

Centrality in Children's Best Friend Networks: The Role of Social Behaviour

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### **Abstract**

Centrality is an indicator of an individual's relative importance within a social group. Predictors of centrality in best friendship networks were examined in 146 children (70 boys, 76 girls,  $M_{age}= 9.95$ ). Children completed measures of social confidence, social desirability, friendship quality, school liking, and loneliness, and nominated their best friends from within their class at two time points, 3 months apart. Multigroup path analysis revealed gender differences in the antecedents of centrality. Social confidence, social desirability, and friendship quality predicted changes in the indicators of centrality in best friend networks over time. In boys' social behaviour positively predicted changes in centrality whereas in girls' social behaviour negatively predicted changes in centrality. Together, these findings suggest that some aspects of social behaviour are influential for centrality in best friend groups.

*Key words:* best friends, peer relationships, school adjustment, social network analysis, centrality

## Centrality in Children's Best Friend Networks: The Role of Social Behaviour

Children's best friends are a distinct type of peer relationship: Best friendships are high quality dyadic peer relationships characterised by greater levels of positivity than other peer relationships (Sebanc, Kearns, Hernandez, & Galvin, 2007). Mutual best friends during childhood are important for psychosocial development (Sebanc et al., 2007), ameliorating the negative impact of bullying (Hodges, Boivin, Vitaro, & Bukowski, 1999), and reducing somatic symptoms in girls (Jellesma, Rieffe, & Terwogt, 2008).

Classrooms provide one of the most influential social contexts for the emergence of peer networks with positive peer relationships yielding positive developmental outcomes (Betts, Rotenberg, Trueman, & Stiller, 2012; Fabes, Hanish, Martin, Moss, & Reesing, 2012). However, because classroom composition is often managed by school staff, classrooms represent a relatively institutionalised peer group (Howes, 2010). Nevertheless, whilst classroom composition may be predetermined by external factors, a popularity and friendship network structure still emerges (Jansson, 2000). Group identities also influence peer relationships in school (Rutland et al., 2012). Consequently, the individual factors that determine children's status in best friend networks within classrooms may be less resolute and warrant consideration. However, relatively little is known about the factors that predict centrality in children's best friend networks derived from class groups. Therefore, this study represented one of the first attempts to address this issue in 9- to 11-year-olds over 3 months.

Social network analysis allows exploration of complex relationships between individuals within social groups (Wey, Blumstein, Shen, & Jordan, 2008). Centrality is an indicator of an individual's relative importance within a group compared to other group members and the complete network (Borgatti, 2005). Individuals with high levels of centrality are regarded as important for the group's function as they provide the cohesive links between other group members (Gifford-Smith & Brownell, 2003). Node degree, betweenness, and share centrality in children's best friend networks were examined in the present study. Together, these

centrality measures reflect different aspects of the extent to which a child is embedded in the classroom best friend network whilst taking in to account best friendships between other class members (see Carolan, 2013).

Node degree reflects the extent to which an individual is connected to others within the network regardless of how others are related in the network (Carolan, 2013). Total degree was assessed to represent the extent that a child nominated others as best friends and was nominated as a best friend. Betweenness centrality represents how connected an individual is within the group and their role as a link or 'gatekeeper' between subgroups within the group (Croft, James, & Krause, 2008). In best friend networks, high betweenness would denote a child who maintained links within the network and who would rely less on other children as intermediaries to make links in the network. For example, a child might either nominate a large number of friends themselves or act as a link between multiple friendship groups within the class. Share denotes the proportion of a network that individuals belong to as a proportion of the ties within a network (Haythornthwaite, 1996). For best friend networks, share reflects how connected a child is within the network in terms of the proportion of friendships that they occupy within the class. Whilst previous research suggests that degree and betweenness centrality are influential for psychosocial adjustment (e.g., Gest, Graham-Bermann, & Hartup, 2001; Lansford et al., 2009; Witvlieta, van Lierb, Brendgen, Koot, & Vitaro, 2010), little is known about the influence of share.

Social dominance theory (Sidanius & Pratto, 1999) provides a theoretical account of children's social network status. Specifically, social dominance theory posits that through social aggression individuals who maintain centrality, and who are dominant, receive a disproportionate amount of attention (Halwley, 1999). Central individuals maintain their position through controlling the distribution of resources which are often access to other social contacts and social partners. Together, these behaviours constitute an adaptive method of enhancing peer standing and reputation within the group (Neal, 2010). However, as

children age they recognise that aggression may be an inappropriate strategy to maintain social position (Hawley, 1999) and other antecedents are likely to influence social position (Kindermann & Gest, 2011). Therefore, the current study examined the extent to which social behaviours were antecedents of 9- to 11-year-olds' centrality in classroom best friendship networks over three months.

