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Physiological Reactivity Moderates the Association between Parental Directing and Young Adolescent Friendship Adjustment

Kelly M. Tu,

Human Development and Family Studies, Auburn University

Stephen A. Erath,

Human Development and Family Studies, Auburn University

Gregory S. Pettit, and

Human Development and Family Studies, Auburn University

Mona El-Sheikh

Human Development and Family Studies, Auburn University

Abstract

This study examined whether the longitudinal association between parental directing of friendships (i.e., encouraging or discouraging certain friendships) and young adolescents' friendship adjustment (i.e., friendship quality and friends' positive characteristics) was moderated by skin conductance level reactivity (SCLR) to peer stress. Participants included 123 young adolescents (*M* age = 12.03 years at T1; 50% boys; 58.5% European Americans). At T1 (summer before the transition to middle school), parents reported on the extent to which they directed adolescents toward or away from certain peers, and adolescents' SCLR was assessed during a lab-based peer evaluation task. At T1 and T2 (spring of the first year of middle school), adolescents reported on the quality of their friendships and positive peer affiliations. Controlling for T1 friendship adjustment, parental directing predicted higher friendship quality and more positive peer affiliations, but only among young adolescents with lower SCLR, which was conceptualized as a marker of under-arousal and insensitivity to stress. Results are discussed with reference to the developmental period of early adolescence and related research on interactions between parental control and child characteristics as predictors of adolescent adjustment.

Keywords

parental directing; SCLR; friendship adjustment; early adolescence

Friends can be powerful socialization agents during early adolescence (Brechwald & Prinstein, 2011; Dishion, Spracklen, Andrews, & Patterson, 1996) in part because young adolescents spend increasing time with friends relative to parents (Keijsers, Branje, VanderValk, & Meeus, 2010; Larson & Richards, 1991). Friends offer skill-building opportunities and psychological supports (Parker, Rubin, Erath, Wojslawowicz, & Buskirk,

2006), and they often promote positive behavioral adjustment (Brown & Braun, 2013). However, friends may also contribute to deviant or antisocial behavioral development, which may be related to unsupervised time with friends (Lam, McHale, & Crouter, 2014; Pettit, Bates, Dodge, & Meece, 1999) as well as social and emotional rewards for risky behavior paired with an underdeveloped cognitive-control system in early adolescence (Albert, Chein, & Steinberg, 2013). Thus, establishing and maintaining positive, high-quality friendships are important developmental processes related to behavioral and psychological adjustment in early adolescence.

Understandably, parents often wish to influence their children's selection of friends. In particular, parents may attempt to "direct" their children's friendships, encouraging them to become friends with prosocial peers and discouraging them from friendships with deviant peers. Whereas parental directing of friendships may effectively foster friendships with prosocial peers and support psychosocial adjustment, beliefs in the legitimacy of parental authority over peer relationships decline in early adolescence (Kuhn & Laird, 2011), possibly limiting parental influence. Furthermore, the potential benefits of (or need for) parental directing of friendships may vary among young adolescents at higher or lower risk for involvement in negative peer relationships. Indeed, the literature on the association between parental directing and friendship adjustment is mixed. Some studies have linked parental directing with positive friendship adjustment (Mounts 2000; 2002), yet other studies suggest negative or counter productive effects of parental directing on friendships (Keijsers et al., 2012; Soenens, Vansteenkiste, & Niemiec, 2009; Soenens, Vansteenkiste, Smits, Lowet, & Goossens, 2007). The present study examines whether young adolescents' physiological responsiveness to peer stress can clarify the effects of parental directing of friendships.

Adolescents' physiological responsiveness to peer stress is one potential indicator of the need for parental directing. Physiological arousal reflects sensitivity or responsiveness to environmental circumstances; it also serves as a signal to increase awareness and provides metabolic support for cognitive or behavioral action (Porges, 2007). Adolescents who experience low levels of physiological arousal in stressful or challenging peer situations may be insensitive to social cues or negative social consequences (Raine, 2002), increasing their risk for social and behavioral problems, particularly in the context of other social risk factors (e.g., peer victimization, Gregson, Tu, & Erath, 2014; affiliation with deviant peers, Sijtsema et al., 2010; 2013). Despite the risk of physiological under-arousal, these adolescents may develop positive, high-quality friendships in the context of other social protective factors, such as having parents who direct them toward more positive peers and away from more deviant peers. In contrast, parental directing may be superfluous among adolescents who exhibit higher physiological responsiveness to challenging peer situations. These adolescents may be more attuned to social cues and consequences in challenging peer situations, and thus may be more likely than under-aroused adolescents to avoid negative or risky peer interactions and to engage in positive, prosocial behaviors with peers, even in the absence of parental intervention.

