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When empathy matters: The role of sex and empathy in close friendships

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Acknowledgements: We acknowledge the Australian Research Council (DP140103874) for supporting this research.

Full citation: Ciarrochi, J., Parker, P., Sahdra, B., Kashdan, T., Kiuru, N., Conigrave, J. (in press March 18, 2016). When empathy matters. The role of sex and empathy in close friendships. *Journal of Personality*.

Abstract

Objective: Based on prior theory and research (Ciarrochi & Heaven, 2009; Eagly & Wood, 1999), we hypothesized that the link between empathy and friendship would be moderated by sex: girls will nominate empathic boys as friends, whereas boys will not tend to nominate empathic girls.

Method: We collected measures of empathy, friendship social support, and close friendship nominations in Grade 10 across 1970 students in 16 schools (Age = 15.70, SD = .44; Males = 993, Females = 977).

Results: Multilevel models revealed that boys high in cognitive empathy attracted an average of 1.8 more girl friendship nominations than did their low empathy counterparts, whereas empathic girls did not attract a greater number of opposite sex friends. In addition, the more friendship nominations a boy received from either boys or girls, the more they felt supported by their friends; the number of friendship nominations received by girls, in contrast, had no effect on their felt support by friends. Regardless of the quantity of friendship nominations, empathy was linked to more supportive friendships for both males and females.

Discussion: These results inform a contextual understanding of the role of empathy in selecting and maintaining friendships.

Keywords: empathy, friendship, sex, social support

When empathy matters: The role of sex and empathy in close friendships

Friends are essential to positive adolescent development (Furman & Buhmester, 1992; Oswald & Clark, 2003; Selfhout et al., 2010). Friendships are voluntary and intimate relationships founded on cooperation and trust, and are characterized by affiliation and reciprocal liking (Hartup, 1996; Newcomb & Bagwell, 1995). Friendships are also universal, appearing in all cultures. In addition to providing companionship, close friendships promote the development of interpersonal skills, learning, and growth (Bukowski, 2001; Gifford-Smith & Brownell, 2003; Sullivan, 1953). Having friends has also been found to be linked with lower rates of depression and other mental health problems (Kiuru, 2008; Schaefer, Kornienko, & Fox, 2011), and higher subjective well-being (Bukowski, Newcomb, & Hartup, 1998). Thus, it is critical that we identify and teach young people the skills that may help them develop supportive friendships. This paper focuses on one such skill, empathy.

We define empathy as the ability to understand another's emotions (cognitive empathy) and share another's emotions (affective empathy;(Jolliffe & Farrington, 2006a). Several researchers have argued that empathy is a key skill needed to develop positive relationships (Hayes & Ciarrochi, 2015; Kashdan & Ciarrochi, 2013). Empathy facilitates good communication, and successful conflict management in close relationships (De Wied, Branje, & Meeus, 2007), and enhances satisfaction in romantic relationships (Davis & Oathout, 1987). Adolescent empathy has been positively associated with family cohesion (Henry, Sager, & Plunkett, 1996). Empathic individuals are less likely to bully (Stavrinides, Georgiou, & Theofanous, 2010; van Noorden, Haselager, Cillessen, & Bukowski, 2014), and more likely to engage in prosocial behavior (Fabes et al., 1994; Findlay, Girardi, & Coplan, 2006; Gano-Overway, 2013; Miller & Eisenberg, 1988; Miller, Eisenberg, Fabes, & Shell, 1996). Empathy and prosociality have both been related to great cooperation (Eisenberg & Miller, 1987a), and prosociality has been found to predict the quality of close friendships

(Markiewicz, Doyle, & Brendgen, 2001). In terms of interventions, empathy is a core ingredient of effective social and emotional learning (SEL) programs that have been shown to increase positive social behavior related to friendship building (Durlak, Weissberg, Dynmicki, Taylor, & Schellinger, 2011).

This literature would lead one to expect that empathy would help young people to develop friendships. But is this always the case? We argue that theories based on proximate social context, genetic predisposition, and cultural context all point to a similar prediction in mixed-sex relationships: girls will tend to select empathic boys as close friends, whereas boys will be relatively indifferent to the empathy levels of girls. We present these different theories to offer a conceptual framework for why we expect to uncover sex differences.

Our first theory suggests that females' focus on empathy in males is a rational way of maintaining safety. Males low in empathy may be more likely to be aggressive and violent towards females (Lisak & Ivan, 1995; Rose & Rudolph, 2006). Indeed, one study found that 43% of high school students report being a victim of sexual or physical violence, and most of these victims were girls (Bennet & Fineran, 1998). Boys, even as young as those in kindergarten, appear to be more aggressive and less prosocial than girls of that age (Flannery et al., 2003). Females could avoid male aggression and violence by becoming skilled at detecting and selecting empathic male friends, who are less likely to act aggressively (Lisak & Ivan, 1995; Rose & Rudolph, 2006).

The second genetic/evolution theory suggests that females need to be more selective than males in mate selection because they can only bear and raise a limited number of children and they need male mates who are likely to support them and their children (presumably those high in empathy) (Buss, 1989, 1995; Feingold, 1992; Shackelford, Schmitt, & Buss, 2005). In a high school context, there is evidence that developing mixed-sex friendships may be a precursor to romantic relationships and mate selection (Connolly,

Furman, & Konarski, 2000; Perry & Pauletti, 2011). Although young girls are unlikely to marry their close high-school friends (the present sample) in high school, they may already be fairly discerning about whom they pick as friendship partners.

The third theory focuses on culture rather than genetics. If we assume mixed-sex friendships are precursors to romantic relationships and mate selection (Connolly et al., 2000; Perry & Pauletti, 2011), then cultural forces would lead us to predict sex differences in social perception (Eagly & Wood, 1999). In societies like Australia, females are more likely to drop out of the labour market for issues related to childcare, and serve as primary caregivers throughout their children's development. Indeed, the participation rates of mothers in the Australian labor market is lower than averages in many other countries (Keegan & Corliss, 2008). These social roles may shape females' values and preferences of friendships in fundamental ways (Eagly & Wood, 1999). If females are more invested in receiving support from male friends and romantic partners, valuing traits such as empathy in males makes sense, given the evidence that empathic males have a more egalitarian view of the division of household labor (Erickson, 2005).

