Childhood Physical and Sexual Abuse and Social Network Patterns on Social Media: Associations With Alcohol Use and Problems Among Young Adult Women

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ABSTRACT. Objective: The aim of the present study was to examine the links between severities of child abuse (physical vs. sexual), and alcohol use versus problems via social media (Facebook) peer connection structures. Method: A total of 318 undergraduate female students at a public university in the United States reported severity of child abuse experiences and current alcohol use and problems. Social network data were obtained directly from the individuals' Facebook network. Results: Severity of childhood physical abuse was positively linked to alcohol

use and problems via eigenvector centrality, whereas severity of child-hood sexual abuse was negatively linked to alcohol use and problems via clustering coefficient. **Conclusions:** Childhood physical and sexual abuse were linked positively and negatively, respectively, to online social network patterns associated with alcohol use and problems. The study suggests the potential utility of these online network patterns as risk indices and ultimately using social media as a platform for targeted preventive interventions. (*J. Stud. Alcohol Drugs*, 76, 845–851, 2015)

URING YOUNG ADULTHOOD, one's social ecology Created by specific peer group structures and dynamics exerts significant risk for alcohol use (Dumas et al., 2014). Peer social ecology is also interdependent with child abuse, another key predictor of young adult substance use. Early adversity leads to a progression of substance use in young adulthood via its link with individual interpersonal vulnerabilities, such as affiliations with deviant individuals within the peer social networks (Egeland et al., 2002). Young adult victims of child abuse may become part of deviant social ecologies and be more susceptible to alcohol use via peer influence. Recently, social media platforms have become influential social spaces that have transformed young peoples' formation and enactment of their relationships with peers. Therefore, online social structures may serve as mechanisms that link early adversity with substance use.

Child maltreatment consists of multiple types of abuse and includes acts of commission (physical and sexual abuse) and omission (emotional and physical neglect). As a strong psychosocial pathogen, child abuse often leads to the development of a weaker self-concept and susceptibility to peer influence among victims (Kim & Cicchetti, 2010). Research supports differential adverse impacts of child physical and sexual abuse on victims, including behavioral and relational outcomes (Cicchetti et al., 2011; Trickett et al., 2011). The impact of physical abuse on social development may potentiate individual and interpersonal vulnerabilities that generate proclivities to affiliate and socialize with deviant peers (Egeland et al., 2002; Trickett & Negriff, 2011). Physical abuse victims are often psychologically less self-assured, form insecure relationships, and are susceptible to social influences on alcohol use (Allen et al., 2012). Physical abuse is associated with problematic peer relations, potentiating peer influence to engagement in antisocial behavior during adolescence through these negative peer networks (Salzinger et al., 2007). In turn, individuals embedded in deviant and influential social environments are at a greater risk for alcohol use (Dishion & Owen, 2002). Social contagion and peerclustering theories propose that adolescents' and young adults' substance use are linked to risky peer networks through friends' influences and bidirectional selection processes (Berkman et al., 2000).

The path from sexual abuse to alcohol use disorders is more complex. Sexually abused young adults report feelings of anxiety and shame in relation to their peer relationships, less satisfaction with same-sex friends, and lower perceptions of peer acceptance and close friendships (Feiring et al., 2000). In a social context, sexually abused young adults

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might engage in alcohol use as a means to self-medicate against painful memories of their traumatic relational histories. Pertinently, tension-reduction theories of substance use (Cooper et al., 1995; Ham & Hope, 2005) have suggested that coping with negative affect (e.g., anxiety symptoms) is one mechanism to understand alcohol use and misuse. However, this path may differ by context (Hussong & Hicks, 2003). Among college students, sexually abused young adults may withdraw from close social circles, lessening their susceptibility to experience social anxiety or peer influence to use alcohol. Empirical research is needed to explore the differential effects of both physical and sexual abuse on social network patterns and to examine the potential role of this research in alcohol use.

