

Title: Beyond behaviour: Is social anxiety low in Williams syndrome?

Running Head: Social Anxiety in Williams Syndrome

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Abstract

Individuals with Williams syndrome (WS) exhibit striking social behaviour that may be indicative of abnormally low social anxiety. The present research aimed to determine whether social anxiety is unusually low in WS and to replicate previous findings of increased generalised anxiety in WS using both parent and self report. Fifteen individuals with WS aged 12-28 years completed the Spence Children's Anxiety Scale (SCAS) and the Children's Automatic Thoughts Scale (CATS). Their responses were compared to clinically anxious and community comparison groups matched on mental age. The findings suggest that WS is not associated with unusually low social anxiety but that generalised anxiety symptoms and physical threat thoughts are increased in WS, relative to typically developing children.

Keywords: Williams syndrome, Anxiety, Threat, Thoughts, Social Behaviour.

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Beyond behaviour: Is social anxiety low in Williams syndrome?

Williams Syndrome (WS) is a genetic disorder caused by a microdeletion of a sequence of genes on chromosome 7. Prevalence is between 1 in 7,500 and 1 in 20,000 (Martin, Snodgrass, & Cohen, 1984; Stromme, Bjornstad, & Ramstad, 2002). The deletion typically results in dysmorphic facial features, short stature and a mild to moderate intellectual impairment (Bellugi, Lichtenberger, Jones, Lai, & St, 2000; Mervis et al., 2000). Additionally, individuals with WS exhibit outgoing, gregarious social behaviour, as if they have little or no social anxiety (Doyle, Bellugi, Korenberg, & Graham, 2004; Jones et al., 2000). In contrast to this social behaviour, there is emerging evidence that individuals with WS may be at increased risk for Generalised Anxiety Disorder (GAD) and Specific Phobia (Dykens, 2003; Leyfer, Woodruff-Borden, Klein-Tasman, Fricke, & Mervis, 2006). These findings may indicate that the WS deletion specifically increases risk for certain anxiety disorders whilst decreasing risk for Social Phobia. However, it is also possible that individuals with WS do experience social anxiety but that their outgoing social behaviour masks these thoughts and feelings of social anxiety. Due to the limitations of previous research, it is not currently possible to differentiate between these two hypotheses. The present study utilises a multi-method, multi-informant approach to examine the evidence that social anxiety is unusually low in WS.

Although a number of early studies reported that WS is associated with increased anxiety (Davies, Udwin, & Howlin, 1998; Einfeld, Tonge, & Florio, 1997; Sarimski, 1997), there has been little examination of specific subtypes of anxiety (e.g. social anxiety, generalised anxiety etc.) within WS. Two recent studies have utilised diagnostic interviews validated against the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; Association, 1994) to assess the prevalence of clinical

anxiety disorders in WS. Based on parent report, Leyfer et al. (2006) found evidence of high rates of GAD (12%) and Specific Phobia (54%) in children with WS, relative to rates reported for typically developing children, and also reported that 1.7% of their sample met criteria for Social Phobia. Similar prevalence rates for GAD and Specific Phobia were found by Dodd & Porter (in press) for a sample of children and adults with WS, however, no cases of Social Phobia were found. By comparing these prevalence rates to those reported for typically developing children (for example, Bolton et al., 2006; Costello et al., 1996), it is clear that children with WS may be at significantly increased risk for GAD and Specific Phobia. However, due to the variability in prevalence rates of Social Phobia reported for the typically-developing population (see Furmark, 2002 for discussion) it is difficult to determine whether overall rates of Social Phobia in WS are unusual. For example, in typically developing children, the three-month prevalence of Social Phobia is between 0.6% and 2.9% (Bolton et al., 2006; Costello et al., 1996) and the three-month prevalence of Social Phobia in adults is between 0.45% and 14.2% (Furmark, 2002).