Regardless of whether we focus on immediate safety concerns (Theory 1), mate selection related influences (Theory 2), or social influences (Theory 3), all of these theories point to the possibility that females will be more likely than males to prefer empathic, opposite sex friends. There is surprisingly little research linking empathy to objective or peer-rated measures of close friendships, especially mixed-sex friendships. Two peer nomination studies are consistent with our sex moderation hypotheses. Ciarrochi and Heaven (2009) found that females' peer-rated adjustment ratings of males were influenced by males' ratings of agreeableness, conscientiousness, and antisocial personality, whereas males' ratings of the adjustment of females were uninfluenced by these characteristics. Similarly, Sahdra and colleagues (2015) found that males' empathy levels were linked to the degree to which

females nominated them as kind and helpful, but females' empathy levels were unrelated to males' nominations of females as kind and helpful. However, none of these studies provided evidence related to close friendships. To our knowledge, no prior research has directly examined our key hypothesis that females, but not males, will be especially likely to befriend highly empathic males.

Quantity of friendships does not equal quality. For example, previous research suggests that quality of social support and number of supportive others are only modestly related (Ciarrochi & Heaven, 2008; Rowsell, Ciarrochi, Deane, & Heaven, 2016, in press). It is possible for a young person to be surrounded by many friends and yet still feel that their social needs are not being met. What is the likely role of empathy and perceived social support from friends, or a young person's subjective appraisal that their friends care for them, and provide them with assistance and support (Lakey & Scoboria, 2005; Rowsell et al., 2016, in press). The overwhelming weight of evidence is that empathy can be seen as a skill that promotes supportive relationships (Eisenberg & Miller, 1987b; Ford & Aberdein, 2015; Hojat, Michalec, Veloski, & Tykocinski, 2015; Riggio, Tucker, & Coffaro, 1989; van Noorden et al., 2014). Thus, we would predict that, even if empathy does not necessarily help a young person to have many (opposite-sex) friends, it does help them to have supportive friends.

Hypothesis 1: Females will nominate a greater number of empathic males as close friends, whereas males will be relatively insensitive to empathy in females.

Hypothesis 2: Regardless of quantity of nominations, high empathy males and females will both have high support from their friends.

Method

Participants and procedure

The sample consisted of Grade 10 students (Age = 15.70, SD = .44, N= 1970; Males = 993, Females = 977) from sixteen Catholic secondary schools within the Cairns (Queensland) and Illawara Diocese (New South Wales). All schools within the Dioceses participated. Ten schools were coed, three schools all male, and three schools all female. The sample was part of the Australian Character Study, in which participants completed a battery of questionnaires. Paper-and-pencil questionnaires were administered using a similar procedure in all schools. Ethics approval was obtained from the University of Wollongong Human Research Ethics Committee (HE10/158) before data collection.

The Catholic schools account for almost a quarter of all secondary school students in Australia and the demographic makeup of this sample broadly reflects that of the Australian population in terms of ethnicity, employment, and religious belief (Australian Bureau of Statistics [ABS], 2010). The students in the sample professed diverse religious views with 18% identifying as atheist, 43% as agnostic, and 39% holding theistic beliefs (though 46% identified as Catholic). The Australian Government provides a school socioeconomic index in which the average across Australia is 1000 (http://bit.ly/1mJK7KC). The schools in this sample had a similar average score of 1026 (SD = 43). In order to assesses socioeconomic status, participants reported on their parents' occupation using the coding system based on the ABS (http://www.abs.gov.au/ausstats/abs@.nsf/mf/1220.0). For Mothers, 25% reported professional, technical, or managerial positions, 19% reported sales/clerical occupations, 10% each reported homemaker or pensioner, 10% community service, with smaller numbers in trades, production, labour, or transport positions. For Fathers, 25% reporting that their parents had professional, technical, or managerial positions, 34% reported trades, production, labour, or transport positions, with smaller numbers in sales/clerical, community service, and pensioner/homemaker.

Missing data were small in this cross-sectional design (no greater than 1% for any instrument). Overall, less than 5% of participants had missing data on at least one variable of interest. When explored by individual item, rarely were data missing at a rate of greater than 1% and never greater than 4%. Utilizing the MissMech package (Jamshidian, Jalal, & Jansen, 2014) in R, the MCAR test revealed that data were not missing completely at random, $p < .01$. Boys were significantly more likely to have missing data than girls ($t = 2.29$, $p < .05$), as were participants from the state of New South Wales compared to Queensland ($t = 2.26$, $p < .05$). Participants from girls' schools had significantly lower levels of missing data than either boys' school or co-ed schools ($t = 2.4$, $p < .05$). There was little evidence that propensity for having missing data varied as a function of either school socioeconomic status or parental social status, $p > .1$. However, adolescents who had missing data also had slightly lower cognitive empathy ($m = 3.83$, $SD = 0.56$) than did those who did not having missing data ($m = 4.07$, $SD = 0.61$), $t = 3.9$, $p < .01$. Missingness was not associated with affective empathy or our key dependent variables, namely, friendship support and friendship nominations. In all analyses, we operated under the assumption that data were not MCAR but were missing at random, and used a multilevel method of estimation that used all available information.

Instruments

Empathy

We used the Basic Empathy Scale (BES) (Jolliffe & Farrington, 2006a) to assess both cognitive and affective empathy. Cognitive empathy refers to the capacity to comprehend the emotions of another and is measured with items like "I find it hard to know when my friends are frightened" (reverse-scored), "When someone is feeling down I can usually understand how they feel," and "I can often understand how people are feeling even before they tell me". Affective empathy refers to the capacity to experience the emotions of

another and is measured with items like “I get caught up in other people’s feelings easily”, “I often get swept up in my friend’s feelings”, and “After being with a friend who is sad about something, I usually feel sad.” Cognitive and affective empathy are inter-correlated yet clearly distinguishable (Jolliffe & Farrington, 2006). The BES relates in expected ways to other empathy measures, to personality measures, to low levels of antisocial behavior, to high levels of prosocial behavior, and to differences in brain activity (Albiero, Matricardi, Speltri, & Toso, 2009; Jolliffe & Farrington, 2006a, 2006b; Sahdra et al., 2015; Sebastian et al., 2012). The alpha reliabilities for affective and cognitive empathy were .80 and .77, respectively.