In the present study, we used skin conductance level reactivity (SCLR; change in skin conductance from baseline to stress situation) as a measure of physiological responsiveness

in the specific context of peer stress. The primary aim was to examine whether young adolescents' SCLR to peer stress moderated the longitudinal associations between parental directing of friendships and indices of friendship adjustment (i.e., friendship quality and friends' positive characteristics) across the transition to middle school. The context-specific assessment of all constructs—parenting, physiological responsiveness, and adjustment—in *the peer domain* is an important innovation of the present study that should elucidate the effects of parenting directing of friendships in early adolescence.

Friendships in Early Adolescence

Friendships permeate multiple areas of development (e.g., emotional, academic, health) and their developmental significance is well-documented (Brown & Braun, 2013). Key features of friendships include having friends, the quality of friendships, and friends' characteristics (Bagwell & Schmidt, 2011; Berndt, 2004); the present study focused on two of these key features: friendship quality and friends' characteristics. Friendship quality refers to affection, intimacy, and support in friendships (e.g., Berndt, 2002; Parker & Asher, 1993), whereas friends' characteristics refers to values or behaviors typical of friends (e.g., Bagwell & Schmidt, 2011). Given the increasing value placed on friendships from childhood to adolescence (Parker et al., 2006), it is important to not only understand how these aspects of friendships are associated with youth adjustment, but also what factors might predict young adolescents' friendship quality and friends' characteristics.

Further, examining these aspects of friendships may be especially important during a period of transition or change. Specifically, the transition to middle school can create or exacerbate challenges in friendships, in part, because of the changes in school and classroom structure that may disrupt established peer and friendship networks (e.g., Barber & Olson, 2004; Eccles, Lord, & Buchanan, 1996). Indeed, at the transition to middle school, young adolescents report concerns about losing touch with friends and having trouble making new friends (Anderson, Jacobs, Schramm, & Splittgerber, 2010; Duchesne, Ratelle, & Roy, 2012). Additionally, risky and antisocial behaviors increase during this developmental period, and the expansion of the peer network in middle school may expose youths to peers who engage in more deviant behavior (Patterson, Dishion, & Yoerger, 2000).

Parental Directing of Friendships

According to conceptual frameworks proposed by Ladd and Pettit (2002) and Parke and Buriel (2006), parents may influence children's peer relationships indirectly through interactions within the family (e.g., family experiences transferred to peer relationships) or directly by providing instruction about peer relationships and opportunities for peer interactions (i.e., parent as advisor or consultant; Ladd & Pettit, 2002). The focus of the present study is on direct parental involvement in young adolescents' peer relationships. Specifically, parental directing of friendships, a form of parental control, is defined as parental efforts to manage young adolescents' friendships by directing them toward peers who have characteristics or behaviors typically consistent with parental values (e.g., prosocial, positive peers) and away from peers that the parent views as a negative influence (e.g., deviant peers). Unlike dimensions of parenting that are unequivocally positive (e.g.,

warmth) or negative (e.g., harshness), parental directing of friendships in early adolescence may involve elements of both supportiveness (e.g., Mounts, 2000; 2002) and intrusiveness (e.g., Keijers et al., 2012; Mounts, 2002; Soenens et al., 2007).

Existing studies of parental directing of friendships, or similar constructs, have suggested potentially positive as well as negative effects on youth peer adjustment. Mounts reported that adolescent-reported parental directing behaviors (e.g., encouraging or discouraging certain friendships) were associated with adolescents' having friends with lower levels of drug use and antisocial behavior over time (Mounts, 2000; 2002), as well as concurrent positive friendship quality (Mounts, 2004). In another study, parental involvement in peer-oriented activities (e.g., talking with adolescent about friends) concurrently predicted adolescent-reported intimacy in best friendships, peer group involvement, and perceived social competence (Updegraff, McHale, Crouter, & Kupanoff, 2001). However, parental directing may be perceived as intrusive by adolescents, yielding unintended effects (Soenens et al., 2007). For example, adolescent-reported parental prohibition of friendships was concurrently associated with more adolescent-reported deviant behavior among friends (Soenens et al., 2007). Further, parent-reported prohibition predicted an increase in deviant peer contact one year later, according to adolescent reports (Keijers et al., 2012). Thus, it is unclear if parental directing of friendships serves its intended purpose, and we did not anticipate main effects of parental directing on friendship adjustment.