A social network is a latent relationship structure created by interconnected social individuals (i.e., "actors"; Wasserman & Faust, 1999). On Facebook, users form their social networks by "friending" others, participating in the enormous network of Facebook users. Within this massive network, each user has his or her own personal network, or egocentric network (hereafter: ego-network), created by that user, its alters (hereafter: Facebook friends), and the Facebook friendship connections among them. These patterns of relationships constitute the structure of one's immediate social network on Facebook (i.e., participant's ego-network). Offline, social network analysis has been extensively used to delineate patterns of connections or social relationship and alcohol use problems among adolescents and young adults (Burk et al., 2012; Ennett et al., 2008a). In addition, there is a burgeoning interest in understanding influences of social media on alcohol misuse (Westgate et al., 2014). In the present study, two indices of social network structures are examined in relation to previous childhood adversity and current alcohol use problems. Clustering coefficient (CC) is an indicator of a social network structure that measures the extent to which an individual's alters are tightly interconnected. Users with low CC exhibit a sparse network where their Facebook friends are loosely interconnected and vice versa. Eigenvector centrality (EC) is indicative of the ego's association with highly connected individuals in the network, reflecting the extent to which the ego is relatively central in his or her network. The role of these two social network patterns on Facebook in relation to childhood adversity among college students is empirically unknown. We hypothesized that individuals who retrospectively report adverse familial experiences may form distinct patterns of social ties on Facebook that would be conducive to or protective of social participation in risk behaviors such as alcohol use problems in college.

The aim of the current study was to examine the interrelationships among child abuse (physical and sexual abuse), social network structure, alcohol use, and alcohol misuse. We expected elevations of alcohol use and problems when individuals are embedded in a social network that is more interconnected (i.e., higher CC) or with greater proximity to other relatively central individuals (i.e., higher EC). In addition, physical abuse has been shown to result in compromised self-concepts among the victims, increasing their susceptibility to social influence by dominant peers (Allen et al., 2012; Trickett & Negriff, 2011). Thus, we predicted that individuals with a higher severity of physical abuse experiences would form social networks with more central Facebook friends, indicating that a few friends dominate one's ego-network. In contrast, although individuals with higher severity sexual abuse experiences may be at greater risk based on coping motives, they may also be more withdrawn, which may protect them from social drinking in college, thus limiting directional hypotheses. We hypothesized that EC and CC would independently and indirectly link severity of both child physical and sexual abuse to alcohol use and problems.

Method

Participants and procedures

Participants were 318 female undergraduates ($M_{\rm age}$ = 20.96 years, SD = 3.39; 77% White) in an American public university; men were not included because too few were available in the recruitment cohort for sufficient representation. The only eligibility criterion was having an active Facebook account. The Institutional Review Board approved all procedures. Participants provided consent online and completed the assessment using a computer in a designated laboratory. Network data were extracted using NodeXL's Facebook personal network importer (The Social Media Research Foundation, 2010).

Measures

Childhood abuse. The Childhood Trauma Questionnaire (Bernstein & Fink, 1998) was used to assess abuse history. The Childhood Trauma Questionnaire assesses child physical and sexual abuse with five items per abuse type (α 's = .54 and .91, respectively). Total scores represent severity and frequency of child physical and sexual abuse. Given the low internal reliability of the physical abuse scale, confirmatory factor analysis was used to evaluate its validity and supported a stable unidimensional factor solution: $\chi^2(4) = 9.53$; p = .053, standardized root mean residual = .022; comparative fit index = .98; root mean square error of approximation = .06; close fit test p = .38.

Alcohol use and problems. The sum of the 10-item self-report Alcohol Use Disorders Identification Test (Babor et al., 2001) was used to assess the severity of recent alcohol use and problems. Alcohol use ($\alpha = .81$) and problems ($\alpha = .77$) subscales were modeled separately (Reinert & Allen, 2007).