Friendship Nominations

There are a number of valid ways to collect peer ratings, including the round robin system and peer nomination systems, and procedures that present participants with classmate names and those that ask participants to recall names (Cillessen, 2009). In the present paper, we asked people to nominate their closest friends. We considered it unlikely that participants would forget the name of their closest friends, and so we utilized the relatively simple and quick peer recall system. Our approach made it easy to collect substantial amounts of data from multiple schools.

We asked students to nominate up to five of their closest male and five closest female friends in the same year group at their school (Parker et al., 2015; Rowsell, Ciarrochi, Heaven, & Dean, 2014). This approach is a modification of procedures used for several decades to understand childhood and teenage friendships (Coie, Dodge, & Coppotelli (1982). Sociometric nominations have proved valid, stable, and reliable assessments of friendships during childhood (Bukowski, Cillessen, & Velasquez, 2012).

Perceived Support from Friends

We used the friendship subscale of the Student Social Support Scale to assess support from close friends (Malecki & Elliot, 1999). Due to limitations in the length of time we were given to administer the questionnaire, we used seven items with high factor loadings, based on prior factor analysis results reported elsewhere (Malecki & Elliot, (1999). Participants rated each item on a 6-point scale (1 = *never* to 6 = *always*). The following items were included: "My close friend(s)…. "give me advice", "helps me when I need it", "spends time with me when I'm lonely", "accepts me when I make a mistake", "calms me down when I'm nervous about something," "Understands my feelings", and "Explains things when I'm confused." Friendship support has been shown to be distinguishable from other sources of support, relates to lower levels of being bullied and victimized, fewer behavioral problems, higher reading ability in low socioeconomic status students, higher teacher rated social skills and lower problem behaviors, and higher parent ratings of social skill, lower externalizing behaviors, and higher adaptive skills (Demaray & Malecki, 2002, 2003; Malecki & Demaray, 2006; Malecki & Elliot, 1999). The seven item scale showed high reliability (alpha = .93).

Analyses

The outcome variable, friendship nomination, was count data. To account for this, researchers often use Poisson or negative binomial regression. Negative binomial is often preferred when count data is overdispersed and the data generating mechanisms conforms to a negative binomial distribution (Berk & MacDonald, 2008; Gardner, Mulvey, & Shaw, 1995; Piza, 2012). We contrasted observed counts against counts generated by the Poisson and negative binomial distribution and found that the data tended to conform most closely with a negative binomial distribution, as suggested by lower discrepancy (BIC and AIC) between observed and theoretical distribution (AIC_p = 15716, AIC_{nb} = 14377; BIC_p = 15722, BIC_{nb} = 14389). As such we report results here from the negative binomial regression models. However, we also ran Poisson models with an overdispersion parameter, and in all

cases, the results were similar to those provided here (see supplementary materials, Tables 2 and 3, for Poisson models' results).

The present data constituted a hierarchically nested data structure in that peer nomination counts are nested within individual and individuals are nested within school. There is growing consensus that multilevel random coefficient models (MRCM), also called multilevel or hierarchical linear models, provide more accurate analyses of nested data than ordinary least squares (OLS) analyses (Bryk & Raudenbush, 1992; Kreft & de Leeuw, 1998). Accordingly, relationships between peer nominations and empathy were analyzed using MRCM as implemented in the R program lme4 (Bates, Maechler, Bolker, & Walker, 2015). Missing data were small, as detailed earlier. Nevertheless, the nested multilevel models in the lme4 framework use all available information while estimating the parameters. Prior to analysis, all individual-level variables (i.e., empathy) were standardized.

Results

Quantity of close friends

Descriptive data are presented in Table 1. Of the 10 potential nominations that could be sent to a friend, we found that males tended to receive 5.9 nominations and females received 6.3 nominations. Young people selected more same-sex compared with opposite-sex friends, and females had higher empathy than males; $t > 2$, $p < .01$.

We conducted two sets of MRCM analyses. First, without any covariates, we examined simple relationships between empathy (separately for cognitive and affective empathy) with peer nominations within sex and school type (coed versus same sex). The counts in this model were nested within school. The results are presented in Table 2. The relationships between female empathy variables and number of friend nominations that females received from males were non-significant, whereas the relationships between male empathy variables and female friendship nominations were significant and larger than any of the other correlations; $t > 2$, $p < .05$. The male same-sex associations of affective and

cognitive empathy with friendship nominations tended to be significant but small; the female same-sex associations tended to be small or non-significant. To test our first hypothesis that females would be more responsive than males to empathy in opposite-sex friendships, we compared the size of mixed-sex links between empathy and friendship nominations (shaded, Table 2), and found reliable differences; $t > 4$, $p < .001$, indicating that female friendship nominations were linked to both cognitive and affective empathy in males, whereas male nominations where unrelated to empathy in females. We also examined whether sex moderated any of the same-sex links between empathy and friendship nominations, and found no significant effects; $t < 1.5$.

We next evaluated a full model, in which nominations were predicted by the following variables: empathy, school type, sex of the receiver, sex of the sender, and the interactions involving these variables and empathy. This analysis included a three-way interaction involving sex of the nomination sender, sex of the nomination receiver, and empathy, which allowed us to assess whether the sender x empathy interaction was larger in mixed-sex versus same-sex friendships.

The friendship counts in the full model were nested within both school and participant, so we estimated a 3-level model with random intercept for both of these variables. The model also controlled for whether the school was coed, all male, or all female. The results of the cognitive empathy analyses are presented in Table 3. High cognitive empathy was associated with greater friendship nominations, but this effect was qualified by a three-way interaction.

The shape of this moderation effect is shown in Figure 1, which represents the effects of the model when the school level variables are zero (thus evaluating the effect when school is coed and mixed sex relationships are therefore present), cognitive empathy is plus-or-minus one standard deviation, and the sex of the sender and receiver is male or female. The

figure also includes confidence intervals (+/- 2SE). The effect of empathy depended on both the sex of the sender and the receiver, with empathy having the smallest effect on the female nominating female category and the largest effect on the females nominating males category. Another way of describing this interaction is that females were more responsive to empathy in males than females, whereas males were equally responsive to empathy in females and males. Males with high cognitive empathy (+1SD) received an average of 1.8 more close friendship nominations from females than did their low empathy counterparts (-1SD). In contrast, the link between female cognitive empathy and nominations was not statistically significant (see bottom left value, Table 2).

