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Structural Model of Socioecological Connectedness and Non-Suicidal Self-Injury among Adolescents

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Structural model of socioecological connectedness and non-suicidal self-injury among adolescents

A dissertation submitted in partial satisfaction of the requirements for the degree Doctor of Philosophy

in

Psychological Sciences

by

Ashley C. Baker

Committee in charge:

Professor Jan L. Wallander, Chair
Professor Deborah J. Wiebe
Professor Alexandra Main

2020

The Dissertation of Ashley C. Baker is approved, and it is acceptable
in quality and form for publication on microfilm and electronically:

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Deborah J. Wiebe, Ph.D.

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Alexandra Main, Ph.D.

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Jan L. Wallander, Ph.D., Chair

University of California, Merced

2020

To my wife, Rhiannon, who is ineffably remarkable.

To my grandmother, mother-in-law, and sister-in-law who started this journey with me, but heartbreakingly did not get to see me through it.

This is for you.

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ACKNOWLEGDMENTS

CURRICULUM VITAE

ASHLEY C. BAKER, M.A.

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Research Interests: Youth and family health outcomes; relationships

EDUCATION

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Expected, December 2020	**Ph.D., Psychological Sciences, emphasis in Health Psychology-University of California, Merced** Advisor: Jan L. Wallander, Ph.D. Doctoral Committee: Jan L. Wallander, Ph.D., Deborah J. Wiebe, Ph.D. & Alexandra Main, Ph.D. Dissertation: *Structural model of socio-ecological connectedness and non-suicidal self-injury among adolescents*
2018, May	**M.A., Psychological Sciences, - University of California, Merced** Advisor: Deborah J. Wiebe, Ph.D., MPH Thesis: *Parents and providers facilitate the transfer from pediatric care to adult care in emerging adults with type 1 diabetes*
2011-2014	**General Experimental Psychology-California State University, Northridge (CSUN);** *With Honors; completed 36 units.* Advisor: Jill L. Quilici, Ph.D.
2010, June	**B.S., Psychology-Southern Oregon University (SOU)**

CERTIFICATIONS

2016	"Mastering the Classroom with 1st Generation College Student" Workshop Certificate – Center for Engaged Teaching and Learning (CETL), UC Merced.
2014-Current	Responsible Conduct of Research; Human Research - Collaborative Institute Training Initiative (CITI) program, UC Merced.
2014-Current	Protecting Human Research Participants Certificate – National Institutes of Health.

HONORS AND AWARDS (15+ awards)

GRADUATE

Psychological Sciences Graduate Student Support Award, Psychological Sciences Graduate Group – UC Merced, Spring 2020.

American Public Health Association (APHA) Mental Health Section Lutterman Award (nominated), Spring 2019.

The William R. Shadish Award for Leadership and Service- UC Merced, Spring 2019.

Psychological Sciences Graduate Student Research Award, Psychological Sciences Graduate Group – UC Merced, Summer 2014-2019.

Psychological Sciences Summer Research Award (Adolescent Health Focus)– Psychological Sciences Graduate Group – UC Merced, Summer 2017.

Psychological Sciences Graduate Student Travel Award, Psychological Sciences Graduate Group – UC Merced, Spring 2017.

Research Travel Award, Chancellor's Doctoral Incentive Program (CDIP) – The California State University (CSU), Fall 2016.

Mini-Grant Program, Chancellor's Doctoral Incentive Program (CDIP) – The California State University (CSU), AYs 2015-2017.

Chancellor's Doctoral Incentive Program (CDIP) – The California State University (CSU), AYs 2014-2017.

Psychological Sciences Graduate Student Research Award, Psychological Sciences Graduate Group – UC Merced, Summer 2014-2019.

Roger Moss Teaching Award, CSU Northridge - Department of Psychology, Spring 2014.

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Thesis Support Program Scholarship, CSU Northridge – Graduate Studies, 2013-2014.

Teaching Associate, Teaching Intern Program (TIP), CSU Northridge – Department of Psychology, AYs 2012-2014.

National Institutes of Health – National Institute on Minority Health and Health Disparities, Research Infrastructure for Minority Institutions (NIH-NCMHD-RIMI) Scholar, CSU Northridge – Department of Psychology, AYs 2012-2014.

