.37**	-.44**	.05	.08	.02	.33*	.29*	.22
CDI Ineffectiveness	.20	-.23[a]	.26[a]	.28[a]	.27[a]	.51**	.34*	.37**
CDI Anhedonia	.34**	-.28*	.06	.13	-.01	.32*	.33*	.38**
CDI Negative Self Esteem	.37**	-.29*	.19	.29*	.19	.54**	.56**	.42**
MASC Physical Symptoms: Tense/Restless	.57**	-.19	.02	.04	.02	.51**	.39*	.59**
MASC Physical Symptoms: Somatic/Autonomic	.34*	-.15	.11	.09	.14	.17	.46*	.38*
MASC Physical Symptoms: Total	.49**	-.18	.10	.09	.10	.47**	.48**	.56**
MASC Harm Avoidance: Perfectionism	-.15	.37*	-.01	-.16	-.06	-.41*	-.19	-.20
MASC Harm Avoidance: Anxious Coping	-.24	.24	-.16	-.15	-.14	-.19	-.08	-.12
MASC Harm Avoidance: Total	-.24	.36*	-.10	-.17	-.11	-.32[a]	-.15	-.19
MASC Soc Anxiety: Humiliation	.32*	-.23	.10	.23	.18	.44*	.32[a]	.39*
MASC Soc Anxiety: Performance Fears	.35*	-.28[a]	.27	.05	.23	.30	.28	.21
MASC Soc Anxiety: Total	.36*	-.17	.21	.17	.22	.41*	.30	.29
MASC Separation/Panic	.15	.06	-.02	-.19	-.08	-.16	.03	.06
MASC Total	.15	.00	.08	.03	.12	.08	.24	.24

Note. [a] $p \leq .10$; * $p \leq .05$; ** $p \leq .01$

Group Comparisons

No group differences were seen for the participant characteristics (i.e., ADOS, SCQ, FSIQ), and were therefore excluded from the following table of descriptive statistics. Full scale IQ scores ranged from 85.0 (SD =19.7) in the ANX group (n = 3) to 125.0 in the DEPR group (n = 1). Scores on the ADOS domains were nearly equivalent for four of the five groups; the single participant in the DEPR group showed a very low ADOS communication total, low RRB total score, and relatively high social total score. For the other groups, the scores on the communication domain ranged from 4.0 in the OTHER (SD = 1.8) and LOWAFFECT (SD =1.4) groups to 5.3 (SD = 2.1) in the NoDX group. Social domain scores ranged from 8.3 (SD = 2.5) in the LOWAFFECT group to 11.7 (SD = 2.5) in the ANX group. The Communication and Social Domains combined ranged from 12.3 (SD = 3.7) in the LOWAFFECT group, to 15.7 (SD = 4.2) in the ANX group. Low variability was seen for RRB scores, which ranged from 1.0 in the ANX group (SD = .00) to 1.8 in the OTHER group (SD = 1.3). Again, none of these group differences were significantly different from one another.

Examination of the omnibus ANOVA showed significant group differences on many of the variables of interest. Sample sizes were under 10 for most of the groups; therefore, interpretation was once again tenuous, but results are reported nonetheless to present possible directions for future research as these five groups have never been explicitly identified in the available literature. Significant omnibus tests are designated on Table 39 with asterisks. Table 40 presents the results from the statistically significant post hoc paired comparisons. An evaluation of the parent-report BASC internalizing scales showed nearly equivalent means across all five groups, all of which were within the normal range. Interestingly, the standard deviations for the ANX and DEPR groups were consistently smaller than for the other three groups, suggesting

more coherence within these two affect categories. However, none of the groups could be differentiated from one another based on these parent-report BASC scores. The effectiveness of parents reporting on the internalizing symptoms of their teenaged children will be discussed at a later point.

As might be expected, the self-report measures told a substantially different story. Those in the DEPR group showed the highest scores on the BASC Depression subscale (borderline cutoff for 'at risk'), followed by the ANX and OTHER groups. The DEPR group reported the highest levels of anxiety symptoms on the BASC-2. Surprisingly, the ANX group showed BASC anxiety scores just below the standardized mean of 50, which did not support the discriminative ability or convergent validity of the PANAS-C subscales. The Physical Symptoms subscales of the MASC provided an opportunity to investigate the utility of including a variable that measured physiological hyperarousal. Again, the ability of the PANAS-C subscales to discriminate between the ANX and DEPR groups was not supported by the scores on this subscale. While the theory behind the tripartite model purports that the presence of elevated 'physiological hyperarousal' distinguishes between those with (1) anxiety only, (2) depression only, and (3) both anxiety and depression, the results for this small group of individuals with ASD shows that the DEPR and ANX groups are showing essentially equivalent levels of Physiological Symptoms, although a larger difference was noted between the ANX and DEPR groups on the Somatic/Autonomic scale than for the Tense/Restless scale (see Table 39).

Scores on the Loneliness Questionnaire were significantly higher for the DEPR group than for the ANX, OTHER, and NoDX groups. While the mean score was substantially higher in the DEPR group than in the LOWAFFECT group, the means did not differ significantly from one another. CDI subscale and total scores were virtually equivalent for the DEPR and ANX

groups; however, the sample size for the DEPR group was again comprised of a single individual, making interpretation of these trends difficult and post hoc tests impossible. On CDI subscales for which the omnibus ANOVA was significant, similar trends emerged in which the DEPR, ANX, and LOWAFFECT showed similar means, followed by the OTHER and NoDX groups.

Although significant omnibus tests were found for a number of the MASC subscales, the post hoc results revealed that none of these group differences were between the DEPR and ANX groups; rather, differences emerged primarily between the ANX, OTHER, and NoDX groups (see Table 40). However, mean scores in the DEPR group exceeded the cutoff (T >=65) on all of the Social Anxiety scales, but the difference scores between groups did not reach significance. Means for the Performance Fears subscale exceeded the cutoff for the LOWAFFECT and DEPR groups, whereas the ANX group showed means in the average range for these scales. Additionally, the OTHER group showed levels of Separation Anxiety and Panic that met the clinical cutoff. The remainder of the groups showed average or below-average levels of this specific type of anxiety. None of the groups showed clinically elevated levels of Harm Avoidance; in fact, the ANX group showed the lowest mean score on the Anxious Coping scale (e.g., "I stay away from things that upset me"; see Appendix B). A singular trend of elevated scores across all subscales did not emerge for any affect group on the MASC; rather, certain groups appeared to show elevated levels of anxiety on the different types of anxiety measured by the MASC. Based on the MASC Total score, the OTHER and LOWAFFECT groups showed the most elevated levels of overall anxiety, which was contrary to expectations.

While this group benefited from the inclusion of several self-report measures of internalizing symptoms, there was a relative dearth of information gathered on their social skills,

compared to the elementary-aged participants. With the exception of the NoDX group, all of the means on the IPR were above the established cutoff score of 35 points, signifying the presence of problematic peer relations. The DEPR group reported extremely high levels of problematic peer relations (M =88.00, SD = 21.9), and also showed a low proportion of time in a joint engaged state during their lunch period. In general, all groups spent very little time engaged with peers during the 15-minute observation session. The ANX, OTHER, and LOWAFFECT groups spent between 13 and 26% of their free time engaged with peers, and the individuals in the NoDX group were seldom engaged with peers during their lunch periods (although they reported much lower levels of problematic peer relations than the other groups). Interpersonal problems were also evaluated with the CDI, although no differences emerged between the groups, who all fell well within a normal range.

For this teenaged sample, the LOWAFFECT group showed a unique pattern of scores on the internalizing measures. In line with the defining characteristics of the group (i.e., flat affect), anhedonia scores on the CDI were substantially higher than for the other four groups. While scores on the Performance Fears subscale of the MASC were quite elevated, the remaining scale scores were within the average range. Regarding social variables, the individuals in this LOWAFFECT group only spent 13% of their free time jointly engaged with peers, reported levels of problematic relations with their peers well above the established cutoff score of 35 points on the IPR (M = 53.3), and showed the highest mean score on the Interpersonal Problems scale of the CDI. The LOWAFFECT group also reflected moderately elevated levels of loneliness and average BASC-2 internalizing symptom scores (both parent- and self-report).