We conducted simple effect tests on the slopes of Figure 1. All results were said to be significant if they reached the conventional level of $p < .05$. The slope was significantly different from zero for males nominating males ($\beta = .096$, $SE = .027$, $t = 3.6$) and females nominating males ($\beta = .32$. $SE = .037$, $t = 11.9$), but the slopes for males nominating females ($\beta = .07$. $SE = .041$, $t = 1.7$) and females nominating females ($\beta = .03$. $SE = .029$, $t = 1.0$) were not different from zero. The results are expressed in log units such that a β of .32 corresponds to a multiplicative effect of exp(.32) = 1.37, or an expected 37% increase in close friendship nominations for each standard deviation increase in cognitive empathy. We also compared intercepts for the different lines in Figure 1, and found that all intercepts significantly differed, with the smallest differences being between #M-> M and #F-> M intercepts ($\beta = .10$, $SE = .05$, $t = 2.0$) and the largest difference being between #F->F and #M->F intercepts ($\beta = .34$, $SE = .05$, $t = 6.8$). Thus, females tended to rate more people as friends than males. The highest number of friendship nominations occurred amongst females nominating females, whereas the lowest number occurred amongst males nominating females.

The same analyses were conducted with affective empathy and produced similar results (see supplementary materials, Table 1) to those reported in the cognitive empathy analysis, with a main effect of affective empathy (β =.094, SE = .018, t = 5.22, p< 001), and affective empathy interacting with the sex of the receiver (β = -.036, SE = .009, t = 3.98, p< 001) and the sender (β =.032, SE = .009, t = 3.55, p< 001). However, the three-way interaction, although similar in direction as the one observed for cognitive empathy, was not significant (B=-.006, SE = .004, t = 1.4, p> .05). The simple effects analyses for mixed sex ratings produced similar results to those reported for cognitive empathy. Consistent with our core hypothesis, the slope was significantly different from zero for females nominating males (β = .25, *SE* = .039, t = 6.4, p < .05), but was not significantly different from zero for males nominating females (β = .016, *SE* = .04, t = 0.4). When the affective empathy model was evaluated with school level variables set to zero (i.e., for coed schools), and empathy at plus-or-minus one standard deviation, males with high affective empathy (+1SD) received an average of 1.5 more close friendship nominations from females that their low empathy counterparts (-1SD). In contrast, females with high affective empathy received only .3 more nominations from males.

Concerning same sex ratings, the slope for males nominating males was significantly different from zero (β = .077, *SE* = .029, t = 2.7, p < .05) and similar to the cognitive empathy analysis. However, the slope for females nominating females was significantly different from zero in the affective empathy analysis (β = .062. *SE* = .0.03, t = 2.1), whereas it was not in the cognitive empathy analysis above.

To determine if the quantity effects were independent of friendship support, we reran all analyses reported above controlling for support. The pattern of results reported above did not change.

Empathy and Friendship Support

Our final analyses evaluated our hypothesis that empathy would be consistently linked to friendship support. We used the lme4 package (Bates et al., 2015) in R to conduct separate multilevel models with empathy and degree of support as predictors of friendship support in males and females. The results are presented in Table 4. Both cognitive and affective empathy were related to higher friendship support across both males and females. In addition, male and female friendship nominations were positively related to male friendship support, but not female support.

As shown in Table 4, the more male and female friendship nominations males received, the more they felt supported. There was no such link between quantity of nominations and social support for girls. The results in Table 4 also suggest that cognitive empathy is more strongly linked to support than affective empathy. We conducted four post-hoc t-tests to test apparent differences in Table 4, using a Bonferroni corrected p value of .0125. We found that the cognitive empathy associations were significantly larger for both males (M_{diff} = .12, SE = .047, t = 2.54, p < .05) and females (M_{diff} = .17, SE = .044, t = 3.88, p < .0001). Next, we examined the possibility that the strength of the link between friendship support and number of friendship nominations differed for males and females. We found that the association between female nominations and social support was stronger for males than for females (M_{diff} = .16, SE = .052, t = 3.10, p < .005). The association between male nominations and social support was also stronger for males than females, but the difference was not statistically significant (M_{diff} = .10, SE = .051, t = 1.9, p = .06).

Finally, to evaluate the unique effects of empathy on friendship support, we reran the above analyses of friendship support, this time with the quantity of male and female nominations as covariates. Even in these models controlling for friendship quantity, affective

and cognitive empathy substantially predicted friendship support in males (β for Affective Empathy =.15, SE = .04, $p < .001$; β for Cognitive Empathy = .24, SE = .04, $p < .001$) and females (β for Affective empathy =.16, SE = .04, $p < .05$; β for Cognitive empathy = .32, SE = .04, $p < .001$).

Discussion

Females clearly want to befriend empathic males. For each standard unit increase in cognitive empathy, a male receives approximately one additional close friendship nomination from a female. This effect can be contrasted by the finding that males are not more likely to nominate empathic females as friends. The pattern of results was similar for both cognitive and affective empathy.

These sex differences were observed for the quantity of friends, but not for friendship support. That is, regardless of the number of friends they had, adolescents high in empathy were more likely to have highly supportive friends. We also observed sex differences in the role of friendship quantity on perceived friendship support. Female's sense of friendship support was uninfluenced by the number of people who nominated them as friends. The more friendship nominations males received, in contrast, the more they felt supported by friends.