Social confidence represents the extent to which an individual can disclose to, relate to, and successfully interact with others in the social arena (Rice, Kang, Weaver, & Howell, 2008). Children with low social confidence, and who experience social anxiety, tend to appear nervous during social interactions (Cartwright-Hatton, Tschernitz, & Gomersall, 2005), and are prone to peer rejection (La Greca, Dandes, Wick, Shaw, & Stone, 1988). Consequently, social confidence may foster children's social position and centrality in best friend networks.

Behaving in a socially desirable way may facilitate social status because attribution processes underpin peer interactions (Hennessy, Swords, & Heary, 2008). For example, sixth-graders judged actual and hypothetical peers more favourably when they behaved in a socially desirable manner than when they engaged in deviant behaviour (Juvonen, 1991). However, engaging in socially desirable behaviour may result in children initiating fewer social interactions (Lahaderne & Jackson, 1970) and this may be particularly the case for girls who often want to avoid social disapproval (Crandall, 1966). Therefore, children's propensity to behave socially desirably was examined as a predictor of centrality in best friend networks.

Friendship quality pertains to the extent to which a particular friendship provides children with support, resources, and provisions (Gifford-Smith & Brownell, 2003). Friendship quality is associated with friendship stability: Higher quality friendships are more stable (Bukowski, Hoza, & Boivin, 1994) and provide greater resources (Gifford-Smith & Brownell, 2003). High quality friendships may facilitate children's social network position

because they promote desirability as an interaction partner (Ladd, Kochenderfer, & Coleman, 1996). Therefore, it is likely that friendship quality will predict centrality in best friend networks.

Children who dislike school are often regarded less positively by their teachers and peers (Hauser-Cram, Durand, & Warfield, 2007). Positive peer relationships and friendships positively predict school liking in adolescents (Wilkinson, 2010). However, whether children's school liking predicts centrality in best friend networks remains unclear. Positive attitudes toward school may mean that children are more likely to initiate contact with their peers and, as such, be more central to the classroom best friend network.

Estimates of the proportion of children who experience loneliness vary; Stoeckli (2009) found that 38% of children reported experiencing loneliness in school. Children who experience loneliness have weaker social ties and smaller social networks (Parker & Asher, 1993) and may display withdrawn behavioural styles (Renshaw & Brown, 1993). However, previous research has tended to explore children's propensity to experience loneliness by focusing on its association with their social interactions (e.g., Cassidy & Asher, 1992) rather than reversing the direction of causality to explore the extent to which loneliness can influence social status. The present study addressed this issue because children who feel lonely may develop a self-awareness which means that they may not have the confidence or social skills to initiate peer interactions (Margalit, 1998) and, as such, may be less central in best friend networks.

Gender differences occur in children's social relationships: Girls tend to favour having a smaller group of more intimate peers whereas boys tend to favour having larger less intimate social networks (Erwin, 1995). Along with these structural differences, gender differences occur in how children maintain their social network position. For example, girls may maintain centrality by relational aggression (Gifford-Smith & Brownell, 2003). Therefore, gender was explored as a potential moderator.

The present study examined 9- to 11-year-olds centrality in best friend networks derived from class groups over 3 months. It was hypothesised that increased social confidence, social desirability, friendship quality, and school liking and decreased loneliness would predict increases in degree, betweenness, and share in best friend networks. Multigroup path analysis was used to examine gender as a potential moderator in these relationships, although as this was exploratory analysis direct predictions for gender were not made.

## Method

### Participants

One hundred and 98 (89 male, 98 female, and 11 gender unknown) 9- to 11-year-olds ( $M = 9.95$  years,  $SD = .63$ ) were recruited at Time 1 from 8 classrooms across 5 primary schools. The schools were drawn from a range of catchment areas; four of the schools had a catchment area below the UK national average for professional employment and above the UK national average for unemployment (Office of National Statistics, 2011). One of the schools had a catchment area above the UK national average for professional employment and below the UK average for unemployment. At Time 1, the overall response rate was 91.20% and ranged from 69.56% to 92.59% and the sample was predominately white (85%).

The final data comprised 146 (70 male and 76 female) children and was reduced because of missing data. No significant differences occurred between those children who remained in the sample and those who withdraw for any of the Time 1 outcome measures ( $p > .05$ ).