Table 39

Group 3: Descriptives for Variables of Interest for Affect Groups

Scale	Group	*n*	Mean	SD	Scale		*n*	Mean	SD
NA*	OTHER	55	25.56	5.85	CDI Total T	OTHER	41	48.12	7.33
	NoDX	7	14.14	1.35		NoDX	5	40.40	6.23
	DEPR	3	38.67	4.51		DEPR	1	50.00	.
	ANX	10	36.50	2.22		ANX	7	51.14	9.97
	LOWAFFECT	9	24.22	6.59		LOWAFFECT	5	52.80	10.69
PA*	OTHER	55	44.42	8.32	CDI Negative Self Esteem*	OTHER	41	48.02	8.39
	NoDX	7	57.57	5.68		NoDX	5	43.00	6.71
	DEPR	3	28.67	3.06		DEPR	1	45.00	.
	ANX	10	46.60	8.37		ANX	7	50.43	11.66
	LOWAFFECT	9	26.11	5.42		LOWAFFECT	5	50.40	8.08
pBASC Anxiety	OTHER	38	57.87	13.89	CDI Negative Mood*	OTHER	41	47.07	6.95
	NoDX	7	55.57	11.21		NoDX	5	40.80	2.95
	DEPR	2	54.00	4.24		DEPR	1	53.00	.
	ANX	6	61.17	11.87		ANX	7	54.29	7.50
	LOWAFFECT	6	56.00	15.89		LOWAFFECT	5	46.40	7.57
pBASC Depression	OTHER	38	60.42	10.69	CDI Interpersonal Problems*	OTHER	41	49.07	5.98
	NoDX	7	64.00	14.31		NoDX	5	43.60	.89
	DEPR	2	63.50	13.44		DEPR	1	50.00	.
	ANX	6	60.17	6.24		ANX	7	50.14	5.05
	LOWAFFECT	6	60.83	8.64		LOWAFFECT	5	55.00	7.21
pBASC Internalizing Composite	OTHER	38	56.74	11.76	CDI Ineffectiveness	OTHER	41	48.80	8.12
	NoDX	7	55.29	10.98		NoDX	5	43.20	5.93
	DEPR	2	58.50	16.26		DEPR	1	48.00	.
	ANX	6	56.00	5.33		ANX	7	47.29	6.90
	LOWAFFECT	6	57.00	10.83		LOWAFFECT	41	49.56	8.08
Loneliness Total*	OTHER	45	39.42	12.66	CDI Anhedonia[a]	OTHER	5	42.80	7.43
	NoDX	6	30.00	6.23		NoDX	1	51.00	.
	DEPR	3	61.00	10.44		DEPR	7	51.14	10.65
	ANX	9	33.67	9.33		ANX	5	59.60	16.30
	LOWAFFECT	6	42.33	11.91		LOWAFFECT	41	49.56	8.08

Group 3: Descriptives for Affect Groups (cont.)

Scale	Group	*n*	Mean	SD	Scale	Group	*n*	Mean	SD
MASC Physical Symptoms: Tense/Restless[a]	OTHER	25	53.08	9.80	MASC Harm Avoidance: Total	OTHER	28	54.68	8.74
	NoDX	3	39.00	1.73		NoDX	3	54.00	18.73
	DEPR	2	60.00	.00		DEPR	2	42.00	12.73
	ANX	3	62.00	15.13		ANX	3	41.67	17.01
	LOWAFFECT	4	50.75	7.72		LOWAFFECT	4	49.25	7.59
MASC Physical Symptoms: Somatic/Autonomic	OTHER	25	47.36	6.80	MASC Soc Anxiety: Humiliation	OTHER	28	55.29	11.51
	NoDX	3	37.67	.58		NoDX	3	44.33	4.51
	DEPR	2	42.00	5.66		DEPR	2	71.00	14.14
	ANX	3	48.67	10.69		ANX	3	56.00	16.09
	LOWAFFECT	4	45.50	6.03		LOWAFFECT	4	54.50	10.02
MASC Physical Symptoms: Total[a]	OTHER	28	49.50	8.50	MASC Soc Anxiety: Performance Fears*	OTHER	28	56.86	10.73
	NoDX	3	38.00	2.65		NoDX	3	46.33	10.97
	DEPR	2	51.50	3.54		DEPR	2	66.00	11.31
	ANX	3	56.33	4.62		ANX	3	54.00	9.17
	LOWAFFECT	4	48.25	7.89		LOWAFFECT	4	65.25	12.34
MASC Separation/Panic*	OTHER	28	64.82	11.46	MASC Soc Anxiety: Total	OTHER	28	56.18	11.11
	NoDX	3	43.00	4.58		NoDX	3	44.33	7.23
	DEPR	2	61.50	7.78		DEPR	2	71.00	4.24
	ANX	3	49.67	9.02		ANX	3	55.33	14.22
	LOWAFFECT	4	57.00	5.48		LOWAFFECT	4	55.25	15.48
MASC Harm Avoidance: Perfectionism	OTHER	28	54.18	10.47	MASC Total[a]	OTHER	28	57.29	9.81
	NoDX	3	51.67	13.32		NoDX	3	42.67	2.52
	DEPR	2	43.00	15.56		DEPR	2	47.50	20.51
	ANX	3	53.33	12.50		ANX	3	48.00	13.45
	LOWAFFECT	4	48.50	7.94		LOWAFFECT	4	56.75	7.37
MASC Harm Avoidance: Anxious Coping*	OTHER	28	53.86	7.79	IPR Total*	OTHER	42	47.43	15.96
	NoDX	3	54.67	17.79		NoDX	6	32.50	8.29
	DEPR	2	43.00	7.07		DEPR	3	88.00	21.93
	ANX	3	36.00	19.05		ANX	9	53.56	21.43
	LOWAFFECT	4	51.00	9.42		LOWAFFECT	6	53.33	23.55

Group 3: Descriptives for Affect Groups (cont.)

Scale	Group	*n*	Mean	SD	Scale	Group	*n*	Mean	SD
POPE % JE	OTHER	40	26.00	29.60	sBASC Internalizing Problems*	OTHER	36	49.39	8.99
	NoDX	6	8.33	9.83		NoDX	6	36.50	4.51
	DEPR	3	10.00	17.32		DEPR	2	55.50	12.02
	ANX	9	17.22	19.54		ANX	8	53.00	13.87
	LOWAFFECT	6	13.33	24.22		LOWAFFECT	5	48.00	12.98
sBASC Anxiety	OTHER	37	48.19	9.99	sBASC Depression	OTHER	37	51.00	11.94
	NoDX	6	44.50	12.58		NoDX	6	43.83	8.73
	DEPR	2	58.00	2.83		DEPR	2	64.00	19.80
	ANX	8	47.38	8.57		ANX	8	56.88	12.69
	LOWAFFECT	4	46.25	9.74		LOWAFFECT	5	48.20	9.60

Note. NA = negative affect scale; PA = positive affect scale; pBASC = parent-report BASC; CDI = Children's Depression Inventory; BASC = Behavioral Assessment Scales for Children, 2nd ed.; MASC = Manifest Anxiety Scale for Children; IPR = Index of Peer Relations; POPE % JE = percent of time spent in joint engaged state of play during recess; sBASC = self-report BASC.

Table 40

Group 3: Significant Paired Comparisons Between Affect Groups

Scale	Paired Comparisons		Mean Difference	Std. Error	Sig.	Scale	Paired Comparisons		Mean Difference	Std. Error	Sig.
NA	OTHER	NoDX	11.42	2.16	.00	PA	OTHER	NoDX	-13.15	3.13	.00
		DEPR	-13.10	3.19	.00			DEPR	15.75	4.63	.01
		ANX	-10.94	1.85	.00			ANX	-2.18	2.68	1.00
		LOWAFFECT	1.34	1.94	1.00			LOWAFFECT	18.31	2.81	.00
	NoDX	OTHER	-11.42	2.16	.00		NoDX	OTHER	13.15	3.13	.00
		DEPR	-24.52	3.72	.00			DEPR	28.90	5.39	.00
		ANX	-22.36	2.66	.00			ANX	10.97	3.85	.06
		LOWAFFECT	-10.08	2.72	.00			LOWAFFECT	31.46	3.93	.00
	DEPR	OTHER	13.10	3.19	.00		DEPR	OTHER	-15.75	4.63	.01
		NoDX	24.52	3.72	.00			NoDX	-28.90	5.39	.00
		ANX	2.17	3.55	1.00			ANX	-17.93	5.14	.01
		LOWAFFECT	14.44	3.59	.00			LOWAFFECT	2.56	5.20	1.00
	ANX	OTHER	10.94	1.85	.00		ANX	OTHER	2.18	2.68	1.00
		NoDX	22.36	2.66	.00			NoDX	-10.97	3.85	.06
		DEPR	-2.17	3.55	1.00			DEPR	17.93	5.14	.01
		LOWAFFECT	12.28	2.48	.00			LOWAFFECT	20.49	3.59	.00
	LOWAFFECT	OTHER	-1.34	1.94	1.00		LOWAFFECT	OTHER	-18.31	2.81	.00
		NoDX	10.08	2.72	.00			NoDX	-31.46	3.93	.00
		DEPR	-14.44	3.59	.00			DEPR	-2.56	5.20	1.00
		ANX	-12.28	2.48	.00			ANX	-20.49	3.59	.00

Group 3: Significant Paired Comparisons Between Affect Groups (cont.)