Friendship Quantity

The failure of males to use empathy as a basis for selecting close female friends may be due to a failure to detect empathy, an indifference to empathy, or both. There is some preliminary evidence for the detection failure hypothesis. Ciarrochi and Heaven (2009) examined the link between personality and peer ratings of kindness and friendliness towards others. They found that females rated male peers as adjusted if those males reported lower levels of antisocial personality and higher levels of conscientiousness. Thus, they seemed to be able to detect these traits in males. In contrast, males showed no evidence of detecting these traits in

females. They viewed unconscientious, antisocial females to be just as “kind and friendly to others” as conscientious, prosocial females. Females, in contrast, were much less likely to see unconscientious, antisocial females as kind and friendly. However, inconsistent with the detection hypothesis, males were more likely to have close friendships with other males with high levels of cognitive and affective empathy. Thus, they can detect empathy, as evidenced by results relating to same-sex friendships.

Future research is needed to more directly evaluate the detection versus indifference hypothesis. One simple way to do this would be to ask males and females to nominate their friends and then rate their friends and peers on empathy. One could then examine the link between self-reported empathy and peer reported empathy. If the detection hypothesis is accurate, males should be poor at identifying empathic females. If the indifference hypothesis is correct, males should be better at identifying empathic females, but this detection should not influence whom they nominate as close friends.

There is at least one piece of adult data that suggests that females, more so than males, benefit from detecting empathy in opposite-sex relationships (Busby & Gardner, 2008). Busby and Gardner (2008) examined male and female empathy in a longitudinal study of couples and found that male empathy predicted the development of female satisfaction with the relationship, but female empathy did not predict the development of male satisfaction. This result suggests that male empathy is more beneficial to females than vice-versa. Future longitudinal research is needed to examine if this effect holds up in adolescent, mixed-sex friendships.

We argued in the introduction that theories derived from immediate safety concerns, mate selection, and cultural context all suggest that females (more so than males) identify and select empathic, opposite-sex friends. Future research is needed to better tease apart these

theories. For example, to test a cultural explanation, empathy and friendship could be examined in cultures and subcultures that differ in sex roles, norms, and power differentials (Hoftsted, Hofstede, & Minkov, 2010). One limitation of our study is that it took place in a particular cultural context, Catholic schools. We showed that the students in these schools have diverse religious beliefs and are similar to the Australian population in terms of SES of their family. Nevertheless, it is possible that the effects observed here could be moderated by school context. For example, Catholic schools may place a relatively high value on empathy and amplify the effect that empathy has on male-female friendships. Future research is needed to examine if school context moderates the relationship between empathy and friendship nominations.

It is possible that females choose to befriend empathic males simply because they are safer (Lisak & Ivan, 1995; Rose & Rudolph, 2006). To evaluate this possibility, one could compare friendships in relatively safe versus dangerous school environments. We would expect empathy to become a more important friendship selection criterion in dangerous communities or societies. This hypothesis is consistent with prior research suggesting that psychological constructs such as happiness, respect, and meaning in life are influenced by the degree of safety or danger in one's environment (Diener, Tay, & Myers, 2011).

There is another possible explanation for the sex effects on empathy. Instead of *selecting* empathic males, perhaps females help males develop empathy. Perhaps when males spend time with females, they become more like them in terms of empathy (i.e., empathy enhancement effects). This could have a number of benefits to males. First, our data suggest that higher empathy will be linked to higher friendship support. Second, learning the "female style" of empathy and relationship focus may help males reduce their focus on status related goals when interacting with friends and give those males a chance to experience relationship support and validation (Rose & Rudolph, 2006). Finally, males who can integrate aspects of

both female-linked and male-linked styles into their own peer relationship style may be especially able to obtain reward in both competitive and nurturing context (Rose & Rudolph, 2006). This type of psychological integration can be considered a variant of psychological flexibility, which a growing body of research links to psychological, social, and physical indices of well-being (Kashdan & Rottenberg, 2010).

We have focused on findings related to our mixed-sex hypotheses, but the same sex findings are also interesting. Males' friendship nominations were linked to both cognitive and affective empathy. In contrast, female nominations were linked only to affective empathy. This suggests that both boys and girls value same-sex friends who are affectively "in sync" with them but the evidence only supports boy's preference for same-sex friends that understand them cognitively. Future research could begin to test this possibility by asking young people how much they value cognitive and affective empathy in same sex and opposite sex friendships.

Friendship Support

Although we found sex differences in the link between quantity of close friends and empathy, we did not find such effects for friendship support. This is consistent with the notion that empathy helps young people build high quality friendships (Hayes & Ciarrochi, 2015), even if it does not result in more friendships. Empathy should help young people to recognize a friend's feelings, motivations, and needs, promoting communication and motivating them to provide social support to the friend (Decety, Norman, Bernstson, & Cacioppo, 2012). Such support is likely to lead their friend, in turn, to reciprocate with support and cooperation (Rumble, Van Lange, & Parks, 2010).

We found that sex moderated the link between number and supportiveness of friends. The more friendship nominations males received, especially from females, the more they felt

supported. In contrast, receiving more friendship nominations did not make females feel more supported. One speculative explanation for this finding can be found in Baumeister and Summer's (1997) work, in which they suggest that males and females tend to be attracted to different "spheres of belongingness." Females prefer and invest in a small number of close relationships, whereas males prefer and invest in larger spheres of social relationships. A substantial amount of data is consistent with this view (Cross & Madson, 1997; Gabriel & Gardner, 1999). Females tend to describe themselves in relational terms, report more experiences linked to relationships, are attuned to information pertaining to relationships of others, and behave in ways that maintain close relationships. In contrast, males tend to describe themselves in collective terms, report more experiences linked to groups, appear attuned to information pertaining to the group memberships of others, and behave in ways that support their groups (Gabriel & Gardner, 1999).

A contextual lens offers insight into how sex differences develop and how they could even be reversed in some contexts. For example, parents may encourage a female to believe that she needs be successful and influential above all other things. This may lead her to do things like run for class president. The more friends she has, the more she may feel connected and supported. In contrast, other parents may teach a boy that popularity is irrelevant and the only thing that matters is authentic friendship. Such a boy may feel quite satisfied by having a small group of friends. As with all sex differences, we expect that there will be substantial variation within sex and substantial effects of context (Hyde, 2005).

In conclusion, we found clear support that sex moderated the link between empathy and the quantity of friends but not perceived support from friends. Empathy attracts opposite-sex close friendship nominations in males but not females. Having more close friends is not only important for the young person's well-being in high school (Bukowski et al., 1998; Kiuru, 2008; Schaefer et al., 2011), it could have long term positive consequence. For

example, Conti et al (2013) showed that moving from the 20th to 80th percentile in peer friendship nominations yielded a 10% wage premium 40 years later. Further research on empathy and sex in friendship development would improve our understanding of the quality of adolescent lives.