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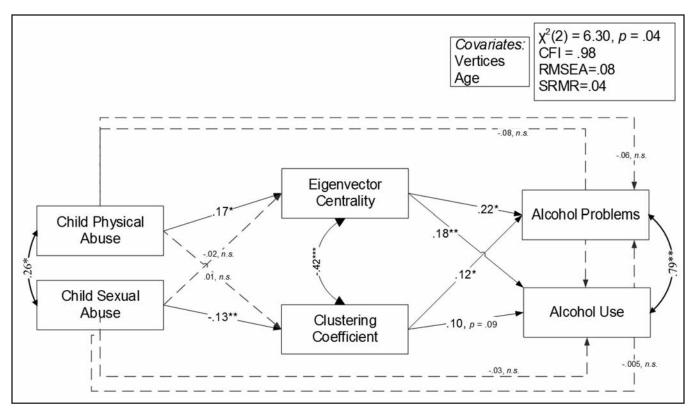


FIGURE 1. The influence of physical and sexual abuse severity on alcohol use and problems via social network indices. Social network indices are eigenvector centrality and clustering coefficient. Standardized parameter estimates shown. The number of Facebook friends is controlled for in this model. CFI = comparative fit index; RMSEA = root mean square error of approximation; SRMR = standardized root mean residual; n.s. = not significant. *p < .05; **p < .01.

Network analysis matrices. CC measures the density and network tightness (i.e., interconnectedness) of an individual's egocentric network, formed by one's Facebook friends and the ties among them. The CC is a ratio between the number of actual connections and the highest possible number of connections between a participant's Facebook friends. EC measures one's relative importance within a network, based on its proximity to other highly interconnected Facebook friends. Following its algorithm, a score is assigned to each node based on its relative connectivity in the network, which is then used to calculate the EC of the ego's direct and indirect neighbors. The EC value of each ego was used as a measurement of the relative importance of the ego in his or her own network. A low value suggests that a participant is the primary connected user, whereas a high value suggests other highly connected individuals in one's ego-network (Borgatti, 2005; Wasserman & Faust, 1999).

Analytic plan

Structural equation modeling analyses were performed using Mplus Version 7.12 (Muthén & Muthén, 2008–2013). All analyses were conducted using the maximum likelihood estimator with robust standard errors. Indirect effects were tested via bootstrapping with 5,000 replicates of the

indirect effects' product coefficients (MacKinnon, 2008). All structural equation modeling analyses were evaluated by the recommended model fit cutoffs that indicate excellent to moderate model fit (Hu & Bentler, 1999; MacCallum et al., 1996). Age and vertices (i.e., number of Facebook friendships) were used as covariates in all analyses to adjust for individual differences in age and network size.

Results

Child abuse, social network patterns, and alcohol use

Endorsement of physical abuse was moderately high (43.4%), and endorsement of sexual abuse was relatively low (8.8%). However, the prevalence of physical abuse reflects any positive endorsement for one or more items, a low severity nonclinical definition. Alcohol use (M = 3.82, SD = 2.94) and problems (M = 2.98, SD = 3.42) were similar to other college samples (DeMartini & Carey, 2012). Figure 1 shows the comprehensive model addressing all of the hypotheses. Physical and sexual abuse were modeled as separate predictors of the two social network indices. The model fit the data adequately. Higher severity of child physical abuse was associated with a larger EC and was not significantly associated with CC. In contrast, a higher severity of sexual abuse