Studies on Parenting x Child interactions and the development of externalizing behaviors provide some clues about the conditions under which parental directing may be effective. These studies suggest that indices of parental control and child characteristics interact to predict behavioral outcomes. For example, in a younger sample, Bates et al. (1998) found that temperamentally impulsive children had lower levels of externalizing problems when mothers were high in restrictive control (e.g., prohibitions and warnings to manage harmful child actions). Among older youths, Stice and Gonzales (1998) found that adolescent-reported parental behavioral control, such as monitoring, consistency, and enforcement of rules, predicted lower delinquency among adolescents who reported more temperamental behavioral disinhibition. Further, a recent study examining parental involvement (e.g., family rules about appropriate behavior during unsupervised time, parental solicitation of information) in young adolescents' activities found that adolescents who reported low self-control had lower levels of antisocial behavior when parental involvement was high, but higher levels of antisocial behavior when parental involvement was low (Kuhn & Laird, 2013). More closely related to parental directing, Tilton-Weaver, Burk, Kerr, and Statin (2013) found that parental communication of disapproval about peers predicted reduced deviant peer influence among adolescents who reported high levels of delinquency, but increased influence of delinquent peers among less delinquent adolescents. These studies provide some evidence that either disinhibited or delinquent youths may particularly benefit from heightened parental control, but with the exception of Tilton-Weaver et al. (2013), they do not specifically concern parental control in the peer domain.

Skin Conductance Level Reactivity

Although a number of studies have shown that child temperamental characteristics (noted above) or physiological responses (e.g., Erath, El-Sheikh, Hinnant, & Cummings, 2011; Kochanska, Brock, Chen, Aksan, & Anderson, in press) moderate associations between forms of parental control and child adjustment, to our knowledge, no published studies have examined whether similar interactive associations are evident in the peer domain specifically. Questionnaire-based measures of child reactivity or regulation have the advantage of capturing responses across a range of times and situations, yet physiological assessments can readily capture responses in specific circumstances, such as conditions of peer-evaluative stress or challenge. In the present study, SCLR was assessed in the context of a lab-based simulation of a normative peer-evaluative stress experience.

In the current investigation, low SCLR is conceptualized as an indicator of physiological under-arousal or under-responsiveness in the context of peer-evaluative stress. Similarly, low SCLR has been conceptualized as a marker of fearlessness or sensation-seeking (Dindo & Fowles, 2011; Raine, 1993; 2002) and under-activation of the Behavioral Inhibition System, a neurophysiological motivational system that promotes inhibition in stressful situations (Beauchaine, 2001; Gray, 1987). Consistent with these conceptual models, low skin conductance activity has been linked with higher aggressive and antisocial behaviors (for reviews, see Murray-Close, 2013 and Raine, 2002).

More specific to the present study, in the context of peer evaluation, in which youths typically seek to gain peer approval, lower SCLR may reflect lower levels of anxiety or concern about making a positive impression on others. Youths who exhibit physiological under-responsiveness in peer evaluation situations may be less aware of social cues or less motivated to engage in socially appropriate behaviors that would facilitate gaining peer approval. Indeed, other measures of physiological under-responsiveness to peer stress (e.g., lower vagal withdrawal) have been linked with less socially competent behavior (Erath & Tu, 2013). In contrast, consistent with evidence that higher SCLR reflects cognitive effort or engagement (e.g., Sheppes, Catran, & Meiran, 2009), higher SCLR in the context of peer evaluation may indicate greater levels of awareness and engagement with the challenge of making a positive impression on peers. Although we anticipated modest positive associations between higher SCLR and indices of friendship adjustment, the focus of the present study was whether the effects of parental directing on friendships adjustment depend on SCLR to peer evaluation.

The Present Study

The primary aim of the present study was to examine whether SCLR to peer stress moderated the association between parental directing of friendships and friendship adjustment in early adolescence. We hypothesized that parental directing at Time 1 (T1) would predict improved friendship adjustment at Time 2 (T2) among adolescents with lower SCLR but not among adolescents with higher SCLR, controlling for friendship adjustment and general parental involvement at T1. Adolescents who experience low physiological arousal in response to peer-evaluative stress may have heightened risk for less positive or

more negative behavior in peer evaluation situations, and therefore benefit from more external signals or external control of their peer interactions. Thus, parental control in the form of directing adolescents toward more prosocial friends may promote friendship adjustment among adolescents with lower SCLR. In contrast, parental directing was not expected to predict friendship adjustment among adolescents who exhibited higher SCLR to peer-evaluative stress, as the sensitivity to social cues and consequences potentially reflected in higher SCLR would likely reduce the need for imposition of parental control over friendships. We expected similar effects on friendship quality and positive peer affiliations as both of these measures represent positive aspects of friendships (e.g., Barry, & Wentzel, 2006; Dishion, Andrews, & Crosby, 1995).

Method

Participants

At T1 (before the middle school transition) participants included 123 fifth and sixth grade students (50% boys; M age = 12.03 years, SD = .64) and one parent (82% biological mothers, 67% married) per young adolescent. The sample included 58.5% European American, 35% African American, and 6.5% other races/ethnicities, consistent with demographics of the communities and schools from which participants were recruited. The average family household income was between \$35,001 and \$50,000; 21% of families reported an income of less than \$20,000; and 24% of families reported an income greater than \$75,000. At T2 (after the middle school transition), participants included 99 young adolescents (M age = 12.78, SD = .63) and one parent (81% biological mothers) per adolescent. Individual t -tests revealed that there were no significant differences between participants with and without T2 data.