Declaration of conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: Preparation of this manuscript was supported by Grant DP140103874 from Australian Research Council.

References

Albiero, P., Matricardi, G., Speltri, D., & Toso, D. (2009). The assessment of empathy in adolescence: A contribution to the Italian validation of the "Basic Empathy Scale". *Journal of Adolescence, 32,* 393-408.

Bates, D., Maechler, M., Bolker, B., & Walker, S. (2015). lme4: Linear mixed-effects models using Eigen and S4. Retrieved from https://CRAN.R-project.org/package=lme4.

Baumeister, R., & Sommer, K. (1997). What do men want? Gender differences in two spheres of belongingness: Commont on Cross and Madson. *Psychological bulletin, 122*, 38-44.

Bennet, L., & Fineran, S. (1998). Sexual and severe physical violence among high school students: power beliefs, gender, and relationship. *American Journal of Orthopsychiatry, 68*, 645-652.

Berk, R., & MacDonald, J. (2008). Overdispersion and Poisson Regression. *Journal of Quantitative Criminology, 24*, 269-284.

Bryk, A., & Raudenbush, S. (1992). *Hierarchical linear models: Applications and data analysis methods*. CA: Sage.

Bukowski, W. M. (2001). Friendship and the worlds of childhood. In D. W. Nangle & C. A. Erdley (Eds.), *The role of friendship in psychological adjustment: New directions for child and adolescent development* (pp. 93-106). San Francisco: Jossey-Bass.

Bukowski, W. M., Cillessen, A. H. N., & Velasquez, A. M. (2012). The use of peer ratings in developmental research. In B. Laursen, T. Little, & N. Card (Eds.), *Handbook of developmental research methods* (pp. 211-228). New York: Guilford.

Bukowski, W. M., Newcomb, A. F., & Hartup, W. (Eds.). (1998). *The company they keep: Friendships in childhood and adolescence.* Cambridge, UK.: Cambridge University Press.

Busby, D., & Gardner, B. (2008). How do I analyze Thee? Let me count hte ways: Considering empathy in couple relationships using self and partner ratings. *Family Process, 47*, 229-242.

Buss, D. M. (1989). Sex differences in human mate preferences: Evolutionary hypotheses tested in 37 cultures. *Behavioral and Brain Sciences, 12*(1), 1-49.

Buss, D. M. (1995). Psychological sex differences: Origins through sexual selection. *American psychologist, 50*(3), 164-168.

Ciarrochi, J., & Heaven, P. C. L. (2008). Learned social hopelessness: the role of explanatory style in predicting social support during adolescence. *the Journal of Child Psychology and Psychiatry, 49*, 1279-1286.

Ciarrochi, J., & Heaven, P. C. L. (2009). A longitudinal study into the link between adolescent personality and peer-rated likeability and adjustment: Evidence of gender differences. *Journal of Research in Personality, 43*, 978-986.

Cillessen, A. (2009). Sociometric methods. In K. H. Rubin, W. M. Bulowski, & B. Laursen (Eds.), Handbook of peer interactions, relations and groups (pp. 82-89). New York: The Guilford Press.

Coie, J., Dodge, K., & Caoppotelli, H. (1982). Dimensions and types of social status: A cross-age perspective. *Developmental Psychology, 18*, 557-570.

Connolly, J., Furman, W., & Konarski, R. (2000). The role of peers in the emergence of heterosexual romantic relationships in adolescence. Child development, 1395-1408. *Child development, 71*, 1395-1408.

Conti, G., GAleotti, A., Mueller, G., & Pudney, S. (2013). Popularity. *Journal of Human Resources, 48*, 1072-1094.

Cross, S., & Madson, L. (1997). Models of the self: Self-construals and gender. *Psychological bulletin, 122*, 5-37.

Davis, M., & Oathout, A. (1987). Maintenance of satisfaction in romantic relationships: Empathy and Relational Competence. *Journal of personality and social psychology, 53*, 397-410.

De Wied, M., Branje, S. J., & Meeus, W. H. (2007). Empathy and conflict resolution in friendship relations among adolescents. *Aggressive Behavior, 33*(1), 48-55.

Decety, J., Norman, G., Bernstson, G., & Cacioppo, J. (2012). A neurobehavioral evolutionary perspective on the mechanisms underlying empathy. *Progress in Neurbiology, 98*, 38-48.

Demaray, M., & Malecki, C. (2002). Critical levels of Perceived Social Support Associated with Student Adjustment. *School Psychology Quarterly, 17*, 213-241.

Demaray, m., & malecki, C. (2003). Perceptions of the frequency and importance of social support by students classified as victims, bullies, and bully/victims in an urban middle school. *School Psychology Review, 32*, 471-489.

Diener, E., Tay, L., & Myers, D. (2011). The religion paradox: If religion makes people happy, why are so many dropping out? *Journal of personality and social psychology, 101*, 1278-1290.

Durlak, J., Weissberg, R., Dynmicki, A., Taylor, R., & Schellinger, K. (2011). The impact of enhancing students' social and emotional learning: A meta-analysis of school-based universal interventions. *Child Development, 82*, 405-432.

Eagly, A., & Wood, W. (1999). The origins of sex differences in human behavior: Evolved dispositions versus social roles. *American psychologist, 54*, 408-423.

Eisenberg, N., & Miller, P. A. (1987a). The relation of empathy to prosocial and related behaviors. *Psychological bulletin, 101*(1), 91-119.

Eisenberg, N., & Miller, P. A. (1987b). The relation of empathy to prosocial and related behaviors. *Psychological bulletin, 101*(1), 91.

Erickson, R. (2005). Why emotion work matters: Sex, gender, and the divvision of household labor. *Journal of Marriage and Family, 67*, 337-351.

Fabes, R. A., Eisenberg, N., Karbon, M., Bernzweig, J., Lee Speer, A., & Carlo, G. (1994). Socialization of children's vicarious emotional responding and prosocial behavior: Relations with mothers' perceptions of children's emotional reactivity. *Developmental Psychology, 30*(1), 44.