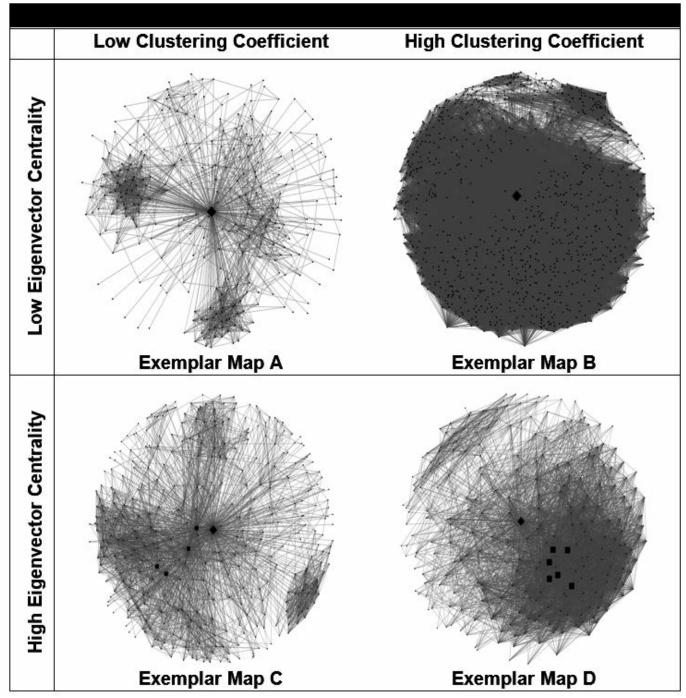


FIGURE 2. Visual representations of individual Facebook social networks. Maps A through D illustrate social networks of four Facebook participants. Each participant is indicated by the diamond-shaped dot in the center of each graph. Map A illustrates a network with low clustering coefficient (CC), indicating that the participant's friends (represented by black dots/circles) are loosely connected to one another. Map A also illustrates a network with low eigenvector centrality (EC), indicating that, relative to others, the participant emerges as the sole highly connected user. Map B displays a high CC, indicating a much more interconnected ego-network (i.e., clustered), but low in EC; all friends are relatively evenly connected, and therefore no highly connected key users appear. Map C displays a loosely connected network (low CC), but friends can connect to others through a few highly connected Facebook friends (high EC; solid squares represent these key friends). Map D is an exemplar of an ego-network where both EC and CC are relatively high. Friends are rather highly interconnected (high CC), and the elevated EC indicates a prevalence increase of a few interconnected friends (central users) in the ego-network. Both indicators show that Map D's participant is redundant in his or her network for maintaining connectivity.

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was found to be associated with a lower CC and was not significantly associated with EC. To illustrate the differences among the social network analysis matrices, Figure 2 shows visual representations of four ego networks.

Indirect effects via social network indices

Indirect effect analyses showed support for the hypotheses. Child physical abuse was indirectly and positively associated with alcohol use and problems via EC (use: B = 0.05, SE = 1.73, 95% CI [0.010, 0.120]; problems: B = 0.06, SE = 1.48, 95% CI [0.009, 0.150]). Child sexual abuse was indirectly and negatively associated with alcohol use and alcohol problems via CC (Use: B = -0.03, SE = -1.15, 95% CI [-0.090, -0.002]; problems: B = -0.04, SE = -1.30, 95% CI [-0.111, -0.001]).

Discussion

Using a novel, non–self-report, online social network data collection strategy, this study delineates linkages between severity of child abuse, social network patterns, and alcohol use among a sample of collegiate women. The findings document connections between child physical and sexual abuse, distinct social network patterns on Facebook, and levels of alcohol use and associated problems. Furthermore, the results suggest that child physical and sexual abuse have a differential impact on victims' relational patterns online, as well on their risk for drinking (Feiring et al., 2007; Shin et al., 2009).

Child physical abuse was associated with Facebook social networks characterized by networks with highly connected individuals, and this was indirectly positively associated with both alcohol use and misuse. The indirect effect suggests that these social network patterns are at least partially responsible for the link between physical abuse and drinking behavior. Directionally, this relationship indicated that having highly interconnected friends in one's network reflected greater risk for alcohol misuse. Experiencing physical abuse may contribute to an individual's vulnerability to internalizing any pro-alcohol social norms espoused by dominant peers in their networks, as well as in engaging in alcohol use via peer interactions (Teunissen et al., 2012). In a college context, young adults who form network structures with central friends are vulnerable to the influence of their social environment. This suggests the potential utility of these online patterns as indicators of risk and, ultimately, possibly using social media for targeted interventions.

Young adult women with higher sexual abuse severity were embedded in less-tight Facebook networks, supporting a significant negative indirect effect of sexual abuse on alcohol problems via CC. The significant indirect effect suggests a quantitatively mechanistic relationship between sexual abuse and alcohol problems, albeit in a cross-sectional de-

sign. These results may be explained by the fact that sexually abused girls may be too withdrawn and anxious (Jones et al., 2013) to engage in tightly connected networks. Although information on peer use is unknown using this methodology, in college, this lack of social engagement may reduce opportunities for alcohol misuse, which is effectively normative socially. This illustrates both the potentiating and protective effects that social networks may have on substance use and the link between child abuse and substance use. Although an assumption is often that social isolation is harmful, this can become protective in a network with high rates of unhealthy behavior. Similarly, high connectedness to central peers in a network that often favors alcohol use may have harmful consequences. These may be important nuances in understanding the interrelationships among abuse, social networks, and alcohol misuse.