Procedures

The present study is based on a larger longitudinal investigation of physiological and coping responses across the transition to middle school and only pertinent procedures are discussed. The short-term longitudinal design involved two waves of data collection spaced approximately 10 months apart. Participants were recruited across two cohorts (approximately 60 participants per cohort), separated by one year, via flyers sent home with fifth and sixth grade students at five elementary schools in the southeastern United States. At T1, parents who responded to the school flyers were given information about the study and were scheduled for a research visit over the phone during the spring. Adolescents and their parents visited the research laboratory during the summer before adolescents transitioned to middle school; consent to participate was obtained and adolescents and parents were compensated monetarily. Adolescents participated in lab activities while their physiological activity was recorded and then completed questionnaires about their friendship adjustment. Parents completed questionnaires about parenting behaviors.

The laboratory protocol, which was developed for the larger investigation from which this study is based, included an activity designed to simulate peer evaluation. Following five-minute acclimation and three-minute baseline (i.e., pre-task) periods, adolescent participants were asked to act as if an adult research assistant (RA; same-sex) was someone about their

age and to lead a three-minute conversation to get to know the RA. To lead the conversation, participants were told that they could tell about themselves, ask questions about the RA, or talk about anything they wanted. They were told that the conversation would be viewed via one-way Skype (an internet-based video-chat program) by three same-age, same-sex peer judges, who were actually fictitious. Participants were told that the peer judges would decide how well they performed in the conversation activity compared to two other participants the peer judges had watched on video. The *peer evaluation* period refers to the three-minute conversation activity. Following the completion of laboratory activities, participants were carefully debriefed using a procedure informed by Underwood (2005) and Hubbard (2005). Participants were led to their own conclusion that the peer judges were not real, and the rationale for deception and purpose of the study were discussed with participants. Physiological data from the pre-task/baseline and peer evaluation periods were used in the present study. Support for the simulated peer stress protocol as a moderately stressful task has been established, and several published studies have linked cognitive, behavioral, and physiological responses during the peer-evaluative stress protocol with social, academic, or psychological adjustment (Erath, Bub, & Tu, in press; Erath & Tu, 2013; Erath, Tu, & El-Sheikh, 2012).

At T2, participants were re-contacted during the spring for a follow-up visit during adolescents' first year in middle school. Adolescents and their parents visited the research laboratory in the spring and completed questionnaires and were compensated using the same procedures as T1. All study procedures were approved by the University Institutional Review Board and consent and assent were obtained.

Measures

Predictor Variables at T1

Control variables: Some socio-demographic variables were associated with primary study variables and were controlled in analyses. Child sex (coded 0 = male, 1 = female), age at T1 (in years), and ethnicity (coded 0 = European American, 1 = minority) were collected via parent report. Annual household income at T1 ($M = 4.13$, $SD = 1.55$) was reported by the parent on a 6-point scale (1 = *less than \$10,000* to 6 = *more than \$75,000*). Additionally, parent-reported involvement (from the Alabama Parenting Questionnaire; Shelton, Frick, & Wootton, 1996) was controlled in analyses to more clearly determine the effects of peer-specific parental involvement (i.e., parental directing of friendships), as opposed to more general parental involvement. Ten items (e.g., "You volunteer to help with special activities your child is involved in"; "You ask your child about his/her day in school") were rated on a 5-point scale (1 = *never* to 5 = *always*). Internal consistency was good ($\alpha = .78$). On average, parents reported relatively high levels of involvement ($M = 4.04$, $SD = .46$).

Parental directing of friendships: Parent-reported parental directing was assessed using 10 items adapted from the Mediating subscale of Mounts' (2002, 2007) Parental Management of Peers Inventory (PMPI), which included items about parental guiding and prohibiting of friendships. Items assess the extent to which parents promote or prohibit friendships based on their preferences about peers' characteristics (e.g., "I let my child know who he/she should be friends with" or "I tell my child if I don't want him/her to hang around

with certain friends”). The Mediating subscale of the PMPI has been linked with other peer-related parenting constructs in expected directions, such as consulting about peer relationships ($r = .39, p < .001$) and autonomy-granting in peer relationships ($r = -.12, p < .05$; Mounts, 2004). Similar associations among related constructs were also found in another study (e.g., Tilton-Weaver & Galambos, 2003). Items were rated on a 6-point scale (1 = *strongly disagree* to 6 = *strongly agree*). Internal consistency in this study was high ($\alpha = .85$).