Scale	Paired Comparisons		Mean Difference	Std. Error	Sig.	Scale	Paired Comparisons		Mean Difference	Std. Error	Sig.
Loneliness Total	OTHER	NoDX	9.42	5.12	.70	IPR Total	OTHER	NoDX	14.93	7.54	.52
		DEPR	-21.58	7.02	.03			DEPR	-40.57	10.32	.00
		ANX	5.76	4.30	1.00			ANX	-6.13	6.34	1.00
		LOWAFFECT	-2.91	5.12	1.00			LOWAFFECT	-5.90	7.54	1.00
	NoDX	OTHER	-9.42	5.12	.70		NoDX	OTHER	-14.93	7.54	.52
		DEPR	-31.00	8.32	.00			DEPR	-55.50	12.21	.00
		ANX	-3.67	6.20	1.00			ANX	-21.06	9.10	.24
		LOWAFFECT	-12.33	6.80	.74			LOWAFFECT	-20.83	9.97	.41
	DEPR	OTHER	21.58	7.02	.03		DEPR	OTHER	40.57	10.32	.00
		NoDX	31.00	8.32	.00			NoDX	55.50	12.21	.00
		ANX	27.33	7.85	.01			ANX	34.44	11.52	.04
		LOWAFFECT	18.67	8.32	.28			LOWAFFECT	34.67	12.21	.06
	ANX	OTHER	-5.76	4.30	1.00		ANX	OTHER	6.13	6.34	1.00
		NoDX	3.67	6.20	1.00			NoDX	21.06	9.10	.24
		DEPR	-27.33	7.85	.01			DEPR	-34.44	11.52	.04
		LOWAFFECT	-8.67	6.20	1.00			LOWAFFECT	.22	9.10	1.00
	LOWAFFECT	OTHER	2.91	5.12	1.00		LOWAFFECT	OTHER	5.90	7.54	1.00
		NoDX	12.33	6.80	.74			NoDX	20.83	9.97	.41
		DEPR	-18.67	8.32	.28			DEPR	-34.67	12.21	.06
		ANX	8.67	6.20	1.00			ANX	-.22	9.10	1.00

Group 3: Significant Paired Comparisons Between Affect Groups (cont.)

Scale	Paired Comparisons		Mean Difference	Std. Error	Sig.	Scale	Paired Comparisons		Mean Difference	Std. Error	Sig.
sBASC Anxiety	OTHER	NoDX	3.25	4.45	1.00	sBASC Internalizing Problems	OTHER	NoDX	12.89	4.37	.05
		DEPR	-18.85	6.79	.08			DEPR	-6.11	7.19	1.00
		ANX	-1.64	3.85	1.00			ANX	-3.61	3.87	1.00
		LOWAFFECT	-6.35	4.11	1.00			LOWAFFECT	1.39	4.72	1.00
	NoDX	OTHER	-3.25	4.45	1.00		NoDX	OTHER	-12.89	4.37	.05
		DEPR	-22.10	7.82	.07			DEPR	-19.00	8.08	.23
		ANX	-4.89	5.47	1.00			ANX	-16.50	5.35	.03
		LOWAFFECT	-9.60	5.66	.96			LOWAFFECT	-11.50	5.99	.61
	DEPR	OTHER	18.85	6.79	.08		DEPR	OTHER	6.11	7.19	1.00
		NoDX	22.10	7.82	.07			NoDX	19.00	8.08	.23
		ANX	17.21	7.49	.26			ANX	2.50	7.83	1.00
		LOWAFFECT	12.50	7.63	1.00			LOWAFFECT	7.50	8.28	1.00
	ANX	OTHER	1.64	3.85	1.00		ANX	OTHER	3.61	3.87	1.00
		NoDX	4.89	5.47	1.00			NoDX	16.50	5.35	.03
		DEPR	-17.21	7.49	.26			DEPR	-2.50	7.83	1.00
		LOWAFFECT	-4.71	5.20	1.00			LOWAFFECT	5.00	5.64	1.00
	LOWAFFECT	OTHER	6.35	4.11	1.00		LOWAFFECT	OTHER	-1.39	4.72	1.00
		NoDX	9.60	5.66	.96			NoDX	11.50	5.99	.61
		DEPR	-12.50	7.63	1.00			DEPR	-7.50	8.28	1.00
		ANX	4.71	5.20	1.00			ANX	-5.00	5.64	1.00

Group 3: Significant Paired Comparisons Between Affect Groups (cont.)

Scale	Paired Comparisons		Mean Difference	Std. Error	Sig.	Scale	Paired Comparisons		Mean Difference	Std. Error	Sig.
MASC Physical Symptoms: Tense/ Restless	OTHER	NoDX	14.08	5.87	.22	MASC Physical Symptoms: Total	OTHER	NoDX	11.50	4.82	.23
		DEPR	-6.92	7.05	1.00			DEPR	-2.00	5.81	1.00
		ANX	-8.92	5.87	1.00			ANX	-6.83	4.82	1.00
		LOWAFFECT	2.33	5.17	1.00			LOWAFFECT	1.25	4.24	1.00
	NoDX	OTHER	-14.08	5.87	.22		NoDX	OTHER	-11.50	4.82	.23
		DEPR	-21.00	8.76	.23			DEPR	-13.50	7.25	.71
		ANX	-23.00	7.84	.06			ANX	-18.33	6.48	.08
		LOWAFFECT	-11.75	7.33	1.00			LOWAFFECT	-10.25	6.06	1.00
	DEPR	OTHER	6.92	7.05	1.00		DEPR	OTHER	2.00	5.81	1.00
		NoDX	21.00	8.76	.23			NoDX	13.50	7.25	.71
		ANX	-2.00	8.76	1.00			ANX	-4.83	7.25	1.00
		LOWAFFECT	9.25	8.31	1.00			LOWAFFECT	3.25	6.88	1.00
	ANX	OTHER	8.92	5.87	1.00		ANX	OTHER	6.83	4.82	1.00
		NoDX	23.00	7.84	.06			NoDX	18.33	6.48	.08
		DEPR	2.00	8.76	1.00			DEPR	4.83	7.25	1.00
		LOWAFFECT	11.25	7.33	1.00			LOWAFFECT	8.08	6.06	1.00
	LOWAFFECT	OTHER	-2.33	5.17	1.00		LOWAFFECT	OTHER	-1.25	4.24	1.00
		NoDX	11.75	7.33	1.00			NoDX	10.25	6.06	1.00
		DEPR	-9.25	8.31	1.00			DEPR	-3.25	6.88	1.00
		ANX	-11.25	7.33	1.00			ANX	-8.08	6.06	1.00

Group 3: Significant Paired Comparisons Between Affect Groups (cont.)

Scale	Paired Comparisons		Mean Difference	Std. Error	Sig.	Scale	Paired Comparisons		Mean Difference	Std. Error	Sig.
MASC Harm Avoidance: Anxious Coping	OTHER	NoDX	-.81	5.91	1.00	MASC Separation/ Panic	OTHER	NoDX	21.82	6.41	.02
		DEPR	10.86	7.12	1.00			DEPR	3.32	7.73	1.00
		ANX	17.86	5.91	.05			ANX	15.15	6.41	.24
		LOWAFFECT	2.86	5.20	1.00			LOWAFFECT	7.82	5.64	1.00
	NoDX	OTHER	.81	5.91	1.00		NoDX	OTHER	-21.82	6.41	.02
		DEPR	11.67	8.88	1.00			DEPR	-18.50	9.64	.63
		ANX	18.67	7.95	.25			ANX	-6.67	8.62	1.00
		LOWAFFECT	3.67	7.43	1.00			LOWAFFECT	-14.00	8.06	.91
	DEPR	OTHER	-10.86	7.12	1.00		DEPR	OTHER	-3.32	7.73	1.00
		NoDX	-11.67	8.88	1.00			NoDX	18.50	9.64	.63
		ANX	7.00	8.88	1.00			ANX	11.83	9.64	1.00
		LOWAFFECT	-8.00	8.43	1.00			LOWAFFECT	4.50	9.14	1.00
	ANX	OTHER	-17.86	5.91	.05		ANX	OTHER	-15.15	6.41	.24
		NoDX	-18.67	7.95	.25			NoDX	6.67	8.62	1.00
		DEPR	-7.00	8.88	1.00			DEPR	-11.83	9.64	1.00
		LOWAFFECT	-15.00	7.43	.51			LOWAFFECT	-7.33	8.06	1.00
	LOWAFFECT	OTHER	-2.86	5.20	1.00		LOWAFFECT	OTHER	-7.82	5.64	1.00
		NoDX	-3.67	7.43	1.00			NoDX	14.00	8.06	.91
		DEPR	8.00	8.43	1.00			DEPR	-4.50	9.14	1.00
		ANX	15.00	7.43	.51			ANX	7.33	8.06	1.00

APPENDIX F

ADI Friendship Item Codes (Current)

ADI Codes:

0 = one or more relationships with person in approximately own age group with whom subject shares non-stereotyped activities ofpersonal variety; whom subjects sees outside prearranged group (such as club); and with whom there is definite reciprocity and mutual responsiveness.