Consistent with research using social network analysis offline (Haynie, 2001), assuming directionality, these findings may support a positive significant association between network tightness and alcohol problems. The link between higher drinking and tighter social circles may be related to a social topography (Ennett et al., 2008a) in which individuals may feel as a part of a "small town" community, familiar with each other, and feel comfortable drinking together. Specifically, findings support Ennett et al.'s (2008b) documentation that indicators of higher interconnectedness (transitive triads) were associated with smoking behavior. Thus, a highly connected social network within a college context may convey more pro-alcohol social norms that can be internalized and influence drinking behaviors (Read et al., 2003). Furthermore, the prevalence of central peers was associated with alcohol use and associated problems, highlighting that the risk for alcohol use may also emanate from dominant individuals beyond the density of one's social network.

Although the application of an online social network approach in examining the links between child abuse and alcohol use is highly novel, these findings should be considered in the context of a number of limitations. These include (a) cross-sectional data, limiting knowledge about the directionality of the associations and any causal inferences; (b) an exclusively female sample, limiting the generalizability to men; (c) an exclusive focus on social network structures, not content; (d) low internal reliability for the physical abuse subscale (albeit with sufficient evidence for construct validity confirmed by confirmatory factor analysis); and (e) characterization of the Facebook network as a whole, without distinguishing peers from family members or others. This latter issue is mitigated somewhat by evidence of the psychological importance of peer audience in the Facebook environment (Manago et al., 2012) and that young adults use it chiefly for social interaction with friends with whom the students had a pre-established relationship offline (Kalpidou et al., 2011; Pempek et al., 2009). Although these issues will need to be addressed in future applications of this strategy, these data nonetheless reveal the value in using social networks to understand the mechanisms linking child abuse and substance use disorders.