UNDERGRADUATE

All Academic and All Conference, Cascade Collegiate Conference, SOU, 2008-2010.

Southern Oregon University Dean's List, SOU, 2008-2010; Multiple Semesters

SCHOLARSHIP

Published Manuscripts/Book Chapters (7 total)

Mello, D., Wiebe D.J., **Baker, A.C.,** & Berg, C.A. Family relations and executive function mediate neighborhood disorder risk in adolescents with type 1 diabetes (in press, 2020) *Social Sciences and Medicine.*

Wiebe, D. J., **Baker, A.C.,** & Marino, J.A. (2020). Medical systems and patient provider relationships. In A. Delamater and D. Marrero (Eds.). Behavioral Diabetes. New York, NY: Springer. Doi: 10.1007/978-3-030-33286-0

Baker, A.C., Wiebe, D.J., Kelly, C.S., Munion, A., Butner, J….,Berg, C.A. (2019). Patient-centered communication, self-efficacy, and type 1 diabetes management among emerging adults who have and have not transferred to adult care. *Journal of Behavioral Medicine*, *42,* 831-841. doi: 10.1007/s10865-019-00012-9

Lee, E., Berg, C.A., **Baker, A.C.,** Mello, D., Huntbach, B. A., Litchman, M.A., & Wiebe, D.J. (2018). Risk behaviors and type 1 diabetes outcomes in the transition from adolescence to emerging adulthood, *Children's Health Care, 48*, 285-300. doi: 10.1080/02739615.2018.1531758

Wiebe, D. J., **Baker, A. C.,** Suchy, Y., Stump, T. K., & Berg, C. A. (2018). Individual differences and day-to-day fluctuations in goal planning and type 1 diabetes management. *Health Psychology.* Advance online publication. doi: doi.org/10.1037/hea0000624

Kelly, C.S., Berg, C.A., Ramsey, M.A., **Baker, A.C**., Murray, M., Swinyard, M.,…Wiebe, D.J. (2017). The role of social relationships in health care transition readiness in Emerging Adults with Type 1 diabetes. *Children's Health Care, 47,* 308-325. doi: 10.1080/02739615.2017.1354294

Queen, T.L., Baucom, K., **Baker, A.C**., Mello, D.M., Berg, C.A., & Wiebe, D.J. (2017). Neighborhood disorder predicts HbA1c in late adolescents with type 1 diabetes. *Journal of Social Medicine and Sciences, 183,* 126-129. doi: 10.1016/j.socscimed.2017.04.052

CONFERENCE PRESENTATIONS
National/International Conference Presentations

Baker, A.C. & Wallander, J.L. (November 2019). Associations between social connectedness and non-suicidal self-injury among diverse adolescents. Oral presentation accepted at the *American Public Health Association Annual Meeting*, Philadelphia, PA.

Baker, A.C. Wiebe, D.J., Lee, E., Litchman, M.A., & Berg, C.A. (March 2018). Disordered eating, negative emotions, and type 1 diabetes management during late adolescence. Poster presented at *Society of Behavioral Medicine's Annual Meeting*, San Diego, C.A.

Baker, A.C., Cabral, P., & Wallander, J.L. (March 2017). Parental monitoring in the link between early dating initiation and dating violence among diverse adolescents. Poster presented at *Society of Behavioral Medicine's Annual Meeting*, San Diego, C.A.

Baker, A.C., Wiebe, D.J., & Berg, C.A. (December 2016). Relationships with parents and providers facilitate type 1 diabetes management across the transition to adult care. Oral presentation at the *International Congress for Behavioral Medicine*, Melbourne, VIC, AUS.

Baker, A., Wiebe, D.J., Ramsey, M., Nguyen, M., Barranco, C. & Berg, C. A. *Daily stress of type 1 diabetes across the transition to Emerging Adulthood* (March 2016). Poster presented at the annual meeting of the Society of Behavioral Medicine, Washington D.C.