### Measures

**Best friend nominations.** Following Parker and Asher's (1993) procedure, participants were provided with a list comprising all classmates with parental consent and asked to identify as many best friends as they wanted ( $M_{\text{boys Time 1}} = 2.69$ ,  $SD_{\text{boys Time 1}} = 1.34$ ,  $M_{\text{girls Time 1}} = 3.11$ ,  $SD_{\text{girls Time 1}} = 2.82$ ,  $M_{\text{boys Time 2}} = 2.44$ ,  $SD_{\text{boys Time 2}} = 2.75$ ,  $M_{\text{girls Time 2}} = 3.13$ ,  $SD_{\text{girls Time 2}} = 2.77$ ). The nominations were used to calculate the indicators of centrality. Degree reflected the number of friendship nominations a child made and received. Betweenness

indicated children's propensity to maintain links between groups in the classroom. Share denoted the proportion of friendships they had relative to class size.

**Social confidence.** The 17-item social confidence subscale from the Coping Resources Inventory Scales for Educational Enhancement (McCarthy, Seraphine, Mathney, & Curlette, 2000) assessed confidence (e.g., "I keep thoughts to myself"). Participants responded to the items using a 5-point scale ranging from 1 (*Strongly agree*) to 5 (*Strongly disagree*); items were reverse coded and summed so high scores indicated higher social confidence. The scale demonstrated good internal consistency at Time 1 ( $\alpha = .88$ ) and Time 2 ( $\alpha = .92$ ) and stability over time,  $r(125) = .81, p < .001$ .

**Social desirability.** The 12 item Crandall Social Desirability Scale for Children Form A (Carifio, 1994) assessed self-reported propensity to engage in socially desirable behaviour using a *True* (1) / *False* (2) response format (e.g., "When I make a mistake, I always admit that I am wrong"). Items were recoded such that low scores indicated a propensity to engage in socially desirable behaviour. The scale demonstrated acceptable internal consistency at Time 1 ( $\alpha = .71$ ) and Time 2 ( $\alpha = .73$ ) and modest stability over time,  $r(130) = .68, p < .001$ .

**Friendship quality.** The Multidimensional Friendship Qualities Scale (Bukowski et al., 1994) was used to assess friendship quality across five subscales assessing: Companionship (4 items e.g., "My friend and I spend all our free time together", Time 1  $\alpha = .68$  and Time 2,  $\alpha = .66, r(154) = .47, p < .001$ ), conflict (4 items e.g., "I can get into fights with my friend", Time 1  $\alpha = .71$  and Time 2  $\alpha = .75, r(154) = .41, p < .001$ ), help/aid (5 items e.g., "My friend helps me when I'm having trouble with something", Time 1  $\alpha = .76$  and Time 2  $\alpha = .77, r(154) = .40, p < .001$ ), security (5 items e.g., "If I have a problem at school or at home, I can talk to my friend about it", Time 1  $\alpha = .80$  and Time 2  $\alpha = .75, r(154) = .42, p < .001$ ), and closeness (5 items e.g., "I feel happy when I am with my friend", Time 1  $\alpha = .73$  and Time 2  $\alpha = .79, r(154) = .51, p < .001$ ). Children responded to the items using a 5-point scale ranging



from 1 (*Strongly agree*) to 5 (*Strongly disagree*) with higher scores indicative of higher friendship quality.

**School liking.** The 11-item Liking for School Questionnaire (Ireson & Hallam, 2005) assessed children's attitudes toward school (e.g., "This is a good school"), happiness in school (e.g., "I am very happy when I am in school"), the value of school (e.g., "School work is worth doing"), and the relationship to school (e.g., "The school and I are like..."). The children responded to the questions using a 5-point scale ranging from 1 (*Strongly agree*) to 5 (*Strongly disagree*) for items 1-9, a 4-point scale for question 10 ranging from 1 (*Very important*) to 4 (*Not important at all*), and a 5-point scale for question 11 ranging from 1 (*Good friends*) to 5 (*Enemies*). Items were reverse coded and then summed such that high scores indicated higher levels of reported school liking. The scale had moderate internal consistency at Time 1 ( $\alpha = .74$ ) and Time 2 ( $\alpha = .79$ ) and acceptable stability over time,  $r(158) = .69, p < .001$ .

**Loneliness.** A four item 'pure' measure of loneliness derived from the Loneliness and Social Dissatisfaction Questionnaire (Asher, Rymel, & Henshaw, 1984) was used to assess experiences of loneliness in school using a 5-point scale ranging from 1 (*Not true at all*) to 5 (*Always true*). The items were summed such that high scores indicated greater reported loneliness in school (e.g., "I feel alone at school"). The items had good internal consistency at Time 1 ( $\alpha = .86$ ) and Time 2 ( $\alpha = .85$ ) with modest stability over time,  $r(166) = .60, p < .001$ .