In summary, studies that have examined anxiety in WS suggest that a significant proportion of individuals with WS may experience recurrent worries and fears that have a significant impact on their daily functioning. However, it remains unclear whether social anxiety is unusually low in WS, as their outgoing social behaviour suggests. There are two major limitations of previous research. Firstly, the vast majority of research has relied entirely on parent report. Within the clinical anxiety literature, discrepancies in parent and child report are common (Stanger & Lewis, 1993) and current thinking highlights that children provide an additional perspective to parents that is equally as important (La Greca, 1990). More specifically, over-reliance on parent report is of particular importance for the

assessment of social anxiety in WS. As discussed the outgoing, 'gregarious' social behaviour (Doyle et al., 2004; Jones et al., 2000) observed in WS may be indicative of unusually low social anxiety. Alternatively, it is possible that individuals with WS experience a normal level of social anxiety but that this is masked by their social behaviour. If the later hypothesis is accurate then it may be difficult for parents to reliably report their child's internal feelings of social anxiety. Consequently, self report may provide further insight into social anxiety in WS.

The second limitation of previous research is the predominant focus on behavioural manifestations of anxiety in WS. To date, no previous research has examined cognitive factors related to anxiety in WS. Theoretical models of child psychopathology emphasise the crucial role of negative thoughts in the development and maintenance of anxiety in typically developing children. For example, Beck (1976) proposes that different types of psychopathology are underpinned by clusters of thoughts and that the ideational content of these thoughts relates to the type of psychopathology expressed. For example, beliefs of personal failure, loss, and hopelessness are associated with depression, and thoughts of physical and social threat are associated with anxiety. In support of this, there is evidence that maladaptive thoughts cluster together to reflect themes of threat and personal loss/failure and that these thoughts are closely related to specific emotional states in typically developing adults (Clark, Beck, & Brown, 1989) and children (Schniering & Rapee, 2004a; Schniering & Rapee, 2004b). With regards to anxiety in WS, the assessment of cognitive as well as behavioural aspects of anxiety will provide a more comprehensive examination of anxiety in this population.

The current study assesses symptoms of clinical anxiety and the frequency of maladaptive thoughts in a group of high functioning individuals with WS using both

parent and self report. The WS group will be compared to clinically anxious and community comparison groups matched on MA. The first aim was to determine whether social anxiety is unusually low in WS by assessing symptoms of social anxiety and the frequency of maladaptive thoughts relating to social threat. Based on the social behaviour of individuals with WS, it was hypothesised that the WS group would report less symptoms and thoughts of social anxiety than both comparison groups. The second aim was to replicate previous findings of increased symptoms of GAD and Specific Phobia in WS, using self report. It was hypothesised that the WS group would report more symptoms of generalised anxiety than the community controls but less than the clinically anxious controls. Finally, the third aim was to evaluate whether individuals with WS experience frequent thoughts relating to physical threat, as would be predicted by cognitive theories based on their diagnostic profile. It was hypothesised that the WS group would report more frequent thoughts relating to physical threat and than the community controls but less than the clinically anxious controls.

Method

Participants

The study involved a total of 318 participants, including a group of young people with WS (N=15), a group of clinically anxious children (N=208) and a community comparison group (N=96).

Williams syndrome group.

Fifteen individuals (6 female) with WS, aged 12-28 years, with a mean chronological age of 19.45 years, participated. Participants were recruited through the Australian Williams Syndrome Association. All participants were negative for the elastin gene when tested using the Fluorescent in situ hybridization (FISH) test

(Fryssira et al., 1997) and exhibited the typical WS behavioural phenotype.

Participants were selected from a larger cohort of individuals with WS based on their mental age as assessed using the Woodcock-Johnson Test of Cognitive Ability – Revised (WJ-COG-R; Woodcock & Johnson, 1989, 1990). Individuals with a mental age of 7 years or above were invited to participate. The mean mental age of the WS participants was 8;2 years (range: 7–10 years) and the level of impairment was in the mild to borderline range (Standard score range: 50-77).