SCLR: Data acquisition for skin conductance level (SCL) followed standard procedures (MindWare Technologies, Inc.). SCL was measured continuously throughout the lab protocol through two disposable Ag-AgCl electrodes (1 ½" × 1" foam, 0% chloride gel) placed on the palms of the non-dominant hand. To minimize physiological data acquisition artifacts, participants were seated throughout the protocol, electrode sites were prepared and cleaned, and cloth tape was used to loop and secure excess electrode leads to reduce movement artifacts. SCL scores (units = microsiemens or μS) were quantified with MindWare EDA analysis software (MindWare Technologies, Inc.). Peer-evaluative stress levels of physiological parameters were not collected for three participants because they chose not to participate in the peer stress procedures or their uncomfortable appearance led us to forego the peer-evaluative stress period. On average, young adolescents exhibited an increase in SCL from the pre-task period ($M = 6.23, SD = 4.07$) to the peer-evaluative stress period ($M = 10.50, SD = 4.98; t = -15.55, p < .001$). Approximately 97% of participants exhibited some increase in SCL from the pre-task period to the peer-evaluative stress period, consistent with the stress-inducing nature of the protocol.

SCLR was computed as the residualized change score from the pre-task period to the peer evaluation period, such that higher SCLR scores reflect greater increases in SCL from the pre-task period to the peer-evaluative stress period. The residualized change score is the residual of the regression of SCL-evaluation on pre-task SCL (Burt & Obradovi, 2013). SCLR data were not included for 12 participants due to measurement artifacts; these participants were more likely to be ethnic minorities ($\chi^2 = 10.45, p < .01$), but did not differ from participants with SCLR data on any of the primary study variables.

Outcome Variables at T1 and T2

Friendship quality: Adolescents completed eight items adapted from the widely used and well-validated Friendship Quality Questionnaire (e.g., “My friends care about me;” “I can count on my friends when I need them;” “My friends and I argue a lot”-reverse-scored; Parker & Asher, 1993); items were rated on a 5-point scale (1 = *not at all true* to 5 = *very true*). These items were adapted to focus on friends more generally as opposed to a specific friend. This measure was internally consistent at T1 ($\alpha = .79$) and T2 ($\alpha = .81$).

Positive peer affiliation: Young adolescents’ positive peer affiliations were assessed using items adapted from reliable measures of friends’ characteristics (Dishion, Patterson, Stoolmiller, & Skinner, 1991; Laird, Criss, Pettit, Dodge, & Bates, 2008). Adolescents rated seven items about their friends (e.g., “Do your friends...” “Get along with teacher/parents?”, “Have lots of friends at school?”, or “Make good grades?”) on a 5-point scale (1 = *never do*

this to 5 = *very often*). In prior studies, similar measures of friends' positive characteristics (and low deviant characteristics) were associated with higher social acceptance (Dishion et al., 1991) and lower delinquency (Laird et al., 2008) among youths. In the present study, reliability of this measure was adequate at T1 ($\alpha = .79$) and T2 ($\alpha = .73$).

Plan of Analysis—Preliminary analyses examining descriptive statistics and correlations (Table 1) among all study variables were conducted. Variables were checked for outliers, skewed distributions, and other non-standard conditions. Regression analyses (Table 2) were then conducted in Amos (Arbuckle, 2012), which uses full information maximum likelihood (FIML) estimation to handle missing data. Separate models were fitted for each friendship adjustment outcome (friendship quality and positive peer affiliations). All continuous predictor variables were mean-centered for regression analyses. Each model included several steps. In Step 1, adolescent sex, race/ethnicity, age at T1, household income at T1, and parental involvement at T1 were controlled. Additionally, the T1 level of the corresponding T2 friendship adjustment outcome was controlled in each analysis. In Step 2, parental directing and SCLR were added to the model, followed by the interaction between parental directing and SCLR in Step 3.

Simple intercepts and slopes of significant interactions were estimated and plotted to clarify the associations among variables (Aiken & West, 1991). Simple slopes represent the association between the predictor (T1 parental directing) and outcome (T2 friendship adjustment) at lower ($-1\ SD$) and higher ($+1\ SD$) levels of the continuous moderator variable (T1 SCLR). Illustrative plots of significant interactions are presented in Figures 1–2.

Results

Preliminary Analyses

All variables were within the commonly accepted range of skewness (absolute values < 1.09) (e.g., Kline, 2005) and there were no outliers. Means, standard deviations, and correlations among primary study variables are presented in Table 1. Correlations with demographic variables (not depicted in a Table) revealed that girls experienced higher levels of T2 friendship quality than boys ($r = .30, p < .01$). Ethnic minorities had lower household income ($r = -.51, p < .001$) and lower SCLR ($r = -.27, p < .01$) compared to European Americans. Participants from higher income households reported higher T2 friendship quality ($r = .22, p < .05$) and T2 positive peer affiliations ($r = .32, p < .01$). T1 parental involvement was correlated with higher T1 positive peer affiliations ($r = .27, p < .05$).