## **Procedure**

Children completed the questionnaires twice over a three month period during a class session. They were asked to work independently, to keep their answers confidential, and informed that it was not a test. Head teachers initially gave consent; parents were informed of the study and given the option of withdrawing their son/daughter from the sample. The children also gave their verbal assent.

## Results

### Analysis strategy

Each classroom served as a social network and the best friend nominations were analysed separately at each time using Ucinet version 6 (Borgatti, Everett, & Freeman, 2002).

Participants' normalised degree, betweenness, and share scores were used in subsequent analysis to adjust for differences in class size.

Gender differences in the measures of centrality for children's best friend networks were examined through a series of t tests: No significant differences occurred (Table 1).

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Insert Table 1 here

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### Concurrent associations among measures

Correlations were performed to examine the concurrent associations between the measures at Time 1 (Table 2) and Time 2 (Table 3) separately according to gender; these revealed that the various centrality measures are not redundant but rather assess different aspects of centrality at both times (Carolan, 2013).

For boys, degree was positively associated with school liking and closeness at Time 1: Scoring higher on degree was associated with higher school liking and closeness. Degree at Time 2 was positively associated with school liking, companionship, help, and security at a trend level: Scoring higher on degree was associated with higher on these measures. Degree was also negatively associated with loneliness at Time 2: Scoring higher on degree was associated with lower loneliness. Betweenness was positively associated with confidence and conflict at Time 2: Having higher betweenness was associated with higher confidence and conflict. Finally, share was positively associated with companionship and help and negatively associated with loneliness and confidence at Time 2: Having a higher share score was associated with higher companionship and help and lower loneliness and confidence.

For girls, share was negatively associated with confidence and positively associated with competence and school liking at Time 1: Having a higher share of the network was associated with lower confidence scores, higher competence, and higher school liking. At Time 2, share was positively associated with school liking, social desirability, and closeness, and negatively associated with confidence: Having a higher share score was associated with higher scores on these measures. The magnitude of the reported associations was small to modest.

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Insert Table 2 and Table 3 here  
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### **Longitudinal relationships between measures**

Multigroup path analysis was used to examine whether social confidence, propensity to engage in socially desirable behaviour, friendship qualities, school liking, and loneliness at Time 1 predicted changes in centrality in best friend networks. The friendship qualities subscales were treated as separate variables rather than as a latent variable of friendship quality as conflict loaded below the recommended .60 (Netmeyer, Bearden, & Sharma, 2003). Degree, betweenness, and share at Time 2 were the outcome variables and the corresponding variables at Time 1 were included to examine the stability of these characteristics, to control for base line, and to examine change in the measures. AMOS version 18 was used for the analysis and groups were created according to gender to explore potential gender differences.

The initial model which included paths between all of the predictor and outcome variables was an adequate fit of the data: Comparative fit index (CFI) = .96 and root mean square error of approximation (RMSEA) = .063 (Byrne, 2001). However, the chi-square indicated that the model was not a complete fit,  $\chi^2(50) = 78.22$ ,  $p < .01$ , (Schumacker & Lomax, 1996) and a number of paths were not significant in either group. The non-significant paths were removed in turn and the fit statistics recalculated until all paths were significant in at least one

model. School liking and loneliness at Time 1 did not predict any of the centrality measures at Time 2. The final model was a good fit of the data, CFI = .94, and RMSEA = .058 (Figure 1 with standardised regression weights for boys and Figure 2 with standardised regression weights for girls, for ease of presentation only significant paths are presented). However, the chi-square indicated the model was not a complete fit,  $\chi^2(76) = 113.14, p < .01$ .

Byrne's (2001) procedure was used to examine gender as a moderator; all paths were constrained to be equal across groups and then individually unconstrained and gender differences assessed using chi-square change. Constraining all paths indicated that there were gender differences,  $\Delta\chi^2(28) = 2314.07, p < .001$ .

For boys, the stability of centrality in best friend networks was low with the exception of betweenness. Degree and betweenness positively predicted changes in degree and betweenness over time and the path for betweenness was significantly stronger in boys,  $\Delta\chi^2(1) = 76.87, p < .001$ . There was no such evidence of stability for share.

There was also evidence of longitudinal relationships between the centrality measures for boys. Share negatively predicted changes in betweenness: Higher share of the network predicted decreases in betweenness over time and this path was significantly stronger in boys,  $\Delta\chi^2(1) = 27.48, p < .001$ .

For girls, there was only very modest evidence of stability of centrality in best friend networks: Degree, betweenness, and share at positively predicted changes in degree, betweenness, and share over time. The share and degree paths were significantly stronger in girls,  $\Delta\chi^2(2) = 23.20, p < .001$ , and  $\Delta\chi^2(1) = 16.35, p < .001$ , respectively.