Current diagnostic status, according to DSM-IV criteria, was assessed through an interview with the primary caregiver using the Schedule for Affective Disorders and Schizophrenia for School-Age Children-Present and Lifetime Version (K-SADS-PL; Kaufman, Birmaher, Brent, Rao, & et al., 1997). Six participants met criteria for a Specific Phobia, one participant met criteria for Generalised Anxiety Disorder, one participant met criteria for Adjustment Disorder with Depressed Mood and three participants met criteria for Attention Deficit Hyperactivity Disorder. This pattern of psychopathology is largely representative of the wider WS population (Leyfer et al., 2006).

Clinically anxious group.

The clinically anxious group comprised 208 children (90 female) with a mean chronological age of 8;10 years (range: 7 - 10 years) who had participated in previous research (Schniering & Lyneham, 2007). All participants in the clinically anxious group were assessed using the Anxiety Disorders Interview Schedule (ADIS-C; Silverman & Albano, 1996) following presentation to a specialist child and adolescent anxiety clinic and had a current diagnosis of GAD. In addition to this diagnosis, 89% met criteria for at least one comorbid anxiety disorder and 33% met criteria for at least one other comorbid disorder including Depression, Attention Deficit Hyperactivity

Disorder and Externalising Disorders. 50% of the clinically anxious group met criteria for Social Phobia.

Community group.

The community comparison group comprised 95 typically developing children (47 female, 48 male) with a mean chronological age of 8;10 years (range: 7–10 years). Participants were recruited through local primary schools in the Sydney metropolitan area.

Materials

Both of the measures used in this study have been used previously with children aged between 7 and 18 years. Child measures were chosen to ensure that the items were appropriate for the cognitive level of the participants with WS and to enable collection of parent report data. For participants with WS who were aged over 18 years, for items that referred to school the word ‘school’ was replaced with ‘work’ and for items that referred to kids, the word ‘kids’ was replaced with ‘people’. For example the item ‘I am popular amongst other kids my own age’ was edited to read ‘I am popular amongst other people my own age’. This was to ensure that the item content was appropriate for all participants.

Symptoms of anxiety: The Spence Children’s Anxiety Scale (SCAS; Spence, 1998).

The parent report and self report versions of the Spence Children's Anxiety Scale (SCAS; Spence, 1998) were used to assess symptoms of anxiety. The SCAS consists of 45 items loading to six scales. The SCAS has good internal consistency, with α coefficients of greater than 0.90, adequate test-retest reliability over 6 months and good convergent and discriminant validity (Spence, 1998). The SCAS has previously been used with atypical populations including individuals with Autism and

individuals with Specific Language Impairment (Gillott, Furnace, & Walter, 2001) but has not been validated specifically for use with individuals with WS. For the present research, the ‘Social Anxiety’, ‘Generalised Anxiety’ and ‘Fear of Physical Injury’ scales were of principal interest, consequently, data and analyses are reported for these scales only.

Maladaptive thoughts: The Children’s Automatic Thoughts Scale (CATS; Schniering & Rapee, 2002).

The Children's Automatic Thoughts Scale (CATS; Schniering & Rapee, 2002) was developed to assess negative automatic thoughts in young people. The CATS consists of 40 items of self-statements covering a range of emotional content. The items load onto four separate cognitive subscales; social threat, physical threat, personal failure and hostility. The CATS possesses good internal consistency, with α values greater than .85 for all subscales, satisfactory test–retest stability and good convergent and discriminant validity (Schniering & Lyneham, 2007; Schniering & Rapee, 2002; Schniering & Rapee, 2004b). The CATS has not been used previously with intellectually impaired populations.

Procedure

The SCAS and CATS were completed by the WS group and clinically anxious comparison group within a single session and the order of measures was randomised. The Community comparison group only completed the CATS because well-established norms are available for the SCAS (Nauta et al., 2004; Spence, 2009). Participants were given a paper copy of each self report questionnaire to complete and provided with assistance in reading the items as required. Parent’s were sent a copy of the parent report SCAS to complete and return. The study was approved by the

Macquarie University Human Ethics Committee and written, informed consent was obtained from parents and verbal consent was obtained from the participants.