References

- Allen, J. P., Chango, J., Szwedo, D., Schad, M., & Marston, E. (2012). Predictors of susceptibility to peer influence regarding substance use in adolescence. *Child Development*, 83, 337–350. doi:10.1111/j.1467-8624.2011.01682.x.
- Babor, T. F., Higgin-Biddle, J. C., Saunders, J. B., & Monteiro, M. G. (2001). The Alcohol Use Disorders Identification Test: Guidelines for primary care (2nd ed.). Geneva, Switzerland: World Health Organization.
- Berkman, L. F., Glass, T., Brissette, I., & Seeman, T. E. (2000). From social integration to health: Durkheim in the new millennium. *Social Science* & *Medicine*, 51, 843–857. doi:10.1016/S0277-9536(00)00065-4.
- Bernstein, D. P., & Fink, L. (1998). *Childhood Trauma Questionnaire:* A retrospective self-report manual. Antonio, TX: The Psychological Corporation.
- Borgatti, S. P. (2005). Centrality and network flow. *Social Networks*, *27*, 55–71. doi:10.1016/j.socnet.2004.11.008.
- Burk, W. J., van der Vorst, H., Kerr, M., & Stattin, H. (2012). Alcohol use and friendship dynamics: Selection and socialization in early-, middle-, and late-adolescent peer networks. *Journal of Studies on Alcohol and Drugs*, 73, 89–98. doi:10.15288/jsad.2012.73.89.
- Cicchetti, D., Rogosch, F. A., & Oshri, A. (2011). Interactive effects of corticotropin releasing hormone receptor 1, serotonin transporter linked polymorphic region, and child maltreatment on diurnal cortisol regulation and internalizing symptomatology. *Development and Psychopathol*ogy, 23, 1125–1138. doi:10.1017/S0954579411000599.
- Cooper, M. L., Frone, M. R., Russell, M., & Mudar, P. (1995). Drinking to regulate positive and negative emotions: A motivational model of alcohol use. *Journal of Personality and Social Psychology*, 69, 990–1005. doi:10.1037/0022-3514.69.5.990.
- DeMartini, K. S., & Carey, K. B. (2012). Optimizing the use of the AUDIT for alcohol screening in college students. *Psychological Assessment*, 24, 954–963. doi:10.1037/a0028519.
- Dishion, T. J., & Owen, L. D. (2002). A longitudinal analysis of friendships and substance use: Bidirectional influence from adolescence to adulthood. *Developmental Psychology*, 38, 480–491. doi:10.1037/0012-1649.38.4.480.
- Dumas, T. M., Wells, S., Flynn, A., Lange, J. E., & Graham, K. (2014). The influence of status on group drinking by young adults: A survey of natural drinking groups on their way to and from bars. *Alcoholism: Clinical* and Experimental Research, 38, 1100–1107. doi:10.1111/acer.12314.
- Egeland, B., Yates, T., Appleyard, K., & van Dulmen, M. (2002). The long-term consequences of maltreatment in the early years: A developmental pathway model to antisocial behavior. *Children's Services: Social Policy, Research, and Practice, 5*, 249–260. doi:10.1207/S15326918CS0504_2.
- Ennett, S. T., Faris, R., Hipp, J., Foshee, V. A., Bauman, K. E., Hussong, A., & Cai, L. (2008a). Peer smoking, other peer attributes, and adolescent cigarette smoking: A social network analysis. *Prevention Science*, 9, 88–98. doi:10.1007/s11121-008-0087-8.
- Ennett, S. T., Foshee, V. A., Bauman, K. E., Hussong, A., Cai, L., Reyes, H. L. M., . . . DuRant, R. (2008b). The social ecology of adolescent alcohol misuse. *Child Development*, 79, 1777–1791. doi:10.1111/j.1467-8624.2008.01225.x.
- Feiring, C., Miller-Johnson, S., & Cleland, C. M. (2007). Potential pathways from stigmatization and internalizing symptoms to delinquency in sexually abused youth. *Child Maltreatment*, 12, 220–232. doi:10.1177/1077559507301840.
- Feiring, C., Rosenthal, S., & Taska, L. (2000). Stigmatization and the devel-