Evidence of longitudinal relationships between some of the centrality measures also emerged for girls. Share at positively predicted changes in degree: Higher share predicted increases in degree over time. Similarly, at a trend level, degree positively predicted changes in betweenness: Higher degree predicted increases in betweenness over time, and this path was significantly stronger in girls,  $\Delta\chi^2(1) = 236.92, p < .001$ .

In boys, at a trend level, friendship conflict negatively predicted changes in degree over time: Higher levels of conflict in friendships predicted decreases in degree over time, and the path was significantly stronger in boys,  $\Delta\chi^2(1) = 6.21, p < .05$ . Social confidence and friendship competence positively predicted changes in betweenness: Higher social confidence and friendship competence predicted increases in betweenness over time. Similarly, friendship closeness negatively predicted changes in betweenness: Higher levels of closeness in friendships predicted decreases in betweenness over time, and this path was significantly stronger in boys,  $\Delta\chi^2(1) = 13.69, p < .01$ . Finally, friendship security and social confidence at negatively predicted changes in share: Higher levels of security and higher levels of social confidence predicted decreases in share over time. The path between social confidence and share was significantly stronger in boys,  $\Delta\chi^2(1) = 248.89, p < .001$ .

For girls, social desirability negatively predicted changes in degree: Acting socially desirably predicted decreases in degree over time, and this path was significantly stronger in girls,  $\Delta\chi^2(1) = 6.29, p < .05$ . Similarly, at a trend level, friendship competence negatively predicted changes in degree: Lower levels of friendship competence predicted increases in degree over time. Social confidence positively predicted changes in betweenness: Higher social confidence predicted increases in betweenness over time. At a trend level, friendship closeness negatively predicted changes in betweenness: Higher levels of friendship closeness predicted decreases in betweenness over time.

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Insert Figure 1 and 2 about here  
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## Discussion

Aspects of 9- to 11-year-olds' social behaviour predicted changes in centrality in best friend networks, drawn from classroom groups, over 3 months when centrality at Time 1 was controlled for. The relationships varied according to centrality measure which supported

Carolan's (2013) proposition that social network structure changes according to the indicator of centrality. The findings also provided empirical support of social dominance theory and the proposition that older children's social position is determined by behaviours other than aggression (Hawley, 1999). Gender differences also occurred: Boys' social behaviour positively predicted changes in centrality and girls' social behaviour negatively predicted changes in centrality.

In boys, friendship conflict predicted changes in degree at a trend level indicating that boys who have higher levels of conflict within their friendships have relatively fewer ties within the best friend network over time. The finding may have occurred for two reasons: (a) the importance of social skills form developing and maintaining friendships (Seban et al., 2007) and (b) the underlying reasons for the conflict (see Abecassis, 2003). Specifically, it could be that 9- to 11-year-old boys who engage in more conflicts in their friendships are regarded as less desirable and as such receive fewer friendship nominations which would reduce their degree. Alternatively, boys with greater levels of conflict in their friendships may nominate fewer children as best friends which would also reduce their degree.

In girls, changes in degree were negatively predicted by the propensity to engage in socially desirable behaviour: Acting socially desirably reduced the number of best friendship nominations the girls made and received. This finding supported the previous research that suggested girls who engage in socially desirable behaviour avoid social interactions (Crandall, 1996; Lahaderne & Jackson, 1970); in the context of the present study it would mean that they received fewer best friendship nominations which reduced their degree. Also in girls, lower levels of friendship competence predicted increases in degree which may reflect differences between dyadic and group relationships: Some girls may not necessarily have the skills to maintain competent friendships with a particular individual but may be more skilful at maintaining connections with a number of peers which would be reflected in a greater number of nominations which would enhance share.

For boys and girls, changes in betweenness over time were positively predicted by social confidence. High levels of betweenness are indicative of a child who is well connected in the network and who relied less on others to make links between subgroups in the network. Therefore, behaving confidently likely enhances children's ability to control the flow of information within the network and fulfil a strategically important role (Croft et al., 2008). In boys, friendship competence predicted increases in betweenness and friendships characterised by closeness predicted decreases in betweenness.

Boys' friendship security and social confidence negatively predicted changes in share: As friendship security and social confidence increased their share decreased indicating that they were less connected in the network relative to the overall proportion of friendships that they occupied. Conversely, for girls social behaviour did not predict changes in share. Social dominance theory offers an explanation for this counterintuitive finding as the results suggest that other factors are important in determining an individual's share of the network (Neal, 2010). Neal argues that the importance that individuals place on equality versus hierarchy may influence their social behaviour. Consequently, future studies should also examine the relative value children attach to their social status as this may also influence their centrality.