1 = one or more relationships that involve some personal shared activities outside a prearranged situation, with some initiative taken by subject, but limited in terms of restricted interests (e.g., model railways) or less than normal responsiveness/reciprocity

2 = people with whom subject has some kind of personal relationship involving seeking of contact, but only in group situation (such as club, church, etc.) or in school or at work

3 = no peer relationships that involve selectivity and sharing

REFERENCES

Abrahams, B.S., & Geschwind, D.H. (2010). Connecting genes to brain in the autism spectrum disorders. *Archives of Neurology, 67*, 395-399.

Achenbach, T. M., & Edelbrock, C. S. (1987). *Manual for the Teacher's Report Form and Teacher Version of the Child Behavior Profile.* Burlington: University of Vermont, Department of Psychiatry.

Achenbach, T., McConaughy, S., & Howell, C. (1987). Child/adolescent behavioral and emotional problems: Implications of cross-informant correlations for situational specificity. *Psychology Bulletin, 101,* 213–232.

Achenbach, T., & Rescorla, L. (2001). *The manual for the ASEBA School-Age Forms & Profiles.* Burlington, VT: University of Vermont, Research Center for Children, Youth, and Families.

Achenbach, T. M., & Rescorla, L. A. (2003). *Manual for the ASEBA adult forms & profiles.* Burlington, VT: University of Vermont, Research Center for Children, Youth, & Families.

American Psychiatric Association. (1994). *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.). Washington, DC: American Psychiatric Association.

Angold, A. (1988). Childhood and adolescent depression: I. Epidemiological and aetiological aspects. British Journal of Psychiatry, 152, 601-617.

Asher, S. R., Hymel, S. & Renshaw, P. D. (1984). 'Loneliness in children.' *Child Development*, 55 (4), pp. 1456–64.

Bagwell, C. L., Bender, S. E., Andreassi, C. L., Kinoshita, T. L., Montarello, S. A. & Muller, J. G. (2005) 'Friendship quality and perceived relationship changes predict psychosocial adjustment in early adulthood.' *Journal of Social and Personal Relationships*, 22, pp. 235–54.

Barker, E.T., Bornstein, M.H., Putnick, D.L., Hendricks, C., & Suwalsky, J.T.D. (2007). Adolescent-mother agreement about adolescent problem behaviors: Direction and predictors of disagreement. *Journal of Youth and Adolescence, 36*(7), 950-962.

Baron-Cohen, S. (1991). The development of a theory of mind in autism: Deviance or delay? *Psychiatric Clinics of North America, 14*, 33-51.

Baron-Cohen, S., Richler, J., Bisarya, D., Gurunathan, N., & Wheelwright, S. (2003). The systemizing quotient: An investigation of adults with Asperger syndrome or high-functioning autism and normal sex differences. Philosophical Transactions of the Royal Society B: Biological Sciences, *358*, 361–74.

Bauminger, N., & Kasari, C. (2000). Loneliness and friendship in high-functioning children with autism. *Child Development, 71*(2), 447-456.

Bauminger, N., Shulman, C. & Agam, G. (2003) 'Peer Interaction and Loneliness in High-Functioning Children with Autism', *Journal of Autism and Developmental Disorders* 33: 489–507.

Bauminger, N., Solomon, M., Aviezer, A., Heung, K., Gazit, L., Brown, J. & Rogers, S. J. (2008) 'Children with autism and their friends: A multidimensional study of friendship in high-functioning autism spectrum disorder.' *Journal of Abnormal Child Psychology*, 36 (2), pp. 135–50.

Beck, A. T., Steer, R. A, & Brown, G. K. (1996). *Beck depression inventory* (BDI-II)*: Manual* (2nd Ed.). Boston: Harcourt Brace.

Bellini, S., Peters, J.K., Benner, L., & Hopf, A. (2007). A meta-analysis of school-based social skills interventions for children with autism spectrum disorders. *Remedial and Special Education, 28*(3), 153-162.

Berry, D.S., & Hansen, J.S. (1996). Positive affect, negative affect, and social interaction. *Journal of Personality and Social Interaction, 71*(4), 796-809.

Berthoz, S., & Hill, E. L. (2005). The validity of using self-reports to assess emotion regulation abilities in adults with autism spectrum disorder. European Psychiatry, 20, 291–298.

Bevans, K.B., & Forrest, C.B. (2010). The reliability and validity of children's self-reported health. *In* W. Ungar (Ed.), *Economic Evaluation of Child Health*. Oxford, NY, USA.

Bevans, K, B., Riley, A.W., Moon, J., & Forrest, C.B. (2010). Conceptual and methodological advances in child-reported outcomes measurement. *Expert Reviews of Pharmacoeconomics Outcomes Research, 10*(4), 385-396.

Birmaher, B., Ryan, N.D., Williamson, D.E., Brent, D.A., Kaufman, J. (1996). Childhood and adolescent depression: A review of the past 10 years. Part II. *Journal of the American Academy of Child and Adolescent Psychiatry, 35*(12), 1575-1583.

Blumberg, S.H., & Izard, C.E. (1986). Discriminating patterns of emotions in 10 and 11-yr-old children's anxiety and depression. *Journal of Personality and Social Psychology, 51*(4), 852-857.

Bollmer, J. M., Milich, R., Harris, M. J. & Maras, M. A. (2005) 'A friend in need: the role of friendship quality as a protective factor in peer victimization and bullying.' *Journal of Interpersonal Violence*, 20, pp. 701–12.

Brereton, A. V., Tonge, B. J., & Einfeld, S. L. (2006). Psychopathology in children and adolescents with autism compared to young people with intellectual disability. Journal of Autism and Developmental Disorders, 36, 863–870.

Bukowski, W. M., Boivin, M. & Hoza, B. (1994). Measuring friendship quality during pre- and early adolescence: the development and psychometric properties of the Friendship Qualities Scale. *Journal of Social and Personal Relationships*, *11*, 471–484.

Bukowski, W. M., Newcomb, A. F., & Hartup, W. W. (1996). *The Company They Keep: Friendship in "Childhood and Adolescence.* Cambridge: Cambridge University Press.

Burgess, K. B., Wojslawowicz, J. C., Rubin, K. H., Rose-Krasnor, L., & Booth-LaForce, C. (2006). Social information processing and coping strategies of shy/withdrawn and aggressive children: Does friendship matter? *Child Development, 77*, 371-383.

Cairns, R. B.& Cairns, B. D. (1994). *Social Networks and the Function of Friendships*. New York: Cambridge University Press.

Cairns, R. B., Cairns, B. D., Neckerman, H. J., Gest, S. D. & Gariepy, J. L. (1988). Social networks and aggressive behavior: peer support or peer rejection? *Developmental Psychology*, *24*, 815–23.

Centers for Disease Control and Prevention (2012). Prevalence of autism spectrum disorders—Autism and developmental disabilities monitoring network, 14 sites, United States, 2008. *Morbidity and Mortality Weekly Report, 61*(3), 1-19.

Chamberlain, B., Kasari, C., & Rotheram-Fuller, E. (2007). Involvement or isolation? The social networks of children with autism in regular classrooms. *Journal of Autism and Developmental Disorders, 37,* 230-242.

Chorpita, B., & Daleiden, E. (2002). Tripartite dimensions of emotion in a child clinical sample: Measurement strategies and implications for clinical utility. *Journal of Consulting and Clinical Psychology, 70*, 1150-1160.

Clark, L.A. & Watson, D. (1991). Tripartite model of anxiety and depression: Psychometric evidence and taxonomic implications. *Journal of Abnormal Psychology, 100*(3), 316-336.

Colle, L., Baron-Cohen, S., & Hill, J. (2007). Do children with autism have a theory of mind? A nonverbal test of autism vs. specific language impairment. Journal of Autism and Developmental Disabilities, 37, 716–723.

Comrey, A. L., & Lee, H. B. (1992). *A first course in factor analysis* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.

Crawford, J.R., & Henry, J.D. (2004). The positive and negative affect schedule (PANAS): Construct validity, measurement properties and normative data in a large non-clinical sample. *British Journal of Clinical Psychology, 43*, 245-265.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. Psychometrika. 16, 297-334.

Dahlgren, S.O. & Trillingsgaard, A. (1996). Theory of mind in non-retarded children with autism and Asperger's syndrome: A research note. *Journal of Child Psychology and Psychiatry, 37*(6), 759-763.