Wiebe, D. J., **Baker, A**., & Stump, T. (April 2015). *Managing type 1 diabetes in late adolescence: Individual and daily fluctuations in goal regulation.* Oral presentation presented at the annual meeting of the Society of Behavioral Medicine, San Antonio, TX.

Baker, A., & Quilici, J. (November 2013). *Daily caloric recommendations (messages and calculating) aide in reducing overall calories chosen from a mock lunch menu.* Poster presented at the annual meeting of the American Public Health Association, Boston, MA.

Pacheco-Santivaňez, N., **Baker, A.**, & Quilici, J. (May 2013). *The role of restrained eating, nutritional knowledge, and regulatory focus on calorie intake among college students.* Poster presentenced at the annual meeting of the Association for Psychological Science, Washington D.C.

Baker, A., Classen, N., Quilici, J., & Wohldmann, E. (January 2013). *Application of nutritional knowledge helps in selection of fewer calories from a mock menu.* Poster session presented at the annual meeting of the Society for Personality and Social Psychology, New Orleans, LA.

Baker, A., Stephens, R., & Schuldt, J. (May 2012). *Is "Sweet" Fruit Junk Food? How Attribute Accessibility Guides Healthfulness Judgments.* Poster session presented at the annual meeting of the Association for Psychological Science, Chicago, IL.

Baker, A., & Tarshis, T. (October 2011). *Families' treatment choice when given the option in a multi-disciplinary mental health agency.* Poster session presented at the annual meeting of the American Academy of Child and Adolescent Psychiatry, Toronto, ON, Canada.

Regional & State Conference Presentations

Baker, A., Classen, N., Quilici, J., & Wohldmann, E. (April 2012). *Application of nutritional knowledge help sin selection of fewer calories from a mock menu."* Poster session

presented at the annual meeting of the Western Psychological Association, San Francisco, CA.

Baker, A., Classen, N., Quilici, J., & Wohldmann, E. (February 2012). *Nutritional knowledge as a predictor of total meal calories chosen.* Poster session presented at the annual meeting CSUN's Creative Works Symposium, Northridge, CA.

Baker, A., & Naumes, M. (March 2010). *The big-five personality domain and the effect on college athlete's susceptibility of injuring their anterior cruciate ligament.* Poster session presented at the annual meeting of   the Southern Oregon University Psychology Capstone, Ashland, OR

RESEARCH EXPERIENCE

2016, August - Current	**Doctoral Candidate- UC Merced-Psychological Sciences**

Healthy Passages Dataset Lab, Dr. Jan Wallander
Grant supported by the Centers for Disease Control (CDC)-
(R01 DK063044)-UC Merced - Psychological Sciences
Dissertation Overview--Assist and conduct research dealing with health-risk behaviors among adolescents and young adults, and how they contribute to differences in health outcomes across diverse youth. Specifically, examination of self-harmful behavior particularly in LGBTQ+ and racial/ethnic groups. Investigating the influence that social processes have as risk and protective factors on the decision-making process to engage in health risk behaviors and the outcomes across development using the ecological theory as a framework.
- Clean, code, and manage large data in SPSS and Excel
- Analyze data using SPSS and *Mplus* statistical software
- Longitudinal, regression, and structural equation modeling approaches utilized
- Develop and present oral and visual presentations for national conferences, colloquiums, and lab meetings
- Develop and complete candidacy exam on self-harm behaviors in Latinx youth
- Write internal research grants
- Manuscript preparation

2014, July-2016, July	**Doctoral Student and Co-Laboratory Manager-UC Merced-Psychological Sciences**

READY Study Dataset Lab, Dr. Deborah Wiebe
Grant supported from the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) at the National Institutes of Health (R01 DK092939)
Thesis Overview: Assist and conduct research dealing with youth with type 1 diabetes, goal regulation, daily stressors, and how this affects late adolescents' management of their chronic illness at the transfer to emerging adulthood and into adult care. Specific focus on relationships with parents and providers role in facilitating type 1 diabetes management at this unique developmental time.