Results

The means, standard deviations and Cohen's d effect sizes for each group on the SCAS and CATS are shown in Table 1.

[Place Table 1 about here]

Symptoms of anxiety: SCAS

MANOVA analyses were conducted to compare the WS group to the clinically anxious group on the SCAS scales. As published norms from Spence (2009) were used for the community comparison, one-sample t-tests were conducted to compare the WS group to these norms. Significant Shapiro-Wilk tests indicated that the parent report SCAS and self report SCAS data for the clinically anxious comparison group only were positively skewed; consequently, the data were transformed using a square root transformation. For the comparison with the clinically anxious group, the WS data were also transformed. However, for the comparison with the community norms, the untransformed WS data were used. Both the transformed and untransformed means are shown in Table 1.

WS group compared to community norms - parent report.

One-sample t-tests were conducted to compare the WS group with the published community norms. An adjusted p-value of 0.017 (0.05/3) was used to indicate statistical significance. The WS group did not differ significantly from the community norms on the Social Anxiety scale, $t(14) = -0.123, p = 0.904$. However the WS group scored significantly higher than the community norms on both the Fear of Physical Injury, $t(14) = 3.108, p = 0.008$, and the Generalised Anxiety scale, $t(14) = 3.207, p = 0.006$.

WS group compared to clinically anxious group – parent report.

The Manova analysis for the parent report SCAS scale indicated a significant effect of scale, $F(1.875, 414.33)=6.170$, $MSE=1.875$, $p=0.003$, a significant effect of group, $F(1, 221)=11.364$, $MSE=9.329$, $p=0.001$, and a significant interaction, $F(1.875, 414.33)=7.80$, $MSE=3.146$, $p=0.001$. To adjust for violation of the assumption of sphericity, the Huynh-Feldt correction was used. In keeping with the apriori hypotheses, simple contrasts were conducted. An adjusted p-value of 0.017 (0.05/3) was used to indicate significance. The clinically anxious group scored significantly higher than the WS group on both the Social Anxiety ($p<0.001$) and the Generalised Anxiety ($p<0.001$) scales. However, no significant effect of group was found for the Fear of Physical Injury scale ($p=0.862$).

WS group compared to community norms – self report.

One-sample t-tests were conducted to compare the WS group with the published community norms. An adjusted p-value of 0.017 (0.05/3) was used to indicate statistical significance. The WS group did not differ significantly from the community norms on any of the SCAS scales. However, the level of symptoms reported for the WS group on the Generalised Anxiety scale was slightly elevated relative to the community norms at an effect size of 0.24.

WS group compared to clinically anxious group – self report.

The Manova analysis conducted to compare groups on the self report SCAS scales showed a significant effect of scale, $F(1.85, 409.11)=23.626$, $MSE=9.998$, $p<0.001$, but no significant effect of group, $F(1, 221) =2.763$, $MSE=3.00$, $p=0.098$, or significant interaction, $F(1.851, 409.11)=0.723$, $MSE=3.306$, $p=0.476$. To adjust for violation of the assumption of sphericity, the Huynh-Feldt correction was used. As the hypotheses relate only to group differences, no further analyses were conducted.

Maladaptive thoughts: Children's Automatic Thoughts Scale (CATS)

A MANOVA was conducted to compare the WS group to the clinically anxious and community comparison groups on the four CATS scales. Significant Shapiro-Wilk tests indicated that the data was positively skewed; consequently, all the CATS data were transformed using a square root transformation. The transformed means and standard deviations are shown in Table 1. To adjust for violation of the assumption of sphericity, the Huynh-Feldt correction was used.

The MANOVA analysis indicated a significant main effect of scale, $F(2.749, 865.905)=17.417$, $MSE=13.875$, $p<0.001$, and group, $F(2, 315)=4.972$, $MSE=29.906$, $p=0.007$, and a significant interaction, $F(5.498, 865.905)=6.098$, $MSE=4.858$, $p<0.001$. In keeping with the apriori hypotheses, simple contrasts were conducted. Using an adjusted p-value of 0.006 (0.05/8) the WS group reported significantly more thoughts relating to physical threat than the community ($p<0.001$) and clinically anxious ($p=0.003$) comparison groups. No significant differences were found between the WS and clinically anxious or community comparison groups on the other three scales. Although the WS group reported more frequent thoughts relating to social threat than the community comparison group ($p=0.034$), this did not reach significance at the adjusted p-value.