Stability correlations between friendship adjustment measures at T1 and T2 were in the expected direction and high in magnitude ($r = .54, p < .001$ for friendship quality; $r = .57, p < .001$ for positive peer affiliations; Table 1). As shown in Table 1, friendship quality and positive peer affiliations (across T1 and T2) were positively correlated with each other. Bivariate associations linking parental directing and SCLR with indices of friendship adjustment did not emerge.

Predicting Change in Friendship Quality

After controlling for demographic variables, parental involvement, and friendship quality at T1, parental directing marginally predicted higher levels of T2 friendship quality. SCLR did not predict T2 friendship quality (Table 2). As hypothesized, SCLR moderated the association between parental directing and T2 friendship quality. This moderation effect accounted for 2.5% of unique variance in friendship quality; the full model accounted for 45.2% of the variance. Simple slopes analyses revealed that parental directing predicted higher levels of friendship quality from T1 to T2 among adolescents with lower SCLR ($B = .24$, $SE = .06$, $\beta = .28$, $p < .001$), but not among adolescents with higher SCLR ($B = -.01$, $SE = .06$, $\beta = -.02$, $p = .84$; Figure 1). As shown in Figure 1, adolescents with higher SCLR had similar levels of T2 friendship quality at lower and higher levels of parental directing. However, adolescents with lower SCLR had relatively lower levels of T2 friendship quality at lower levels of parental directing, but relatively higher levels of T2 friendship quality at higher levels of parental directing. These results suggest that parental directing facilitated better friendship quality among adolescents with lower but not higher levels of SCLR.

Predicting Change in Positive Peer Affiliations¹

Parental directing and SCLR did not independently predict T2 positive peer affiliations (Table 2). However, as hypothesized, SCLR moderated the association between directing and T2 positive peer affiliation, controlling for demographic variables, parental involvement, and positive peer affiliations at T1. This moderation effect explained 7.3% of unique variance in adolescents' positive peer affiliations, and the full model explained 54.9% of the variance. Similar to results for friendship quality, simple slopes analyses revealed that parental directing predicted higher levels of positive peer affiliations among adolescents with lower SCLR ($B = .21$, $SE = .06$, $\beta = .26$, $p < .001$), but not among adolescents with higher SCLR ($B = -.07$, $SE = .06$, $\beta = -.09$, $p = .26$; Figure 2). As shown in Figure 2, adolescents with higher SCLR reported similar levels of T2 positive peer affiliation at lower and higher levels of parental directing. However, adolescents with lower SCLR reported relatively lower levels of T2 positive peer affiliation at lower levels of parental directing and relatively higher levels of T2 positive peer affiliation at higher levels of parental directing. These results suggest that parental directing facilitated friendships with positive peers among adolescents with lower but not higher levels of SCLR.

Discussion

The present study investigated whether young adolescents' SCLR to peer evaluation moderated the association between parental directing of friendships and change in indices of

¹Young adolescents reports on positive peer affiliation were not collected at T1 for Cohort 1 participants ($n = 63$). Young adolescents without T1 positive peer affiliation scores had slightly higher SCLR ($t = 2.87$, $p < .01$), T2 friendship quality ($t = 2.58$, $p < .05$) and T2 positive peer affiliation ($t = 2.59$, $p < .05$), compared to adolescents with T1 positive peer affiliation scores. No other differences emerged. Additional analyses were conducted with only Cohort 2 participants who had positive peer affiliation scores at T1 and T2 ($n = 60$). Results for Cohort 2 revealed a very similar pattern of effects as those for the entire sample. Specifically, SCLR moderated the association between directing and positive peer affiliations ($B = -.11$, $SE = .03$, $\beta = -.34$, $p < .001$). Simple slopes analyses revealed that directing predicted higher T2 positive peer affiliations among young adolescents who exhibited lower levels of SCLR ($B = .30$, $SE = .09$, $\beta = .29$, $p < .001$), but not among adolescents who exhibited higher levels of SCLR ($B = -.06$, $SE = .09$, $\beta = -.07$, $p = .53$). Given the similar results of analyses with the full sample and only Cohort 2 participants, results with the full sample are presented in the Results and Table.

friendship adjustment. Hypotheses were tested with a multi-method, multi-informant longitudinal study design that examined friendship adjustment before and after the transition to middle school. As anticipated, SCLR moderated the association between parental directing and change in friendship adjustment, such that parental directing predicted higher friendship quality and higher positive peer affiliations among adolescents with lower SCLR but not among adolescents higher SCLR.