- Co-led laboratory team of 6+ undergraduate research assistants and trained on various aspects of research
- Clean, code, and manage large data in SPSS and Excel
- Analyze data using SPSS and *Mplus* statistical software
- Lead project using qualitative coding (coded over 2000 lines of daily diary data) and implement quantitative approaches to analyze data
- Led project on collecting medical record data from hard-to- reach population (emerging adults)
- Collaborated with large team of researchers, medical providers, and statisticians on numerous projects
- Developed and completed thesis
- Manuscript preparation

2011, July-2013, July	**Laboratory Coordinator** **Research Assistant** *Applied Decision-Making Lab* -CSU Northridge – Dept. of Psychology • Design/conduct undergraduate senior honors thesis and Master's thesis project • Enter and verify quantitative and qualitative data • Development and presentation of research projects at conferences • Organization and maintenance of laboratory and research • Perform administrative duties for P.I. • Supervision and training of research assistants • Perform analysis on qualitative and quantitative data • Manuscript preparation

TEACHING EXPERIENCE

Curriculum Development	**Psy150: Introduction to Psychology: Principles of Human Behavior:** This course was designed to give an overview of the scientific field of psychology. The content focused on the exploration of major theories and concepts, methods, and research findings in psychology. Topics included the biological bases of behavior, ethics involved in research, perception, cognition, learning, memory, emotion, motivation, development, personality, social psychology, psychological disorders and therapeutic approaches, and applied psychology. This course satisfied general education requirements for students in any major.
Instruction **Spring 2018-Current** **Fall 2015 – Spring 2020**	**Teaching Fellow** **Teaching Assistant** UC Merced – Psychological Sciences • Assisted with Human Sexuality (*145*); Spring 2020

o Guest lectured on adult relationships and attachment theory
- Assisted with Health Psychology (*120*); Spring 2019
- Assisted with Abnormal Child Psychology (120); Fall 2018
  o Guest lectured on Self-Harm Behaviors
- Assisted with Personality Psychology (159); Spring 2018
- Assisted with Introductory to Psychology (*001*); Spring 2017.
  o Guest lectured on Health Psychology
- Assisted with Clinical Psychology (*PSY 140*); Fall 2016.
- Assisted with Health Psychology (*PSY 140*); Spring 2015.
- Assisted with Introductory to Psychology (*001*); Fall 2014.

Fall 2012 – Spring 2014

Teaching Associate

Teaching Intern Program (TIP), CSU Northridge – Dept. of Psychology
- Taught one section of Introductory Psychology (*PSY 150*) for each semester of the 2012-2014 academic year
- Constructed syllabi, lectures, tests, quizzes, & homework assignments.
- Received summer training and year-round supervision from program coordinator.
- 80+ students/per course = 400+ students in total

Fall 2012-Spring 2013

Teaching Assistant

CSU Northridge – Dept. of Psychology
- Assisted with *PSY 345. Social Psychology*
- Assisted with *PSY320L: Statistical Methods in Psychology*

AFFILIATIONS AND ACTIVITIES

Professional Memberships

2014 - Present

Society of Behavioral Medicine (SBM)- Graduate Student Affiliate

2013 – Present

Association for Psychological Science (APS) - Graduate Student Affiliate

2013 – Present

American Public Health Association (APHA) –Graduate Student Affiliate

University Activities

Fall 2018 – Spring 2019

Graduate Peer Mentor-*Graduate Peer Mentoring Program,* UC Merced – Graduate Division
- Provided first-year doctoral students with guidance in order to aid them in adjusting to their first year as a graduate student

Fall 2016-Spring 2017

Graduate Dean's Advisory Council on Diversity, UC Merced— Graduate Division
- Support and participate in initiatives that promote enhancing and strengthening a culture of open inquiry, pluralism, mutual respect, and engagement among and for graduate students

	- Wrote a piece on diversity hiring initiatives for quarterly newsletter
Fall 2015 – Spring 2016	**Graduate Student Representative;** *Graduate and Research Orientation Week (GROW) Committee,* UC, Merced - Aid in planning and organization of the Graduate and Research Orientation Week (GROW) of incoming graduate students.
Fall 2012 – Spring 2013	**Graduate Peer Mentor,** *Graduate Peer Mentoring Program,* CSU Northridge – Dept. of Psychology - Provided first year Master's students with guidance in order to aid them in adjusting to their first semester as a graduate student