Feingold, A. (1992). Gender differences in mate selection preferences: A test of the parental investment model. *Psychological bulletin, 112*(1), 125-139.

Findlay, L. C., Girardi, A., & Coplan, R. J. (2006). Links between empathy, social behavior, and social understanding in early childhood. *Early Childhood Research Quarterly, 21*(3), 347-359.

Flannery, D., Vazsonyi, A., Laiau, A., Guo, S., Powell, K., Atha, H., . . . Embry, D. (2003). Initial behavior outcomes for the PeaceBuilders universal school-based violence prevention program. *Developmental Psychology, 39*, 292-308.

Ford, R. M., & Aberdein, B. (2015). Exploring social influences on the joint Simon task: empathy and friendship. . *Frontiers in Psychology, 6*.

Furman, W., & Buhmester, D. (1992). Age and sex differences in perceptions of networks of personal relationships. *Child Development, 63*, 103-115.

Gabriel, S., & Gardner, W. (1999). Are there "his" and "hers" types of interdependence? The implications of gender differences in collective versus relational interdependence for affect, behavior, and cognition. *Journal of personality and social psychology, 77*, 642-655.

Gano-Overway, L. A. (2013). Exploring the connections between caring and social behaviors in physical education. *Research quarterly for exercise and sport, 84*(1), 104-114.

Gardner, W., Mulvey, E., & Shaw, E. (1995). Regression Analyses of counts and rates: Poisson, overdispersed Poisson, and negative binomial models. *Psychological bulletin, 118*, 392-404.

Gifford-Smith, M., & Brownell, C. (2003). Childhood peer relationships: Social acceptance, friendships, and peer networks. *Journal of School Psychology, 41*, 235-284.

Hartup, W. (1996). Cooperation, close relationships, and cognitive development. . In W. Bukowski, A. Newcomb, & W. Hartup (Eds.), *The company they keep: Friendships in childhood and adolescence* Cambridge, UK: Cambridge University Press.

Hayes, L., & Ciarrochi, J. (2015). *The thriving adolescent: Using Acceptance and Commitment Therapy and Positive Psychology to Help Young People Manage Emotions, Achieve Goals, and Build Positive Relationships*. Oakland, CA: Context Press.

Henry, C., Sager, D., & Plunkett, S. (1996). Adolescets' perceptions of family system characteristics, parent adolescent dyadic behaviors, adolescent qualities and adolescent empathy. *Family Relations, 45*, 283-292.

Hoftsted, G., Hofstede, G., & Minkov, M. (2010). *Cultures and organizations: software fo the ind: intercultural cooperation and its importance for survival* (3rd ed.). New York: McGrawHill.

Hojat, M., Michalec, B., Veloski, J. J., & Tykocinski, M. L. (2015). Can empathy, other personality attributes, and level of positive social influence in medical school identify potential leaders in medicine?. *Academic Medicine, 90*, 505-510.

Hyde, J. (2005). The gender similarities hypothesis. *American psychologist, 60*, 581-592.

Jamshidian, M., Jalal, S., & Jansen, C. (2014). Missmech: An R package for testing homoscedasticity, multivariate normality, and missing completely at random (mcar). *Journal of Statistical software, 56*, 1-31.

Jolliffe, D., & Farrington, D. P. (2006a). Development and validation of the Basic Empathy Scale. *Journal of Adolescence, 29*(4), 589-611.

Jolliffe, D., & Farrington, D. P. (2006b). Examining the relationship between low empathy and bullying. *Aggressive Behavior, 32*(6), 540-550.

Kashdan, T. B., & Ciarrochi, J. (Eds.). (2013). *Mindfulness, Acceptance, and Positive Psychology: The seven foundations of well-being*. Oakland, CA: Context Press.

Kashdan, T. B., & Rottenberg, J. (2010). Psychological flexibility as a fundamental aspect of health. *Clinical Psychology Review, 30*, 865-878.

Keegan, M., & Corliss, M. (2008). The labour force participation of young mothers versus older mothers. *Australian Journal of Labour Economics, 11*, 149-161.

Kiuru, N. (2008). *The role of adolescents' peer group in the school context.* (Dissertation), University of Jyvaskyla, Finland.

Kreft, I., & de Leeuw, J. (1998). *Introducting Multilevel Modelling*. London: Sage.

Lakey, B., & Scoboria, A. (2005). The Relative Contribution of Trait and Social Influences to the Links Among Perceived Social Support, Affect, and Self-Esteem. *Journal of Personality, 73*, 361-368.

Lisak, D., & Ivan, C. (1995). Deficits in intimacy and empathy in sexually aggressive men. *Journal of Interpersonal Violence, 10*, 296-308.

Malecki, C., & Demaray, M. (2006). Social Support as a buffer in the relationship between socioeconomic status and academic performance. *School Psychology Quarterly, 21*, 375-395.

Malecki, C., & Elliot, S. (1999). Adolescents' ratings of perceived social support and its importance: Validation of the student social support scale. *Psychology in the Schools, 36*, 473-483.

Markiewicz, D., Doyle, A. B., & Brendgen, M. (2001). The quality of adolescents' friendships: Associations with mothers' interpersonal relationships, attachments to parents and friends, and prosocial behaviors. *Journal of Adolescence, 24*(4), 429-445.

Miller, P. A., & Eisenberg, N. (1988). The relation of empathy to aggressive and externalizing/antisocial behavior. *Psychological bulletin, 103*(3), 324.

Miller, P. A., Eisenberg, N., Fabes, R. A., & Shell, R. (1996). Relations of moral reasoning and vicarious emotion to young children's prosocial behavior toward peers and adults. *Developmental Psychology, 32*(2), 210.

Newcomb, A. F., & Bagwell, C. L. (1995). Children's friendship relations: A meta-analytic review. *Psychological bulletin, 117*, 306-347.

Oswald, D., & Clark, E. (2003). Best friends forever? High school best friendships and the transition to college. *Personal Relationship, 10*, 187-196.

Parker, P., Ciarrochi, J., Heaven, P., Marshall, S., Sahdra, B., & Kiuru, N. (2015). Hope, friends, and subjective well-being: A social network approach to peer contextual effects. *Child Development, 86*, 642-650.