Discussion

The current study assessed symptoms of anxiety and the frequency of threat related thoughts in a group of high-functioning individuals with WS. The research had three aims. The first aim was to examine whether social anxiety is unusually low in WS. The second aim was to replicate previous findings of high levels of GAD and Specific Phobia in WS using self report. Finally, the third aim was to examine whether individuals with WS experience frequent thoughts relating to physical threat.

Is social anxiety unusually low in WS?

The present research assessed symptoms of social anxiety, using both parent and self report, and the frequency of thoughts relating to social anxiety in WS. As discussed, individuals with WS exhibit outgoing, social behaviour, as if they have little or no social anxiety. Consequently, it was hypothesised that the WS group would score below both comparison groups on the SCAS Social Anxiety scale and the CATS Social Threat scale. These hypotheses were not supported. No significant differences were found between the WS group and the community norms on the self report or parent report SCAS suggesting that the overall level of social anxiety symptoms in WS is not atypical. Consistent with this, the WS group reported frequent thoughts relating to social threat, scoring similarly to the clinically anxious comparison group and slightly higher than the community comparison group on the CATS Social Threat scale.

Taken together, these findings suggest that social anxiety is not unusually low in WS. Consequently, although individuals with WS are reported to be ‘gregarious’ and ‘always the centre of attention’, it is likely that this behaviour masks underlying thoughts and feelings of social anxiety. An alternative hypothesis that has received support from neuroimaging research (Meyer-Lindenberg, Mervis, Berman, 2006; Mobbs et al., 2007) is that a deficit in inhibition underpins the social behaviour observed in WS (Porter et al., 2007). If this hypothesis is accurate, then thoughts and feelings of social anxiety may not affect social behaviour in WS due to a deficit in the ability to inhibit their social drive to interact.

Are symptoms of generalised anxiety unusually prevalent in WS?

This is the first study to comprehensively examine anxiety in WS using both parent and self report. For both, it was anticipated that the pattern of symptoms

reported using the Spence Children's Anxiety Scale (SCAS; Spence, 1998) would be consistent with previous findings of high rates of Generalised Anxiety Disorder and Specific Phobia in WS. Specifically, it was hypothesised that on the Fear of Physical Injury and Generalised Anxiety symptom scales, the WS group would score higher than community norms but lower than clinically anxious controls. These hypotheses were partially supported.

As predicted, based on parent report, the WS group scored significantly higher than the community norms and significantly lower than the clinically anxious controls on the Generalised Anxiety Scale. In contrast, no significant differences between the WS and either comparison group were found on the self report SCAS. However, the effect sizes suggest that, whilst the WS group scores were very close to the community comparison scores on the Fear of Physical Injury and Social Anxiety scales, for the Generalised Anxiety scale, the WS group mean was increased relative to community norms, falling approximately halfway between the two comparison groups, as hypothesised. In combination, the self report and parent report results provide support for previous findings that symptoms of generalised anxiety are elevated in the WS population relative to the typically developing population.

Do individuals with WS experience frequent thoughts relating to physical threat?