PROFESSIONAL TRAINING AND WORKSHOPS

2017, April	**Quantitative Psychology Workshop:** Intensive Longitudinal Designs, Part 2 Instructor: Dr. Jean-Philippe Laurenceau, Ph.D. University of California, Merced
2016, Oct.	**Quantitative Psychology Workshop:** Intensive Longitudinal Designs, Part 1 Instructor: Dr. Kristin E. Heron, Ph.D. University of California, Merced
2015, Sept.	**Quantitative Psychology Workshop**: Missing Data Instructor: Dr. Craig Enders, Ph.D. University of California, Merced

SKILLS AND ABILITIES

Statistical and Survey Management Software	SPSS, Excel, *Mplus*, Qualtrics, Survey Monkey, (proficient); R, SAS, EQS (familiar)
Methodological and Data Analytical Approaches	Qualitative and Quantitative; Survey; Quasi-experimental designs; Regression, Structural Equation Modeling, Longitudinal, Multi-Level Modeling; Ecological Momentary Assessment (i.e., daily diary techniques)
Word Processing Platforms	Microsoft Office Suite; Google Suite
Research & Project Management Skills	- APA citation format - Academic/scientific writing - Analytical & critical thinking - Communicating with diverse stakeholders - Collaboration/team science - Data collection and coding - Data management - Data visualization - Independent work - Leadership - Mentoring - Organization - Oral/written presentations - Public speaking - Report writing

ABSTRACT

Structural model of socioecological connectedness and
non-suicidal self-injury among adolescents

Ashley C. Baker
Doctor of Philosophy, Psychological Sciences
University of California, Merced, 2020
Committee Chair: Jan L. Wallander

Adolescents who feel connected to people and their environments may be at a reduced risk for engaging in non-suicidal self-injury (NSSI). The objective of this study was to examine the longitudinal associations of socioecological connectedness with bullying victimization and depressive symptoms in early adolescence and with subsequent NSSI in mid-adolescence, and how these paths might differ between girls and boys. Using data from the *Healthy Passages^{TM}* project, adolescents (N=4115; 49.1% girls; non-Latinx Black, 31%; Latinx, 46%, and non-Latinx White, 23%) in the 7th grade reported perceptions of connections with their parents and family, peers, school, and neighborhood, as well as on bullying victimization and depressive symptoms, and their subsequent 10th grade (M^{age}=16.1) NSSI. Structural equation modeling indicated that in the overall sample the absence of NSSI behaviors in 10th grade was associated with higher perceptions of connections between adolescents and their families, both directly as well as indirectly through bully victimization and depressive symptoms three years earlier. Additionally, perceptions of higher school connectedness was indirectly associated with the absence of NSSI through bullying victimization and depressive symptoms. Paths to NSSI varied for girls and boys. Results further advance the understanding of longitudinal pathways from socioecological connectedness to NSSI in adolescent girls and boys.

Keywords: NSSI, socioecological connectedness, bullying victimization, depressive symptoms, adolescence

Chapter 1: Introduction

Non-suicidal self-injury (NSSI) is typically defined as the direct and intentional self-inflicted bodily harm, which includes cutting behaviors but excludes the explicit intent to die and culturally sanctioned forms of body modification such as tattoos (Nock & Favazza, 2009). As a serious public health concern among adolescents, NSSI predicts future suicide attempts in adolescents, even beyond the impact of previous suicide attempts (e.g., Asarnowet al., 2011; Guan, Fox, & Prinstein, 2012; Klonsky, May, & Glenn, 2013). NSSI onset typically occurs between the ages 12 and 16 years (Jacobson & Gould, 2007) and declines in later adolescence and into young adulthood (Monto, McRee, & Deryck, 2018). Recent prevalence estimates of past year NSSI in a non-clinical sample of US adolescents was almost 18%, with girls reporting two times the prevalence compared to boys (23.8% vs 11.3%; Monto, McRee, & Deryck, 2018). Adolescents often report engaging in NSSI to temporarily lessen intense emotions (e.g., Klonsky, Victor & Saffer, 2014). Collectively, the above reasons underscore the importance of research during the early- to mid-adolescent developmental period, which is a high-risk time of NSSI.