Davis, T. E., III, Hess, J. A., Moree, B. N., Fodstad, J. C., Dempsey, T., Jenkins, W. S., et al. (2011). Anxiety symptoms across the lifespan in people diagnosed with autistic disorder. Research in Autism Spectrum Disorders, 5, 112–118.

De Civita, M., Regier, D., Alamgir, A.H., Anis, A.H., FitzGerald, M.J., & Marra, C.A. (2005). Evaluating health-related quality-of-life studies in paediatric populations: Some conceptual, methodological, and developmental considerations and recent applications. *Pharmacoeconomics, 23*(7), 659-685.

Demurie, E., De Corel, M., & Roeyers, H. (2011). Empathic accuracy in adolescents with autism spectrum disorders and adolescents with attention-deficit/hyperactivity disorder. *Research in Autism Spectrum Disorders, 5*, 126–134.

Dyck, M.J., Jolly, J.B., & Kramer, T. (1994). An evaluation of positive affectivity, negative affectivity, and hyperarousal as markers for assessing between syndrome relationships. *Personality and Individual Differences, 17*(5), 637-646.

Eaves, L. C., & Ho, H. H. (2008). Young adult outcome of autism spectrum disorders. Journal of Autism and Developmental Disabilities, 38, 739–747.

Ebesutani, C., Okamura, K., Higa-McMillan, C., & Chorpita, B.F. (2011). A psychometric analysis of the positive and negative affect schedule for children-parent version in a school sample. *Psychological Assessment, 23*(2), 406-416.

Englewood Cliffs: Prentice-Hall Inc.

Edelbrock, C., Costello, A.J., Dulcan, M.K., Kalas, R., & Conover, N. C. (1985). Age differences in the reliability of the psychiatric interview of the child. *Child Development, 56*(1), 265-275.

Eiser, C., & Morse, R. (2001). The measurement of quality of life in children: past and future perspectives. *Journal of Developmental and Behavioral Pediatrics*, *22*, 248–256.

Elliott, C. D. (1990). DAS administration and scoring manual. *San Antonio, TX: Psychological Corporation*.

Findlay, L.C., Coplan, R.J., & Bowker, A. (2009). Keep it all inside: Shyness, internalizing coping strategies and socio-emotional adjustment in middle childhood. *International Journal of Behavioral Development, 33*(1), 47-54.

Fitzgerald, M. (2007). Suicide and Asperger's Syndrome. Crisis, 28(1), 1–3.

Flavell, J.H. (1999). Cognitive development: children's knowledge about the mind. *Annual Review of Psychology, 50*, 21–45

Fombonne, E. (2005). The changing epidemiology of autism. *Journal of Applied Research in Intellectual Disabilities, 18*(4), 281-294.

Frankel, F. D., Gorospe, C.M., Chang, Y., & Sugar, C.A. (2011). Mothers' reports of play dates and observation of school playground behavior of children having high-functioning autism spectrum disorders. *Journal of Child Psychology and Psychiatry, 52*(5), 571-579.

Frankel, F., & Mintz, J. (2011). Maternal reports of play dates of clinic referred and community children. *Journal of Child and Family Studies, 20*, 623-630.

Gadow, K.D., DeVincent, C.J., Pomeroy, J., & Aizizian, A. (2005). Comparison of DSM-IV symptoms in elementary school-age children with PDD versus clinic and community samples. *Autism, 9*(4), 392-415.

Gest, S. D., Graham-Bermann, S. A. & Hartup, W. W. (2001) 'Peer experience: common and unique features of number of friendships, social network centrality, and sociometric status.' *Social Development*, 10, pp. 23–40.

Ghaziuddin, M. (2002). Asperger syndrome: Associated psychiatric and medical conditions. *Focus on Autism and Other Developmental Disabilities, 17*, 138.

Ghaziuddin, M., & Greden, J. (1998). Depression in children with autism/pervasive developmental disorders: a case-control family history study. *Journal of Autism and Developmental Disorders, 28,* 111–115.

Ghaziuddin, M., Alessi, N., & Greden, J. F. (1995). Life events and depression in children with pervasive developmental disorders. *Journal of Autism and Developmental Disorders, 25*(5), 495-516.

Ghaziuddin, M., Ghaziuddin, N., & Greden, J. (2002). Depression in persons with autism: Implications for research and clinical care. *Journal of Autism and Developmental Disorders, 32*(4), 299-305.

Ghaziuddin, M., Weidmer-Mikhail, E., & Ghaziuddin, N. (1998). Comorbidity of Asperger syndrome: a preliminary report. *Journal of Intellectual Disability Research, 4,* 279–283.

Gillott, A., Furniss, F., & Walter, A. (2001). Anxiety in high-functioning children with autism. Autism, 5 (3), 277–286.

Gorsuch, R. L. (1983). *Factor analysis* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.

Gorsuch, R. L. (1988). Exploratory factor analysis. In J. Nessdroade & R. B. Cattell (Eds.), *Handbook of multivariaie experimental psychology* (pp. 231-258). New York: Plenum.

Gorsuch, R.L. (1997). Exploratory factor analysis: Its role in item analysis. *Journal of Personality Assessment, 68*(3), 532-560.

Green, D.P. Goldman, S.L., & Salovey, P. (1993). Measurement error masks bipolarity in affect ratings. *Journal of Personality and Social Psychology, 64*(6), 1029-1041.

Hartup, W. W. & Stevens, N. (1997) 'Friendship and adaptation in the life course.' *Psychological Review*, 121, pp. 355–70.

Hastrup, J.L., Phillips, S.M., Vullo, K., Kang, G., & Slomka, L. (1992). Adolescents' knowledge of medical terminology and family health history. *Health Psychology, 11*(1), 41-47.

Hedley, D., & Young, R. (2006). Social comparison processes and depressive symptoms in children and adolescents with Asperger syndrome. Autism, 10(2), 139–153.

Heerey, E.A., Keltner, D., & Capps, L.M. (2003). Making sense of self-conscious emotion: Linking theory of mind and emotion in children with autism. *Emotion, 3*(4), 394-400.

Hillier, A., Fish, T., Cloppert, P., & Beversdorf, D. Q. (2007). Outcomes of a social and vocational skills support group for young adults on the autism spectrum. Focus on Autism and Other Developmental Disabilities, 22, 107–115.

Hillier, A., Fish, T., Cloppert, P., & Beversdorf, D. Q. (2007). Outcomes of a social and vocational skills support group for young adults on the autism spectrum. Focus on Autism and Other Developmental Disabilities, 22, 107–115.

Hillier, A.J., Fish, T., Siegel, J.H., & Beversdorf, D.Q. (2011). Social and vocational skills training reduces self-reported anxiety and depression among young adults on the autism spectrum. *Journal of Developmental and Physical Disabilities, 23*, 267-276.

Hobson, P. (1989). Beyond cognition: A theory of autism. In G. Dawson (Ed.), *Autism: Nature, Diagnosis, and Treatment* (pp.22-48). New York, NY: Guilford Press.

Hobson, P. (2005). Autism and emotion. In F.R. Volkmar, R. Paul, A. Klin, & D. Cohen (Eds.), *Handbook of Autism and Pervasive Developmental Disorders, Vol. 1: Diagnosis, Development, Neurobiology, and Behavior* (pp. 406-422). Hoboken, NJ: John Wiley & Sons, Inc.

Howard, B., Cohn, E. & Orsmond, G. I. (2006) 'Understanding and negotiating friendships: perspectives from an adolescent with Asperger syndrome.' *Autism*, 10, pp. 619–27.

Howes, C. (1980). Peer play scale as an index of complexity of peer interaction. *Developmental Psychology, 16*(4), 371-372.

Howes, C., & Stewart, P. (1987). Child's play with adults, toys, and peers: An examination of family and child-care influences. *Developmental Psychology, 23*(3), 423-430.

Hudson, W. W., Nurius, P. S., Daley, J. G., & Newsome, R. D. (1990). A short form scale to measure peer relations dysfunction. Journal of Social Service Research, 13, 57–69.

Hughes, A.A., & Kendall, P.C. (2009). Psychometric properties of the positive and negative affect scale for children (PANAS-C) in children with anxiety disorders. *Child Psychiatry and Human Development, 40*, 343-352.

Humphrey, N. & Symes,W. (2010). Perceptions of social support and experience of bullying among pupils with autistic spectrum disorders in mainstream secondary schools. *European Journal of Special Needs Education, 25*, 77–91.

Hwang, B., & Hughes, C. (2000). The effects of social interactive training on early social communicative skills of children with autism. *Journal of Autism and Developmental Disorders, 30*(4), 331-343.

Ialongo, N..S., Edelsohn, S., & Kellam, S.G. (2001). A further look at the prognostic power of young children's reports of depressed mood. *Child Development, 72*(3), 736-747.

Ialongo, N., Edelsohn, G., Werthamer-Larsson, L. *et al.* (1993). Are self-reported depressive symptoms in first-grade developmentally transient phenomena? A further look. *Developmental Psychopathology, 5*, 431–457.