Perry, D., & Pauletti, R. (2011). Gender and adolescent develoopment. *Journal of Research in Adolescence, 21*, 61-74.

Piza, E. (2012). *Using Poisson and Negative Binomial Regression Models to Measure the Influence of Risk on Crime Incident Counts.* Rutgers Center on Public Security, Neward, NJ.

Riggio, R. E., Tucker, J., & Coffaro, D. (1989). Social skills and empathy. *Personality & Individual Differences, 10*(1), 93-99.

Rose, A., & Rudolph, K. (2006). A review of sex differences in peer relationship processes: Potential trade-offs for the emotional and behavioral development of girls and boys. *Psychological bulletin, 132*, 98-131.

Rowsell, C., Ciarrochi, J., Heaven, P., & Dean, F. (2014). The role of emotional identification skill in formation of male and female friendships: A longitudinal study. *Journal of Adolescence, 37*, 103-111.

Rowsell, H. C., Ciarrochi, J., Deane, F. P., & Heaven, P. C. (2016, in press). Emotion identification skill and social support during adolescence: A three-year longitudinal study. . *Journal of Research in Adolescence*.

Rumble, A., Van Lange, P., & Parks, C. (2010). The benefits of empathy: When empathy may sustain cooperation in social dilemmas. *European Journal of Social Psychology, 40*, 856-866.

Sahdra, B., Ciarrochi, J., Parker, P., Marshall, S., & Heaven, P. (2015). Empathy and nonattachment independently predict peer nominations of prosocial behavior of adolescents. *Frontiers in Psychology, 6*.

Schaefer, D. R., Kornienko, O., & Fox, A. M. (2011). Misery does not love company network selection mechanisms and depression homophily. *American Sociological Review, 76*, 764-785.

Sebastian, C., Fontaine, N., Bird, G., Blakemore, S., Brito, S., McCrory, E., & Viding, E. (2012). Neural processing associated with cognitive and affective Theory of Mind in adolescents and adults. *SCAN, 7*, 53-63.

Selfhout, M., Burk, W., Branje, S., Denissen, J., van Aken, M., & Mees, W. (2010). Emerging late adolescent friendship networks and Big Five personality traits: A social network approach. . *Journal of Personality, 78*, 509-538.

Shackelford, T. K., Schmitt, D. P., & Buss, D. M. (2005). Universal dimensions of human mate preferences. *Personality and Individual Differences*, *39*(2), 447-458.

Stavrinides, P., Georgiou, S., & Theofanous, V. (2010). Bullying and empathy: a short-term longitudinal investigation. *Educational Psychology*, *30*(7), 793-802.

Sullivan, H. (1953). *The interpersonal theory of psychiatry*. New York: Norton.

van Noorden, T. H., Haselager, G. J., Cillessen, A. H., & Bukowski, W. M. (2014). Empathy and involvement in bullying in children and adolescents: a systematic review. *Journal of Youth and Adolescence*, 1-21.

Table 1: Means , standard errors, and sex difference effect sizes (Cohen's d) of key study variables

	Co-ed schools			Single Sex Schools		
	Males	Females	*d*	Males	Females	*d*
	N= 613	N= 611		N = 380	N= 366	
Fem. friend nom.	2.80 (.13)	3.66 (.08)	.31	--------	3.72 (.12)	---
Male Friend nom.	3.12 (.09)	2.63 (.12)	.19	3.59 (.12)	------	---
Affective Empathy	3.07 (.03)	3.74 (.02)	1.07	3.15 (.03)	3.68 (.03)	.82
Cognitive Empathy	3.93 (.02)	4.20 (.02)	.50	3.92 (.03)	4.19 (.03)	.49

Table 2: Fixed effects estimates (and standard errors) from separate multilevel negative binomial models assessing simple associations between empathy and close friendship nominations within coed and same sex schools

	# M friends Co-ed	# F friends Co-ed	# M friends Single sex	# F Friends Single sex
Male Affect empathy	.069 (.030)*	.237 (.050)***	.069 (.036)	_____
Fem. Affect empathy	-.009 (.048)	.037 (.024)	_____	.079 (.034)*
Male Cog. Empathy	.092 (.030)**	.312 (.051)***	.108 (.038)**	_____
Fem. Cog. Empathy	.070 (.047)	.009 (.023)	_____	.049 (.034)

Note: ***p< .001, **p< .01, *p< .05; Numbers represent effect sizes: Nominations are on a logarithmic scale and continuous variables are standardized. Shaded cells indicate hypothesized differences between males and females

Table 3. Estimates from a multilevel negative binomial model with cognitive empathy scores predicting counts of friendship nominations

	Estimate	SE	T
School-level			
All male versus coed	.16	.08	2.01*
All female versus coed	.04	.08	.45
Individual-level			
Intercept	1.03	0.034	30.25***
Receiver	0.004	0.009	0.44
Sender	0.03	0.008	3.92***
Cognitive Empathy (CE)	0.129	0.018	7.32***
Sender x Receiver	0.032	0.004	8.13***
Receiver x CE	-0.039	0.008	-4.48***
Sender x CE	0.022	0.008	2.75**
Sender x Receiver X CE	-0.016	0.004	-4.24***

Note: ***p< .001, **p< .01, *p< .05; ; Numbers represent effect sizes: Nominations are on a logarithmic scale and continuous variables are standardized. Maximum likelihood estimation was used.

Table 4: Standardized fixed effects estimates (and standard errors) from separate multilevel models assessing associations between empathy, quantity of close friendship nominations, and quality of social support from close friends

	Male friendship Support	Female friendship support
# Female Friends	.22 (.04)***	.06 (.03)
# Male Friends	.15 (.03)***	.05 (.04)
Cognitive Empathy	.31 (.03)***	.33 (.03)***
Affective Empathy	.19 (.04)***	.16 (.03)***

Note: * $p < .05$, ** $p < .01$, *** $p < 001$. The variables are standardized and continuous. Thus variance explained can be obtained by squaring the number.

Figure 1: The number of males (#M) and females (#F) nominating low and high (+-1SD) empathy males (→M) and females (→ F) as close friends.