Whilst the findings suggest that children's social behaviours predict network centrality in best friend groups differences according to gender emerged. These gender differences may reflect the variation in children's social network structure that has been previously attributed to gender preferences (Erwin, 1995). The identified gender differences also have implications for social skills programmes designed to enhance social status. For example, for boys these should focus on developing competency skills. These skills could be enhanced through interventions similar to the Promoting Alternative Thinking Strategies developed by Greenberg and Kusche (1993). However, such skill development needs to be balanced against the possible reduction in the share of the network for socially confident boys with secure friendships found in the current study and the evidence that only one best friend is

needed to ameliorate the effects of negative peer experiences (e.g., Kochenderfer-Ladd & Skinner, 2002).

Although, there was some evidence of stability of degree and betweenness within best friend groups, for boys and girls, and share for girls, this was lower than expected. However, whilst previous studies have reported limited stability in children's social networks (Kindermann, 2007), the duration of the present research was shorter than previous studies suggesting that children's social networks are fluid in nature. In future, researchers should examine the factors that influence the lack of stability in centrality in children's best friend networks derived from class groups. Adopting a more frequent examination of the social networks would permit examination of whether those children that exhibit high betweenness and low degree act as a "weak link" between friendship cliques within the classroom while capturing the fluctuations in best friend nominations. Gaining further understanding of the antecedents of network centrality could assist in social skills intervention development because as Hamm and Zhang (2010) note individuals who are central to the social network can exert a lot of influence on their peers and this influence is not always positive.

One limitation of the study was the attrition of the sample between Time 1 and Time 2 and the reduction in sample size could have potentially reduced the variability within the sample thus limiting the strength of effect (Howitt & Cramer, 2003). Also, the relatively homogenous sample is a further limitation of the study; future research should aim to replicate these findings with a more heterogeneous sample. However, through using unrestricted best friend nominations it allowed us to explore the social dynamics within the classroom in a more complete way (Poulin & Dishion, 2008) although future studies could also follow Hamm and Zhang's (2010) recommendations to examine social relationships in the broader context of the school and out of school.

In summary, the present study demonstrated that network centrality in best friendship groups within classrooms was predicted by aspects of social relationship behaviour.



Additionally, the research yielded evidence of gender differences in these relationships. The present research is one of the first studies to highlight the importance of children's social behaviour for determining their status within best friend groups and the findings can be used to inform researchers' and practitioners' attempts in designing interventions to enhance social skills, relationships, and identifying children at risk of isolation.

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Table 1

*Means and standard deviations for the centrality measures at Time 1 and Time 2, according to gender and the results of *t* tests to examine gender differences*

	Boys		Girls		<i>t</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Time 1					
Degree	21.18	13.68	23.33	15.18	.90
Betweenness	3.53	6.52	3.64	6.55	.10
Share	.06	.06	.06	.06	.10
Time 2					
Degree	20.77	14.68	24.71	15.37	1.58
Betweenness	4.02	5.87	3.15	5.63	.91
Share	.05	.04	.06	.04	1.18



Table 2

*Summary of intercorrelations for measures of centrality, social behaviour, and school adjustment at Time 1 according to gender (boys above the diagonal and girls below)*

	1	2	3	4	5	6	7	8	9	10	11	12
1. Betweenness		.49***	.24*	.16	.16	.19	-.15	-.05	.00	.03	.17	.01
2. Degree	.60***		.58***	-.17	.31**	.09	.06	.05	.09	.08	.13	.24*
3. Share	.19	.55***		-.22	.22	.00	.16	-.00	.05	-.03	.15	.10
4. Loneliness	-.08	-.07	-.13		-.35**	.50***	-.25*	-.02	.09	-.14	-.09	.10
5. School liking	.02	.18	.22 <sup>†</sup>	-.13		-.01	.28*	.13	-.18	.09	.18	.17
6. Confidence	.02	-.19	-.34**	.47***	-.29*		-.11	.05	.14	-.02	-.12	.25*
7. Social desirability	-.13	-.03	.16	-.08	.48***	-.21 <sup>†</sup>		-.07	-.25*	-.05	-.06	-.09
8. Competence	.14	.21 <sup>†</sup>	.26*	-.37***	.28*	-.34**	.15		.21	.66***	.47***	.64***
9. Conflict	-.02	-.22 <sup>†</sup>	-.17	.14	-.12	.13	-.13	-.35**		.04	.00	.12
10. Help	.07	.04	.13	-.34**	.15	-.29**	-.03	.62***	-.48***		.55***	.68***
11. Security	.05	.07	.15	-.35**	.24 <sup>†</sup>	-.28*	.10	.54***	-.61***	.78***		.57***
12. Closeness	.12	.14	.05	-.27*	.20 <sup>†</sup>	-.28*	.04	.59***	-.43***	.79***	.76***	