Ialongo, N., Edelsohn, G., Werthamer-Larsson, L., Crockett, L., Kellam, S. (1995). The significance of self-reported anxious symptoms in first grade children: Prediction to anxious symptoms and adaptive functioning in fifth grade, *Child Psychology & Psychiatry & Allied Disciplines, 36*(3), 427-437.

Johnson, J.H., McCutcheon, S., (1980). Assessing life stress in older children and adolescents: Preliminary findings with the life events checklist. *In* I. Sarason, I. & C. Spileberger (Eds.), *Stress and Anxiety*. Hemisphere, Washington DC, pp. 111–125.

Johnson, S.A., Filliter, J.H., & Murphy, R.R. (2009). Discrepancies between self- and parent-perceptions of autistic traits and empathy in high functioning children and adolescents on the autism spectrum. *Journal of Autism and Developmental Disorders, 39*, 1706-1714.

Joiner, T.E., Catanzaro, S.J., & Laurent, J. (1996). Tripartite structure of positive and negative affect, depression, and anxiety in child and adolescent psychiatric inpatients. *Journal of Abnormal Psychology, 105*(3), 401-409.

Jolly, J.B. Dyck, M.J., Kramer, T.A., & Wherry, J.N. (1994). Integration of positive and negative affectivity and cognitive content-specificity: Improved discrimination of anxious and depressive symptoms. *Journal of Abnormal Psychology, 103*(3), 544-552.

Jones, B., Nagin, D., & Roeder, K. (2001). A SAS procedure based on mixture models for estimating developmental trajectories. *Sociological Methods & Research, 29*, 374–393.

Kanner, L. (1943). Autistic disturbance of affective contact. *Nervous Child*, *2*, 217- 250.

Kasari, C., Freeman, S., Paparella, T., Wong, C., Kwon, S., & Gulsrud, A. (2005). Early intervention on core deficits in autism. *Clinical Neuropsychiatry: Journal of Treatment Evaluation, 2*(6), 380-388.

Kasari, C., Locke, J., Gulsrud, A., & Rotheram-Fuller, E. (2011). Social networks and friendships at school: Comparing children with and without autism. Journal of Autism and Developmental Disorders, 41, 533–544.

Kasari, C., Rotheram-Fuller, E., Locke, J., & Gulsrud, A. (2012). Making the connection: Randomized controlled trial of social skills at school for children with autism spectrum disorders. *Journal of Child Psychology and Psychiatry, 53*(4), 431-439.

Kashani, J. H., Dandoy, A. C., Vaidya, A. F., Soltys, S. M., & Reid, J. C. (1990). Risk factors and correlates of severe psychiatric disorders in a sample of inpatient children. *The American Journal of Psychiatry, 147*(6), 780-784.

Kellam, S. (1990). Developmental epidemiological framework for family research on depression and aggression. *In* G. Patterson (Ed.), *Depression and aggression in family interaction* (pp. 11-48), Hillsdale, NJ: Lawrence Erlbaum Associates.

Kellam, S. G., & Rebok, G. W. (1992). Building developmental and etiological theory through epidemiologically based preventive intervention trials. *In* J. McCord & R. E. Tremblay

(Eds.), *Preventing antisocial behavior: Interventions from birth through adolescence* (pp. 162-195). New York: Guilford Press.

Kiernan, G., Laurent, J., Joiner, T.E., Catanzaro, S.J., & MacLachlan, M. (2001). Cross-cultural examination of the tripartite model with children: Data from the Barretstown studies. *Journal of Personality Assessment, 77*(2), 359-379.

Kim, J. A., Szatmari, P., Bryson, S. E., Streiner, D. L., & Wilson, F. J. (2000). The prevalence of anxiety and mood problems among children with autism and Asperger syndrome. Autism, 4, 117–132.

Kim, J.A., Szatmari, P., Bryson, S.E., Streiner, D.L., & Wilson, F.J. (2000). The prevalence of anxiety and mood problems among children with autism and Asperger syndrome. *Autism, 4*(2), 117-132.

Klein, W., Beltran, M., & Sowers-Hoag, K. (1990). Validating an assessment of peer relationship problems. Journal of Social Service Research, 13, 71–85.

Kovacs, M. & Staff, M.H.S. (2003). *Children's Depression Inventory (CDI): Technical manual update.* Toronto: Multi-Health Systems Inc.

Kovacs, M. (1992). *The Children's depression inventory* (CDI) *technical manual update*. North Tonawanda, NY: Multi- Health Systems, Inc.

Kuusikko, S., Pollock-Wurman, R., Jussila, K., Carter, A. S., Mattila, M., Ebeling, H., et al. (2008). Social anxiety in high-functioning children and adolescents with autism and Asperger syndrome. Journal of Autism and Developmental Disorders, 38, 1697–1709.

Ladd, G., Kochenderfer, B. J. & Coleman, C. C. (1996) 'Friendship quality as a predictor of young children's early school adjustment.' *Child Development*, 67, pp. 1103–18.

Lainhart, J.E. (1999). Psychiatric problems in individuals with autism, their parents and siblings. *International Review of Psychiatry, 11*(4), 278-298.

Laurent, J., Catanzaro, S.J., & Joiner, T.E. (2004). Development and preliminary validation of the physiological hyperarousal scale for children. *Psychological Assessment, 16*(4), 373-380.

Laurent, J., & Ettelson, R. (2001). An examination of the tripartite model of anxiety and depression and its application to youth. *Clinical Child and Family Psychology Review, 4*(3), 209-230.

Laurent, J., Catanzaro, S.J., Joiner, T.E., Rudolph, K.D., Potter, K.I., Lambert, S., et al. (1999). A measure of positive and negative affect for children: Scale development and preliminary validation. *Psychological Assessment, 11*(3), 326-338.

Lee, J., Koh, D., Ong, C.N. (1989). Statistical evaluation of agreement between two methods for measuring a quantitative variable. *Computational Biological Medicine, 19*, 61-70.

Leue, A., & Beauducel, A. (2011). The PANAS structure revisited: On the validity of a bifactor model in community and forensic samples. *Psychological Assessment, 23*(1).

Lewinsohn, P.M. (1974). *The Psychology of Depression: Contemporary Theory and Research*. Oxford, England: John Wiley & Sons.

Leyfer, O.T., Folstein, S.E., Bacalman, S., Davis, N.O., Dinh, E., Morgan, J., Tager-Flusberg, H., & Lainhart, J.E. (2006). Comorbid psychiatric disorders in children with autism: Interview development and rates of disorders. *Journal of Autism and Developmental Disorders, 36,* 849-861.

Litwin, M. S. (2003). *How to assess and interpret survey psychometrics, 2nd edition*. Thousand Oaks, CA: Sage Publications, Inc.

Locke, J., Ishijima, E.H., Kasari, C., & London, N. (2010). Loneliness, friendship quality and the social networks of adolescents with high-functioning autism in an inclusive school setting. *Journal of Research in Special Educational Needs, 10*(2), 74-81.

Lonigan, C. J., Hooe, E., David, C., & Kistner, J. (1999). Positive and negative affectivity in children: Confirmatory factor analysis of a two-factor model and its relation to symptoms of anxiety and depression. *Journal of Consulting and Clinical Psychology, 67*, 374-386.

Lopata, C., Toomey, J.A., Fox, J.D., Volker, M.A., Chow, S.Y., Thomeer, M.L., Lee, G.K., Rodgers, J.D., McDonald, C.A., & Smerbeck, A.M. (2010). Anxiety and depression in children with HFASDs: Symptom levels and source differences. *Journal of Abnormal Child Psychology, 38*, 765-776.

Lopata, C., Volker, M. A., Putnam, S. K., Thomeer, M. L., & Nida, R. E. (2008). Effect of social familiarity on salivary cortisol and self-reports of social anxiety and stress in children with high functioning autism spectrum disorders. *Journal of Autism and Developmental Disorders, 38*(10), 1866–1877.

Lord, C., Risi, S., Lambrecht, L., Cook, E. H., Leventhal, B. L., & DiLavore, P. C. (2000). The autism diagnostic observation schedule-generic: A standard measure of social and communication deficits associated with the spectrum of autism. Journal of Autism and Developmental Disorders, 30, 205–223.

Lowe, P.A., & Reynolds, C.R. (2004). Psychometric analyses of the adults manifest anxiety scale-adult version among young and middle-aged adults. *Educational and Psychological Measurement, 64*, 661-681.

Le Couteur, A., Lord, C., & Rutter, M. (2003). The autism diagnostic interview–Revised (ADI-R). *Los Angeles, CA: Western Psychological Services*.

Levitan, G.W., & Reiss, S. (1983). Generality of diagnostic overshadowing across disciplines. *Applied Research in Mental Retardation, 4*(1), 59-64.