Previous research examining anxiety in WS has focused entirely on the behavioural manifestations of anxiety. Examining cognitive, as well as behavioural, aspects of anxiety provides a more detailed description of the clinical presentation of anxiety in WS. As discussed, cognitive theories of anxiety (for example, Beck, 1976) emphasise the role of negative thoughts in the development and maintenance of anxiety. Consequently, the present study examined the frequency of maladaptive thoughts in WS to determine whether the increased rates of GAD and Specific Phobia

observed in WS are accompanied by frequent thoughts relating to physical threat, as cognitive theories of anxiety would predict. Based on the high rates of GAD and Specific Phobia reported in WS (Dodd & Porter, in press; Dykens, 2003; Leyfer et al., 2006), it was hypothesised that the WS group would report more frequent thoughts relating to physical threat than the community comparison group, but less frequent thoughts than the clinically anxious comparison group. This hypothesis was partially supported. As anticipated, the WS group reported more frequent thoughts relating to physical threat than the community comparison group. However, the frequency of physical threat thoughts reported by the WS group was also significantly higher than the clinically anxious comparison group, which was unexpected given that the clinically anxious group scored above the WS group on all the SCAS scales. The WS group did not differ from either comparison group on the Personal Loss and Failure scale or Hostility scale.

These results indicate that individuals with WS experience frequent thoughts relating to physical threat. Given evidence that individuals with WS have increased rates of GAD and Specific Phobia, this finding is consistent with cognitive theories of anxiety (e.g. Beck, 1976) which highlight the role of negative thoughts in anxiety disorders. In relation to this, a central component of cognitive therapy for anxiety disorders focuses on alteration of these cognitions (Rapee, Wignall, Hudson, & Schniering, 2000; Treadwell & Kendall, 1996) therefore this later finding provides initial theoretical support for the use of cognitive therapy with these individuals. An important next step will be for future research to pilot the use of such therapy as a treatment for GAD in individuals with WS.

Limitations

The present research makes an important contribution to our understanding of anxiety in WS, primarily through the use of self report. However, the use of self report with a rare, intellectually impaired population resulted in a number of limitations. Firstly, as self report necessarily requires more advanced cognitive skill, it was only possible to conduct this research with high-functioning individuals with WS; a mental age of at least seven years was chosen as a cut-off. Given that less than 50% of individuals with WS fit this criterion, the sample size of the present research was small. Due to the small sample size, effect sizes, as well as statistical significance were calculated. As only high-functioning individuals participated in the study it is possible that the findings may not generalise to the entire WS population. Secondly, there are no self report measures of anxiety designed for use with intellectually impaired populations. Consequently, measures designed for typically developing children of comparable mental age were utilised. A final limitation is that the WS group were compared only to mental age matched controls. In light of evidence that an individual's interpretation of items on self report measures may depend on their level of cognitive development (Campbell, Rapee, & Spence, 2001), it was considered more appropriate to compare the WS participant's responses to mental age, rather than chronological age, matched controls. However, it is possible that a different pattern of results would be found if the WS group were compared to a chronological age matched control group.

In summary, by using a multi-informant, multi-method approach the present research has demonstrated that, despite the outgoing social behaviour that is characteristic of individuals with WS, social anxiety does not appear to be unusually low in this population. This finding highlights that behaviour is not necessarily indicative of internal states, particularly in developmentally disordered populations.

Therefore, in clinical settings, both parent and child report of psychopathology are recommended where possible.

References

- Association, A. P. (1994). *Diagnostic and statistical manual of mental disorders (4th ed.)*. Washington, DC: American Psychiatric Association.
- Beck, A. T. (1976). *Cognitive therapy and the emotional disorders*. Oxford, England: International Universities Press.
- Bellugi, U., Lichtenberger, L., Jones, W., Lai, Z., & St. (2000). I. The neurocognitive profile of williams syndrome: A complex pattern of strengths and weaknesses. *Journal of Cognitive Neuroscience, 12*, 7-29.
- Bolton, D., Eley, T. C., O'Connor, T. G., Perrin, S., Rabe-Hesketh, S., Rijdsdijk, F., & Smith, P. (2006). Prevalence and genetic and environmental influences on anxiety disorders in 6-year-old twins. *Psychological Medicine, 36*, 335-344.
- Campbell, M. A., Rapee, R. M., & Spence, S. H. (2001). Developmental changes in the interpretation of rating format on a questionnaire measure of worry. *Clinical Psychologist, 5*, 49-59.
- Clark, D. A., Beck, A. T., & Brown, G. (1989). Cognitive mediation in general psychiatric outpatients: A test of the content-specificity hypothesis. *Journal of Personality and Social Psychology, 56*, 958-964.
- Costello, E., Angold, A., Burns, B. J., Stangl, D. K., Tweed, D. L., Erkanli, A., & Worthman, C. M. (1996). The great smoky mountains study of youth: Goals,