Note. df = 144, \*\*\*  $p \leq .001$ , \*\*  $p < .01$ , \*  $p < .05$ , <sup>†</sup>  $p \leq .10$

Table 3

*Summary of intercorrelations for measures of centrality, social behaviour, and school adjustment at Time 2 according to gender (boys above the diagonal and girls below)*

	1	2	3	4	5	6	7	8	9	10	11	12
1. Betweenness		.34**	.10	.17	.13	.32**	-.20	.07	.24*	.00	.12	.01
2. Degree	.63***		.90***	-.31**	.24*	-.10	.09	.26*	.04	.33**	.20 <sup>†</sup>	.18
3. Share	.39***	.81***		-.36**	.12	-.27*	.15	.25*	-.06	.29*	.15	.13
4. Loneliness	.04	-.10	-.03		-.31**	.49***	-.14	-.35**	.24*	-.41***	-.33**	-.26*
5. School liking	.04	.17	.24*	-.28*		-.12	.35**	.34**	-.20	.20	.24*	.28*
6. Confidence	.09	-.15	-.23*	.37***	-.39***		-.17	-.23 <sup>†</sup>	.12	-.27*	-.14	-.08
7. Social desirability	.01	.17	.29*	-.10	.54***	-.37***		-.00	-.28*	-.12	-.07	-.02
8. Competence	-.01	.09	.18	-.28*	.44***	-.14	-.14		.03	.69***	.57***	.70***
9. Conflict	-.10	-.14	-.01	.11	-.08	.14	-.10	.01		.13	-.06	.05
10. Help	.14	.25*	.10	-.29**	.28*	-.27*	.20 <sup>†</sup>	.44***	-.15		.69***	.71***
11. Security	.04	.21 <sup>†</sup>	.18	-.33**	.28*	-.29**	.23*	.45***	-.33**	.69***		.78***
12. Closeness	.14	.23*	.23*	-.25*	.38***	-.14	.24*	.61***	-.17	.70***	.64***	

Note. df = 144, \*\*\*  $p \leq .001$ , \*\*  $p < .01$ , \*  $p < .05$ , <sup>†</sup>  $p \leq .10$