Lewis, M. (1997). *Altering Fate: Why the Past Does Not Predict the Future.* New York, NY: The Guilford Press.

Lord, Risi, DiLavore, Shulman, Thurm, & Pickles. (2006). Autism from 2 to 9 years of age. *Archives of General Psychiatry*, 63, 694 – 701.

Lounsbury, J. W., Gibson, L. W., & Saudargas, R. A. (2006). Scale development. In F. T. L Leong & J. T. Austin (Eds.), *The Psychology Research Handbook: A Guide for Graduate Students and Research Assistants* (pp. 125-146). Thousand Oaks, CA: Sage Publications.

Magnuson, K.M. & Constantino, J.N. (2011). Characterization of depression in children with autism spectrum disorders. *Journal of Developmental Behavioral Pediatrics, 32*, 332-340.

Mahan, S., & Matson, J.L. (2011). Children and adolescents with autism spectrum disorders compared to typically developing controls on the behavioral assessment system for children, second edition (BASC-2). *Research in Autism Spectrum Disorders, 5*(1), 119-125.

Mason, J., & Scior, K. (2004). 'Diagnostic overshadowing' amongst clinicians working with people with intellectual disabilities in the UK. *Journal of Applied Research in Intellectual Disabilities, 17*(2), 85-90.

Matson, J. L., & Kozlowski, A. M. (2011). The increasing prevalence of autism spectrum disorders. *Research in Autism Spectrum Disorders*, 5, 418–425.

Mattila, M, Hurtig, T., Haapsamo, H., Jussila, K., Kuusikko-Gauffin, S., Kielinen, M., et al. (2010). Comorbid psychiatric disorders associated with Asperger syndrome/high-functioning autism: A community- and clinic-based study. *Journal of Autism and Developmental Disorders, 40*(9), 1080-1093.

Mazefsky, C.A., Kao, J., & Oswald, D.P. (2011). Preliminary evidence suggestion caution in the use of psychiatric self-report measures with adolescents with high-functioning autism spectrum disorders. *Research in Autism Spectrum Disorders, 5*, 164-174.

Mehrabian, A. (1998). Correlations of the PAD emotion scales with self-reported satisfaction in marriage and work. *Genetic, Social, and General Psychology Monographs, 124*(3), 311-334.

Melfsen S., Walitza, S., & Warnke, A. (2006). The extent of social anxiety in combination with mental disorders. *European Child and Adolescent Psychiatry, 15*(2), 111-117.

Merikangas, K.R., He, J., Brody, D., Fisher, P.W., Bourdon, K., & Doretz, D.S. (2010a). Prevalence and treatment of mental disorders among US children in the 2001-2004

Merikangas, K.R., He, J., Burstein, M., Swanson, S.A., Avenevoli, S., Cui, L., et al. (2010b). Lifetime prevalence of mental disorders in U.S. adolescents: Results from the national comorbidity survey replication—Adolescent supplement (NCS-A). *Journal of the Academy of Child & Adolescent Psychiatry, 49*(10), 980-989.

Nangle, D. W., Erdley, C. A., Newman, J. E., Mason, C. A. & Carpenter, E. M. (2003) 'Popularity, friendship quantity, and friendship quality: interactive influences on

children's loneliness and depression.' *Journal of Clinical Child and Adolescent Psychology*, 32, pp. 546-55.

Nauta, M. H., Scholing, A., Rapee, R., Abbott, M., Spence, H., & Waters, A. (2004). A parent-report measure of children's anxiety: Psychometric properties and comparison with child-report in a clinic and normal sample. *Behaviour Research and Therapy, 42*, 813-839.

Nezlek, J. B., Imbrie, M., & Shean, G. D. (1994). Depression and everyday social interaction. *Journal of Personality and Social Psychology*, *67*, 1101–1111.

Nunnally, J. C., & Bernstein, I. H. (1994). Psychometric theory. New York: McGraw-Hill.

Orsmond, G. I., Krauss, M. W. & Seltzer, M. M. (2004) 'Peer relationships and social and recreational activities among adolescents and adults with autism.' *Journal of Autism and Developmental Disorders*, 34, pp. 245–56.

Ostir, G.V., Smith, P.M., Smith, D., & Ottenbacher, K.J. (2005). Reliability of the positive and negative affect schedule (PANAS) in medical rehabilitation. *Clinical Rehabilitation, 19*, 767-769.

Parker, J. G. & Asher, S. R. (1993) 'Friendship and friendship quality in middle childhood: links with peer group acceptance and feelings of loneliness and social dissatisfaction.' *Developmental Psychology*, 29, pp.611–21.

Parker, J.G., & Gottman, J.M. (1989). Social and emotional development in a relational context: Friendship interaction from early childhood to adolescence. *In* T.J. Berndt & G.W. Ladd (Eds.). *Peer Relationships in Child Development* (pp. 95-131). Oxford, England:John Wiley & Sons, Inc.

Parker, J.G., Rubin, K.H., Price, J.M., & DeRosier, M.E. (1995). Peer relationships, child development, and adjustment: A developmental psychopathology perspective. *In* D. Cicchetti & D.J. Cohen (Eds.), *Developmental Psychopathology, Vol. 2: Risk, disorder, and adaptation* (pp.96-161). Oxford, England: John Wiley & Sons.

Patterson, S., & Smith, V. (2010). Using developmental theory to explore conceptions of friendship: A case comparison. *Developmental Disabilities Bulletin, 38*(1), 75-91.

Portney, L.G. & Watkins, M.P. (2000). *Foundations of clinical research: Applications to practice.* Prentice Hall Inc. New Jersey, pp. 560-567.

Raghunathan, T.E., Solenberger, P.W., and Van Hoewyk, J. (2002). *IVEware: Imputation and Variance Estimation Software Users Guide.* An Arbor: Institute for Social Research, University of Michigan.

Rebok, G., Riley, A.W., Forrest, C. **et al.** (2001) Elementary school-aged children's reports of their health: a cognitive interviewing study. *Quality of Life Research, 10*, 59–70.

Reynolds, C.R., & Kamphaus, R. W. (2004). *BASC-2 behavioral assessment system for children manual* (2nd ed.). Circle Pines, MN: AGS Publishing.

Reynolds, C. R., Richmond, B. O., & Lowe, P. A. (2003). *The Adult Manifest Anxiety Scale:(AMAS): Manual*. Western Psychological Services (WPS).

Richler, J., Bishop, S., Kleinke, J., & Lord, C. (2006). Restricted and repetitive behaviors in young children with autism spectrum disorders. *Journal of Autism and Developmental Disorders, 37*, 73-85.

Riley, A.W. (2004). Evidence that school-age children can self-report on their health. *Ambulatory Pediatrics, 4(4),* 371-376.

Rogers, S.J. (2000). Interventions that facilitate socialization in children with autism. *Journal of Autism and Developmental Disorders, 30*(5), 399-409.

Roid, G. H. (2003). *Stanford-Binet Intelligence Scales, Fifth Edition.* Itasca, IL: Riverside Publishing.

Rucklidge, J. J. (2006). Psychosocial functioning of adolescents with and without paediatric bipolar disorder. *Journal of Affective Disorders, 91*, 181-188.

Russell, J.A., & Carroll, J.M. (1999). On the bipolarity of positive and negative affect. *Psychological Bulletin, 125*(1), 3-30.

Russell, E., & Sofronoff, K. (2005). Anxiety and social worries in children with Asperger syndrome. *Australian and New Zealand Journal of Pscyhiatry, 39*(7), 633-638.

Rutter, M., Bailey, A., & Lord, C . (2003). *Social Communication Questionnaire (SCQ)***.** Los Angeles: Western Psychological Services.

Samm, A., Varnik, A., Tooding, L., Sissask, M., Kolves, K., & von Knorring, A. (2007). Children's depression inventory in Estonia: Single items and factor structure by age and gender. *European Child and Adolescent Psychiatry, 17*, 162-170.

Schalock, R. L., & Keith, K. D. (1993). *Quality of Life Questionnaire Manual.* Worthington, OH: IDS Publishing.

Sebastian, C., Blakemore, S., & Charman, T. (2009). Reactions to ostracism in adolescents with autism spectrum conditions. Journal of Autism and Developmental Disorders, 39(8), 1122–1130.

Shipman, D.L., Sheldrick, R., Christopher Perrin, E.C. (2011). Quality of life in adolescents with autism spectrum disorders: Reliability and validity of self-reports. *Journal of Developmental and Behavioral Pediatrics, 32*(2), 85-89.

Shtayermman, O. (2007). Peer victimization in adolescents and young adults diagnosed with Asperger's syndrome: a link to depressive symptomatology, anxiety symptomatology, and suicidal ideation. *Issues in Comprehensive Pediatric Nursing, 30*, 87–107.