- design, methods, and the prevalence of dsm-iii-r disorders. *Archives of General Psychiatry*, 53, 1129-1136.
- Davies, M., Udwin, O., & Howlin, P. (1998). Adults with williams syndrome: Preliminary study of social, emotional and behavioural difficulties. *British Journal of Psychiatry*, 172, 273-276.
- Dodd, H. F., & Porter, M. A. (in press). Psychopathology in williams syndrome: The effect of individual differences across the lifespan. *Mental Health Research in Intellectual Disabilities*.
- Doyle, T. F., Bellugi, U., Korenberg, J., & Graham, J. (2004). "Everybody in the world is my friend" Hypersociability in young children with williams syndrome. *American Journal of Medical Genetics*, 124A, 263-273.
- Dykens, E. M. (2003). Anxiety, fears, and phobias in persons with williams syndrome. *Developmental Neuropsychology*, 23, 291-316.
- Einfeld, S. L., Tonge, B. J., & Florio, T. (1997). Behavioral and emotional disturbance in individuals with williams syndrome. *American Journal on Mental Retardation*, 102, 45-53.
- Fryssira, H., Palmer, R., Hallidie-Smith, K. A., Taylor, J., Donnai, D., & Reardon, W. (1997). Fluorescent in situ hybridisation (fish) for hemizygous deletion at the elastin locus in patients with isolated supravalvar aortic stenosis. *Journal of Medical Genetics*, 34, 306-308.
- Furmark, T. (2002). Social phobia: Overview of community surveys. *Acta Psychiatrica Scandinavica*, 105, 84-93.
- Jones, W., Bellugi, U., Lai, Z., Chiles, M., Reilly, J., Lincoln, A., & Adolphs, R. (2000). ii. Hypersociability in williams syndrome. *Journal of Cognitive Neuroscience*, 12, 30-46.

- Kaufman, J., Birmaher, B., Brent, D., Rao, U., & et al. (1997). Schedule for affective disorders and schizophrenia for school-age children-present and lifetime version (k-sads-pl): Initial reliability and validity data. *Journal of the American Academy of Child & Adolescent Psychiatry*, 36, 980-988.
- La Greca, A. M. (1990). *Through the eyes of the child: Obtaining self-reports from children and adolescents*. Needham Heights, MA, US.
- Leyfer, O. T., Woodruff-Borden, J., Klein-Tasman, B. P., Fricke, J. S., & Mervis, C. B. (2006). Prevalence of psychiatric disorders in 4 to 16-year-olds with williams syndrome. *American Journal of Medical Genetics, Part B: (Neuropsychiatric Genetics)*, 141B, 615-622.
- Martin, N. D. T., Snodgrass, G. J. A. I., & Cohen, R. D. (1984). Idiopathic infantile hypercalcemia: A continuing enigma. *Archives of Disease in Childhood*, 59, 605-613.
- Mervis, C. B., Robinson, B. F., Bertrand, J., Morris, C. A., Klein-Tasman, B. P., & Armstrong, S. C. (2000). The williams syndrome cognitive profile. *Brain and Cognition*, 44, 604-628.
- Nauta, M. H., Scholing, A., Rapee, R. M., Abbott, M., Spence, S. H., & Waters, A. (2004). A parent report measure of children's anxiety. *Behaviour Research and Therapy*, 42, 813-839.
- Sarimski, K. (1997). Behavioural phenotypes and family stress in three mental retardation syndromes. *European Child & Adolescent Psychiatry*, 6, 26-31.
- Schniering, C. A., & Lynham, H. J. (2007). The children's automatic thoughts scale in a clinical sample: Psychometric properties and clinical utility. *Behaviour Research and Therapy*, 45, 1931-1940.