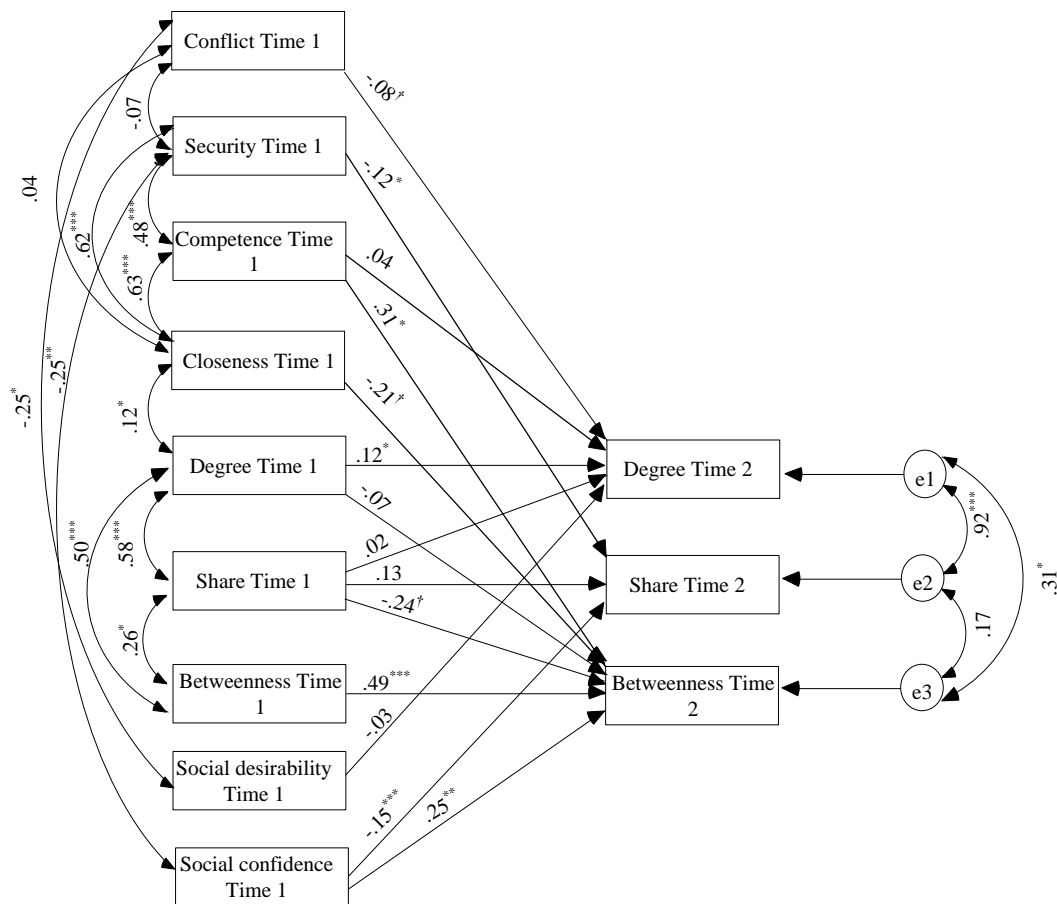


Figure 1. The final path analysis for the relationship between boys', measures of centrality, and social behaviour with standardised path coefficients, e = error,  $^\dagger p \leq .073$ ,  $* p < .05$ ,  $** p \leq .01$ , and  $*** p \leq .001$ .

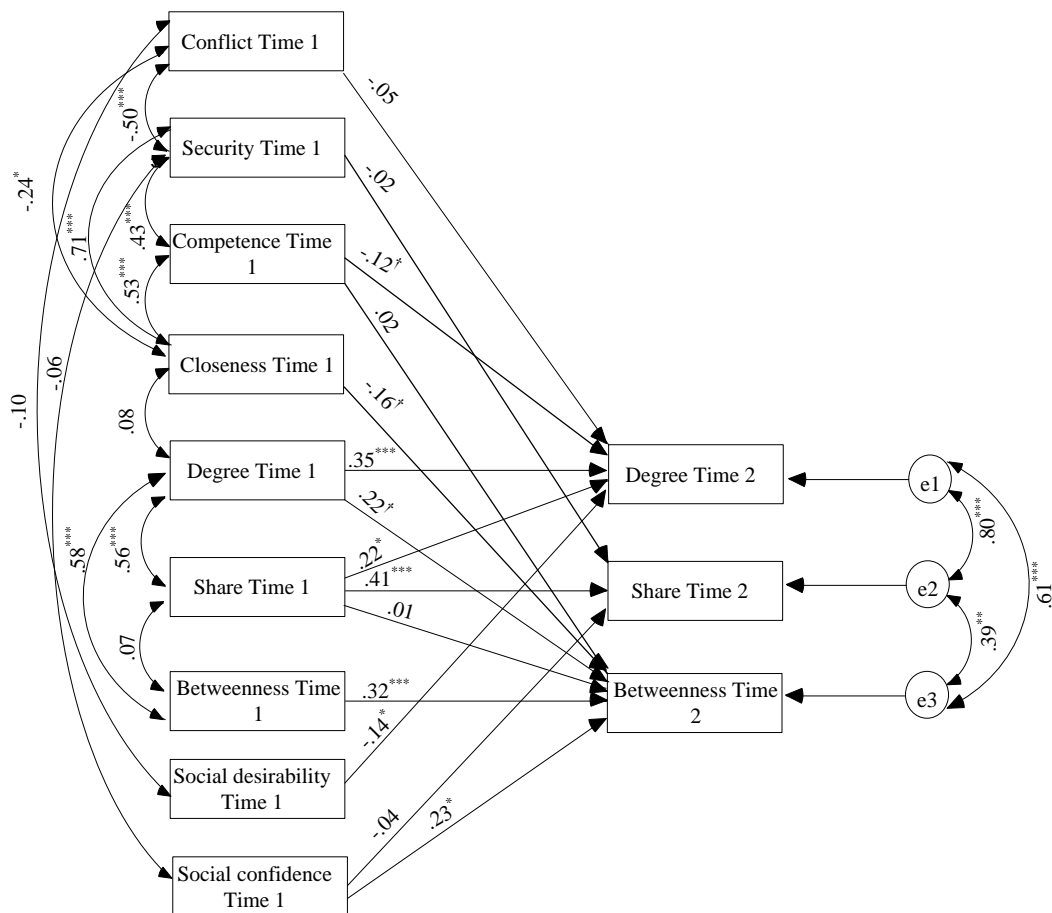


Figure 2. The final path analysis for the relationship between girls' measures of centrality, and social behaviour with standardised path coefficients e = error, † $p \leq .072$ , \*  $p < .05$ , \*\* $p \leq .01$ , and \*\*\*  $p \leq .001$ .