- opment of friendship and romantic relationships in adolescent victims of sexual abuse. *Child Maltreatment*, *5*, 311–322. doi:10.1177/107755 9500005004003.
- Ham, L. S., & Hope, D. A. (2005). Incorporating social anxiety into a model of college student problematic drinking. *Addictive Behaviors*, 30, 127–150. doi:10.1016/j.addbeh.2004.04.018.
- Haynie, D. L. (2001). Delinquent peers revisited: Does network structure matter? *American Journal of Sociology*, 106, 1013–1057. doi:10.1086/320298.
- Hu, L.-T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. Structural Equation Modeling: A Multidisciplinary Journal, 6, 1–55. doi:10.1080/10705519909540118.
- Hussong, A. M., & Hicks, R. E. (2003). Affect and peer context interactively impact adolescent substance use. *Journal of Abnormal Child Psychology*, 31, 413–426. doi:10.1023/A:1023843618887.
- Jones, D. J., Lewis, T., Litrownik, A., Thompson, R., Proctor, L. J., Isbell, P., . . . Runyan, D. (2013). Linking childhood sexual abuse and early adolescent risk behavior: the intervening role of internalizing and externalizing problems. *Journal of Abnormal Child Psychology*, 41, 139–150. doi:10.1007/s10802-012-9656-1.
- Kalpidou, M., Costin, D., & Morris, J. (2011). The relationship between Facebook and the well-being of undergraduate college students. *Cyber-psychology, Behavior, and Social Networking*, 14, 183–189. doi:10.1089/cyber.2010.0061.
- Kim, J., & Cicchetti, D. (2010). Longitudinal pathways linking child maltreatment, emotion regulation, peer relations, and psychopathology. Journal of Child Psychology and Psychiatry, and Allied Disciplines, 51, 706–716. doi:10.1111/j.1469-7610.2009.02202.x.
- Kim, J., & Cicchetti, D. (2006). Longitudinal trajectories of selfsystem processes and depressive symptoms among maltreated and nonmaltreated children. *Child Development*, 77, 624–639. doi:10.1111/j.1467-8624.2006.00894.x.
- MacCallum, R. C., Browne, M. W., & Sugawara, H. M. (1996). Power analysis and determination of sample size for covariance structure modeling. *Psychological Methods*, 1, 130–149. doi:10.1037/1082-989X.1.2.130.
- MacKinnon, D. P. (2008). Introduction to statistical mediation analysis. New York, NY: Lawrence Erlbaum.
- Manago, A. M., Taylor, T., & Greenfield, P. M. (2012). Me and my 400 friends: The anatomy of college students' Facebook networks, their communication patterns, and well-being. *Developmental Psychology*, 48, 369–380. doi:10.1037/a0026338.
- Muthén, L. K., & Muthén, B. O. (2008–2013). MPlus (Version 7.0) [Computer software]. Los Angeles, CA: Authors.
- Pempek, T. A., Yermolayeva, Y. A., & Calvert, S. L. (2009). College students' social networking experiences on Facebook. *Journal of Applied Developmental Psychology*, 30, 227–238. doi:10.1016/j. appdev.2008.12.010.
- Read, J. P., Wood, M. D., Kahler, C. W., Maddock, J. E., & Palfai, T. P. (2003). Examining the role of drinking motives in college student alcohol use and problems. *Psychology of Addictive Behaviors*, 17, 13–23. doi:10.1037/0893-164X.17.1.13.
- Reinert, D. F., & Allen, J. P. (2007). The Alcohol Use Disorders Identification Test: An update of research findings. Alcoholism: Clinical and Experimental Research, 31, 185–199. doi:10.1111/j.1530-0277.2006.00295.x.
- Salzinger, S., Rosario, M., & Feldman, R. S. (2007). Physical child abuse and adolescent violent delinquency: The mediating and moderating roles of personal relationships. *Child Maltreatment*, 12, 208–219. doi:10.1177/1077559507301839.
- Shin, S. H., Edwards, E., Heeren, T., & Amodeo, M. (2009). Relationship between multiple forms of maltreatment by a parent or guardian and adolescent alcohol use. *American Journal on Addictions*, 18, 226–234. doi:10.1080/10550490902786959.

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- Teunissen, H. A., Spijkerman, R., Prinstein, M. J., Cohen, G. L., Engels, R. C., & Scholte, R. H. (2012). Adolescents' conformity to their peers' pro-alcohol and anti-alcohol norms: The power of popularity. Alcoholism: Clinical and Experimental Research, 36, 1257–1267. doi:10.1111/j.1530-0277.2011.01728.x.
- The Social Media Research Foundation. (2010). NodeXL: A free and open network overview, discovery and exploration add-in for Excel 2007/2010 Version 1.0.1.251 [computer program]. Retrieved from http://nodexl. codeplex.com
- Trickett, P. K., & Negriff, S. (2011). Child maltreatment and social relationships. In I. K. Underwood & L. H. Rosen (Eds), Social development:

- Relationships in infancy, childhood, and adolescence (pp. 403–426). New York, NY: Guilford Press.
- Trickett, P. K., Negriff, S., Ji, J., & Peckins, M. (2011). Child maltreatment and adolescent development. *Journal of Research on Adolescence*, *21*, 3–20. doi:10.1111/j.1532-7795.2010.00711.x.
- Wasserman, S., & Faust, K. (1999). Social network analysis: Methods and applications. Cambridge, England: Cambridge University Press.
- Westgate, E. C., Neighbors, C., Heppner, H., Jahn, S., & Lindgren, K. P. (2014). "I will take a shot for every 'like' I get on this status": Posting alcohol-related Facebook content is linked to drinking outcomes. *Journal of Studies on Alcohol and Drugs, 75,* 390–398. doi:10.15288/jsad.2014.75.390.