Lower SCLR to peer evaluation may reflect insufficient internal cues that promote engagement in social situations (i.e., insensitivity to social cues) and signal social risk (i.e., insensitivity to negative social consequences) as well as low anxiety or concern about making a positive impression on peers. In the absence of parental directing toward more prosocial peers and away from deviant peers, adolescents with less social sensitivity or less concern about making positive social impressions may be less likely to develop high-quality friendships with peers who are involved in positive activities and exhibit positive behaviors (e.g., get along with parents and teachers, perform well in school). However, in the context of more parental directing of friendships, adolescents with lower SCLR developed better friendship quality and more positive peer affiliations across the transition to middle school.

In related research on low autonomic arousal, low resting heart rate (RHR) predicted concurrent affiliation with adolescents who bully others (Sijtsema et al., 2013) and directly and indirectly (via sensation-seeking) predicted increased antisocial behaviors over time (Sijtsema et al., 2010; 2013). Furthermore, low RHR predicted later antisocial behaviors among boys with greater affiliations with bullies, but not among boys with fewer affiliations with bullies (Sijtsema et al., 2013). Thus, it is possible that parents who steer youths with low autonomic arousal (e.g., low RHR, low SCLR) away from deviant peers may not only promote more positive peer affiliations and better friendship quality (as found in the present study), but also reduce the likelihood of later antisocial behaviors (as found in Sijtsema et al., 2013).

Parental directing did not predict change in friendship adjustment among adolescents with higher SCLR to peer evaluation; specifically, youths with higher SCLR to peer evaluation had similar levels of friendship quality and positive peer affiliations across low and high levels of parental directing. Higher SCLR may reflect greater sensitivity to social cues and concern about gaining peer approval, prompting more prosocial responses in challenging peer situations. Alternatively, higher SCLR may reflect higher anxiety (Beauchaine, 2001), and more anxious adolescents are unlikely to engage in high-risk behavior or negative peer interactions (Fergusson & Horwood, 1999; Rubin & Burgess, 2001) even without parental intervention. Whether higher SCLR reflects engagement with or elevated anxiety about peer evaluation, parental directing of friendships may be less necessary (and less effective) among adolescents who exhibit higher SCLR.

Main effects of parental directing did not emerge due to a combination of positive and null associations between parental directing and friendship adjustment among adolescents with lower and higher SCLR, respectively. In addition to the divergent effects of parenting directing dependent upon characteristics of adolescents, the manner or style with which parenting behaviors are enacted may influence the effects of parenting behaviors (Darling &

Steinberg, 1993; Mize & Pettit, 1997). Indeed, Soenens and colleagues (2009) found that autonomy-supporting styles of prohibiting certain friendships may serve a protective function. In contrast, psychologically-controlling styles of prohibiting certain friendships predicted more deviant peer affiliation and delinquency (Soenens et al., 2009). Similarly, Mounts (2002) found that parental guiding and prohibiting friendships predicted higher levels of concurrent deviant behavior (e.g., drug use) when parents reported relatively uninvolved parenting styles compared to authoritative or authoritarian parenting styles. Thus, whether parents can effectively direct young adolescents toward certain friends and away from other friends may depend on both the style of parenting and characteristics of the adolescent.

Direct associations between SCLR and friendship adjustment also did not emerge. Physiological responses may be unlikely to strongly and directly predict friendship adjustment because physiological responses are not observed or experienced by peers. The actual social behaviors observed by peers may be influenced by a variety of other factors (e.g., coping strategies) that interact with physiological responses to predict friendship adjustment (Erath & Tu, 2013). It is also possible that optimal responses to peer stress involve moderate levels of SCLR, yet this may not have been detectable in the present study because the peer stress task was designed to simulate a normative peer-evaluative stress experience. Indeed, no effects emerged in exploratory analyses examining non-linear associations between SCLR and indices of friendship adjustment; thus, high levels of SCLR that reflect problematic levels of anxiety or over-arousal may not have been elicited. Future studies should assess SCLR to other tasks (e.g., cognitive, performance, fear-eliciting tasks) to determine whether non-linear associations with adolescent adjustment may exist in other stress contexts.

In summary, results of the present study revealed that parental directing of friendships predicted better friendship quality and more positive peer affiliations when parental directing was compatible with young adolescents' "need" for parental control, as suggested by their physiological responses to peer evaluation (i.e., lower SCLR). Results are generally consistent with research on interactions between other forms of parental control and child behavioral or temperamental characteristics. For example, other studies have shown that more controlling parenting behaviors were associated with reduced problem behaviors among youths who exhibited temperamental disinhibition (Stice & Gonzales, 1998) or impulsivity (Bates et al., 1998), low self-control (Kuhn & Laird, 2013), and greater delinquency (Tilton-Weaver et al., 2013). Results of the present study also provide further evidence that parents can influence peer relationships in early adolescence, despite adolescents' desire for autonomy and declining beliefs in the legitimacy of parental authority over their peer relationships (Kuhn & Laird, 2011).