- Schniering, C. A., & Rapee, R. M. (2002). Development and validation of a measure of children's automatic thoughts: The children's automatic thoughts scale. *Behaviour Research and Therapy, 40*, 1091-1109.
- Schniering, C. A., & Rapee, R. M. (2004a). The relationship between automatic thoughts and negative emotions in children and adolescents: A test of the cognitive content-specificity hypothesis. *Journal of Abnormal Psychology, 113*, 464-470.
- Schniering, C. A., & Rapee, R. M. (2004b). The structure of negative self-statements in children and adolescents: A confirmatory factor-analytic approach. *Journal of Abnormal Child Psychology, 32*, 95-109.
- Silverman, W. K., & Albano, A. M. (1996). *The anxiety disorders interview schedule for children for dsm-iv: Child and parent versions*. San Antonio, TX: Psychological Corporation.
- Spence, S. H. (1998). A measure of anxiety symptoms among children. *Behaviour Research and Therapy, 36*, 545-566.
- Spence, S.H. (2009). *Spence Children's Anxiety Scale*. Retrieved January 23rd, 2009, from www.scaswebsite.com.
- Stanger, C., & Lewis, M. (1993). Agreement among parents, teachers, and children on internalizing and externalizing behavior problems. *Journal of Clinical Child Psychology, 22*, 107-115.
- Stromme, P., Bjornstad, P. G., & Ramstad, K. (2002). Prevalence estimation of williams syndrome. *Journal of Child Neurology, 17*, 269-271.
- Woodcock, R. W., & Johnson, M. B. (Eds.). (1989, 1990). *Woodcock-johnson psycho-educational battery revised*. Itasca IL: Riverside.

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Table 1

Means, standard deviations and effect sizes (d) for each group on SCAS and CATS scales

Scale	Com. M (sd)	Clin. M (sd)	WS M (sd)	WS vs Com (d)	WS vs Clin (d)
Symptoms of Anxiety: Spence Children's Anxiety Scale					
Fear of Physical Injury – Parent report ^a	2.6 (2.3)		4.73 (2.66)	0.80*	
Social Anxiety – Parent report ^a	4.2 (2.8)		4.13 (2.1)	0.03	
Generalised Anxiety – Parent report ^a	2.7 (2)		5 (2.78)	0.83*	
Fear of Physical Injury – Parent report ^b		2.05 (0.80)	2.09 (0.64)		0.06
Social Anxiety – Parent report ^b		2.83 (0.77)	1.97 (0.51)		1.14*
Generalised Anxiety – Parent report ^b		2.74 (0.61)	2.14 (0.66)		0.94*
Fear of Physical Injury – Self report ^a	3.4 (2.78)		3.6 (2.69)	0.07	
Social Anxiety – Self report ^a	6.04 (3.7)		5.7 (3.06)	0.11	
Generalised Anxiety – Self report ^a	6.15 (3.42)		7.13 (4.14)	0.24	

Fear of Physical Injury – Self report ^b	2.07 (0.84)	1.65 (0.98)	0.46
Social Anxiety – Self report ^b	2.44 (0.84)	2.29 (0.72)	0.19
Generalised Anxiety – Self report ^b	2.78 (0.66)	2.55 (0.83)	0.31

Maladaptive Thoughts: Children's Automatic Thoughts Scale

Physical Threat ^b	2.23 (1.57)	2.81 (1.37)	3.93 (1.13)	1.24*	0.89*
Social Threat ^b	2.41 (1.7)	2.92 (1.44)	3.31 (1.43)	0.57	0.27
Personal Loss and Failure ^b	2.25 (1.7)	2.75 (1.44)	2.37 (1.43)	0.08	0.3
Hostility ^b	3.15 (1.42)	3.28 (1.24)	3.41 (0.78)	0.23	0.13

Com. = Community comparison group; Clin. = Clinically anxious comparison group;

WS = Williams syndrome group.

* Indicates statistical significance at Bonferroni adjusted p-value.

^a Untransformed data. ^b Data transformed using the square root transformation.