Sigman, M. & Ruskin, E. (1999). Continuity and change in the social competence of children with autism, Down syndrome, and developmental delays. *Monographs of the Society for Research in Child Development, 64*(1), v-114.

Simpson, R. L. (2005). Evidence-based practices and students with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities, 20*(3), 140–149.

Sourander, A., Helstela, L., & Helenius, H. (1999). Parent-adolescent agreement on emotional and behavioral problems. *Social Psychiatry and Psychiatric Epidemiology, 34*, 657-663.

Sparrow, S., Balla, D., & Cicchetti, D. (1984). Vineland Scales of Adaptive Behavior, Survey Form Manual. *Circle Pines, MN: American Guidance Service*.

Sparrow, S. S., Cicchetti, D. V., & Balla, D. A. (2005). Vineland adaptive behavior scales: (Vineland II), survey interview form/caregiver rating form. *Livonia, MN: Pearson Assessments*.

Stallings, P., & March, J. S. (1995). Assessment. In J. S. March (Ed.), *Anxiety disorders in children and adolescents*. New York: Guilford.

Starfield, B., Riley, A.W., Green, B.F., et al. (1995). The adolescent child health and illness profile: A population-based measure of health. *Med Care, 33,* 553-566.

Sterling, L., Dawson, G., Estes, A., & Greenson, J. (2008). Characteristics associated with presence of depressive symptoms in adults with autism spectrum disorder. *Journal of Autism and Developmental Disorders, 38*, 1011–1018.

Stewart, M. E., Barnard, L., Pearson, J., Hasan, R., & O'Brien, G. (2006). Presentation of depression in autism and Asperger syndrome. *Autism, 10(1),* 103–116.

Stone, W.L., & Lemanek, K.L. (1990). Developmental issues in children's self-reports. In A.M. La Greca (Ed.), *Through the Eyes of the Child: Obtaining Self-Reports from Children and Adolescents*. Allyn Bacon, Boston, Mass, pp. 18–55.

Strang, J.F., Kenworthy, L., Danidos, P., Case, L., Wills, M.C., Martin, A., & Wallace, G.L. (2012). Depression and anxiety symptoms in children and adolescents with autism spectrum disorders without intellectual disability. *Research in Autism Spectrum Disordes, 6*, 406-412.

Strauss, C.C., Forehand, R., Smith, K., & Frame, C.L. (1986). The association between social withdrawal and internalizing problems of children. *Journal of Abnormal Child Psychology, 14*(4), 525-535.

Sukhodolsky, D.G., Scahill, L., Gadow, K.D., Arnold, L.E., Aman, M.G., McDougle, C.J. et al. (2008). Parent-rated anxiety symptoms in children with pervasive developmental disorders: Frequency and association with core autism symptoms and cognitive functioning. *Journal of Abnormal Child Psychology, 36*(1), 117-128.

Tager-Flusberg, H., Joseph, R., & Folstein, S. (2001). Current directions in research on autism. *Mental Retardation and Developmental Disabilities Research Reviews, 7*(1), 21-29.

Tenneij, N. H. & Koot, H. M. (2007). A preliminary investigation into the utility of the adult behavior checklist in the assessment of psychopathology in people with low IQ. *Journal of Applied Research in Intellectual Disabilities, 20*(5), 391-400.

Terracciano, A., McCrae, R.R., & Costa, P.T. (2003). Factorial and construct validity of the Italian positive and negative affect schedule (PANAS). *European Journal of Psychological Assessment, 19*(2), 131-141.

Theunissen, N.C.M., Vogels, T.G.C., Koopman, H.M., Verrips, G.H.W., Zwinderman, K.A.H., Verloove-Vanhorick, S.P. et al. (1998). The proxy problem: Child report versus parent report in health-related quality of life research. *Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care & Rehabilitation, 7*(5), 387-397.

Tuccitto, D.E., Giacobbi, P.R., Leite, W.L. (2010). The internal structure of positive and negative affect: A confirmatory factor analysis of the PANAS. *Educational and Psychological Measurement, 70*(1), 125-141.

Upton, P., Lawford, J., & Eiser, C. (2008). Parent-child agreement across child health-related quality of life instruments: A review of the literature. *Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care, & Rehabilitation, 17*(6), 895-913.

vanSteensel, F.J.A., Bogels, S.M., & Perrin, S. (2011). Anxiety disorders in children and adolescents with Autistic Spectrum Disorders: A meta-analysis. *Clinical Child and Family Psychology Review, 14*, 302-317.

Verrips, G.H.W., Vogels A.G.C., den Ouden, A.L., Paneth, N., & Verloove-Vanhorick, S.P. (2000). Measuring health-related quality of life in adolescents: Agreement between

raters and between methods of administration. *Health and Development, 26*(6), 457-469.

Vickerstaff, S., Heriot, S., Wong, M., Lopes, A., & Dossetor, D. (2007). Intellectual ability, self-perceived social competence, and depressive symptomatology in children with high-functioning autistic spectrum disorders. *Journal of Autism and Developmental Disorders, 37*, 1647-1664.

Villodas, F., Villodas, M.T., & Roesch, S. (2011). Examining the factor structure of the positive and negative affect schedule (PANAS) in a multiethnic sample of adolescents. *Measurement and Evaluation in Counseling and Development, 44*(4), 193-203.

Volker, M.A., Lopata, C., Smerbeck, A.M., Knoll, V.A., Thomeer, M.L., Toomey, J.A., & Rodgers, J.D. (2010). BASC-2 PRS profiles for students with high-functioning autism spectrum disorders. *Journal of Autism and Developmental Disorders, 40*, 188-199.

Waldrip, A. M., Malcolm, K. T. & Jensen-Campbell, L. A. (2008). With a little help from your friends: the importance of high-quality friendships on early adolescent adjustment. *Social Development*, 17, pp. 832–52.

Walker, L.S. & Heflinger, C.A. (1998). Quality of life predictors of outcome in pediatric abdominal pain patients: Findings at initial assessment and 5-year follow-up. In Drotar, D. (Ed.), *Measuring Health-Related Quality of Life in Children and Adolescents.* Lawrence Erlbaum Associates, Hillsdale, NJ, pp. 237–252.

Wallbott, H.G., & Scherer, K. R. (1995). Cultural determinants in experiencing shame and guilt. In J. P. Tangney & K. W. Fischer (Eds.), *Self-conscious emotions: The psychology of shame, guilt, embarrassment, and pride* (pp. 465-487). New York: Guilford Press.

Waterhouse, L. (2008). Autism overflows: increasing prevalence and proliferating theories. *Neuropsychology Review*, 18, 273–286.

Waters, E., Stewart-Brown, S., Fitzpatrick, R. (2003). Agreement between adolescent self-report and parent reports of health and well-being: Results of an epidemiological study. *Child: Care, Health and Development, 29*, 501–509.

Watson, D., Clark, L.A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*(6), 1063-1070.

Wechsler, D. (1991). *WISC-III: Wechsler intelligence scale for children*. San Antonio, TX: Psychological Corporation.

Wechsler, D. (1999). Wechsler Abbreviated Scale of Intelligence. The Psychological Corporation: Harcourt Brace & Company. New York, NY.

Weir, J.P. (2005). Quantifying test-retest reliability using the intraclass correlation coefficient and the SEM. *Journal of Strength and Conditioning Research, 19*(1), 231-240.

Weisbrot, D.M., Gadow, K.D., DeVincent, C.J., & Pomeroy, J. (2005). The presentation of anxiety in children with pervasive developmental disorders. *Journal of Child and Adolescent Psychopharmacology, 15*(3), 477-496.

Wellman, H. M. (2011). Developing a theory of mind. In U. Goswami (Ed.): *The Wiley-Blackwell handbook of childhood cognitive development (2nd ed.)*(pp. 258-284). Hoboken, NJ: Wiley Blackwell.

Wellman, H.M., Harris, P.L., Banerjee, M., & Sinclair, A. (1995). Early understanding of emotion: evidence from natural language. *Cognition and Emotion, 9*, 117–149.

White, S.W., & Roberson-Nay, R. (2009). Anxiety, social deficits, and loneliness in youth with autism spectrum disorders. *Journal of Autism and Developmental Disorders, 39*, 1006-1013.

White, S.W., Oswald, D., Ollendick, T., & Scahill, L. (2009). Anxiety in children and adolescents with autism spectrum disorders. *Clinical Psychology Review, 29*, 216-229.

White, S.W., Schry, A.R., & Maddox, B.B. (2012). Brief report: The assessment of anxiety in high-functioning adolescents with autism spectrum disorder. *Journal of Autism and Development Disorders, 42*, 1138-1145.

Wilson, K., Gullone, E., & Moss, S. (1998). The youth version of the positive and negative affect schedule; A psychometric validation. *Behaviour Change: Journal of the Australian Behaviour Modification Association, 15*(3), 187-193.