Future studies can extend this research in several ways. First, as noted, including measures of parenting style or parent-child relationship quality may provide greater understanding about the associations between parenting behaviors and friendship adjustment, as it is likely that youths may be more responsive to parental involvement in their peer relationships if the style of parents' involvement is warm and autonomy-supportive rather than coercive or hostile (Mounts, 2002; Soenens et al., 2009) or if adolescents have a high-quality

relationship with their parents. Another way to extend the present study is to examine other peer-related parenting behaviors as predictors of friendship adjustment, such as problem-solving about peer problems given that young adolescents encounter a variety of peer challenges. Additionally, including adolescent reports may capture their perceptions about parental involvement in their peer relationships. Discrepancies in parent and adolescent reports of parenting behaviors have been found, and the predictive effects on adolescent adjustment may differ by informant (e.g., Gaylord, Kitzmann, & Coleman, 2003; Mounts, 2007). Examination of other friendship or peer adjustment indices may also be important to the extent that the encouragement of prosocial friendships may in turn promote youths' social skills and competence with peers more generally. Consideration of friends' reports on friendship and peer adjustment, in addition to adolescent reports, would also strengthen future studies.

Given the community sample of the present study, results may not generalize to higher-risk populations. On average, young adolescents in our sample were relatively well-adjusted in the friendship domain. Future studies should consider how parental involvement in peer relationships and youth responses to peer stress may independently and interactively predict adjustment among higher-risk youths, such as those who experience more severe or chronic peer problems. Such studies would inform efforts to promote peer adjustment among youths at greatest risk for maladjustment. In addition, given the examination of interaction effects, the sample size is a potential limitation of the present study.

Despite the limitations noted above, the present study provides a domain-specific and conservative test of the associations among parental directing of friendships, young adolescents' physiological responses to peer stress, and friendship adjustment across the transition to middle school. This study provides new evidence about the fit between parenting and adolescent characteristics, as parental directing promoted friendship adjustment only among adolescents who exhibited lower SCLR to peer evaluation. The results from this study extend the existing literature on parental directing by suggesting the need to consider the compatibility between parental directing and adolescents' "need" for parental involvement.

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Figure 1.
T1 parental directing predicting T2 friendship quality at lower and higher levels of SCLR.

Figure 2.
T1 parental directing predicting T2 positive peer affiliation at lower and higher levels of SCLR.

Table 1

Descriptive Statistics and Correlations among Primary Study Variables

	1	2	3	4	5	6
1. T1 Parental Directing	-					
2. T1 SCLR	.12	-				
3. T1 Friendship quality	-.06	.01	-			
4. T1 Positive peer affiliation	.08	-.01	.41**	-		
5. T2 Friendship quality	.08	.02	.54***	.43**	-	
6. T2 Positive peer affiliation	.09	.01	.30**	.57***	.51***	-
Mean (SD)	3.86 (.83)	.00 (3.09)	4.07 (.74)	4.26 (.59)	4.08 (.69)	4.06 (.63)

Note. T1 = data collected at Time 1; T2 = data collected at Time 2; SCLR = skin conductance level reactivity.

+ $p < .10$.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 2

Unstandardized and Standardized Regression Results of T1 Parental Directing, SCLR, and Directing x SCLR Predicting T2 Friendship Adjustment

T1 Predictors	T2 Friendship quality		T2 Positive peer affiliation	
	<i>B</i> (<i>SE</i>)	β	<i>B</i> (<i>SE</i>)	β
Step 1: Controls				
Sex (1 = female)	.38 (.11) ***	.28 ***	.12 (.11)	.10
Age	.25 (.08) **	.24 **	.11 (.08)	.11
Race (1 = minority)	.07 (.11)	.05	.07 (.11)	.05
Income	.08 (.04) *	.18 *	.12 (.03) ***	.29 ***
T1 Parental involvement	.13 (.12)	.08	-.24 (.12) *	-.17 *
T1 Friendship adjustment	.43 (.07) ***	.46 ***	.63 (.11) ***	.57 ***
Step 2				
T1 Parental directing	.12 (.06) +	.14 +	.07 (.06)	.09
T1 SCLR	.01 (.02)	.04	-.00 (.01)	-.01
Step 3				
Parental directing x SCLR	-.06(.03) **	-.21 **	-.08 (.02) **	-.26 **

Note. T1 = data collected at Time 1; T2 = data collected at Time 2; SCLR = skin conductance level reactivity.

+ $p < .10$.

* $p < .05$.

** $p < .01$.

*** $p < .001$.