NSSI together with suicidal thoughts and attempts are considered forms of self-harm behaviors. However, in juxtaposition, a suicide attempt is clinically classified as a nonfatal, self-inflicted destructive act with the explicit or implicit intent to die (Goldsmith, Pellmar, Kleinman, & Bunney, 2002). Although there are obvious differences between NSSI and suicide attempts, there is often conceptual, methodological, and empirical confounding of these behaviors. In addition, these behaviors share numerous risk factors (e.g., depression, family conflict, child abuse), and engaging in NSSI has been consistently linked to future suicide attempts among adolescents in general (e.g., Asarnow et al., 2011; Nock, & Kessler, 2006). Because research regarding NSSI is limited in the context of socioecological connectedness, we draw upon the broader self-harm behaviors literature for the study rationale. Such research will aid in further understanding the nuances of NSSI among adolescents, and potentially advance conceptualizing socioecological connectedness prevention and intervention efforts regarding this serious health-risk behavior.

Socioecological Connectedness and NSSI among Adolescents

The premise of our research is that adolescents who feel more connected to other people, especially parents and peers, as well as their environments, most typically schools and neighborhood/communities, will be less likely to engage in NSSI. Connectedness, a dynamic, multicomponent, complex factor, has been conceptualized as including aspects of observable characteristics, such as embeddedness and social integration, to more subjective psychological experiences, such as closeness, belonging, caring, and supporting relationships (e.g., Barber & Schluterman, 2008; Borowsky, Ireland, & Resnick, 2001; Resnick et al., 1997, Townsend & McWhirter, 2005). Connectedness is rooted in numerous theoretical frameworks, including attachment theory (Bowlby, 1958) and ecological systems theories (Bronfenbrenner, 1986). It is also a key component of the interpersonal theory of suicidal behavior (Joiner, 2005; Van Orden et al., 2010), which suggests that thwarted belonginess (an indicant of low social connectedness) is associated

which suggests that thwarted belonginess (an indicant of low social connectedness) is associated with suicide risk, in part, due to a crucial psychological need (i.e., social belonginess) not being adequately met. These frameworks serve as a foundation for understanding why connectedness may function as a protective factor in adolescent behaviors (Bernant & Resnick, 2009). The National Center for Injury Prevention and Control at the Centers for Disease Control and Prevention (CDC) identified connectedness as a potential strategy for interventions to increase protective factors among youth in efforts to reduce suicidal behaviors and thoughts, including NSSI (2009, 2013).

Socioecological Connectedness and NSSI among Adolescent Girls and Boys

Limited studies have explicitly explored how pathways between socioecological connectedness and NSSI differ between adolescent girls and boys, with mixed result (e.g., Arango et al., 2018; Langille et al., 2015; Taliaferro et al., 2012; Yates et al., 2008). For example, one study found that connectedness with parents and non-parental adults (e.g., coaches and religious leaders) was associated with less NSSI in girls compared to boys (Taliaferro et al., 2012). Conversely, another study found that negative aspects of parenting (i.e., parental criticism and alienation), which includes overlapping themes of low parental connectedness, was associated with higher NSSI behaviors, particularly for adolescent boys (Yates et al., 2008). Consequently, there are reasons to speculate that the paths from socioecological connectedness to NSSI may differ between girls and boys (e.g., gendered socialization practices and norms), but we cannot advance strong hypotheses regarding gender differences here due to the lack of consistent findings in this area.

Parent-Family Connectedness and NSSI among Adolescents

Although adolescence is often a time of gaining independence from one's parents, research suggests that adolescents want close relationships with their parents (Ungar, 2004). Therefore, strong bonds between parents and adolescents can help protect youth from engaging in health risk behaviors, like NSSI (e.g., Resnick, Ireland, Borowsky, 2004). Parent-family connectedness is defined as the extent to which adolescents feel loved, cared for, valued, and respected by their parents and family (e.g., Bernant & Resnick, 2009). Positive and healthy connections between adolescents and parents has consistently emerged as a robust negative predictor of suicidal thoughts and behaviors, including NSSI, in adolescents (e.g., Resnick et al., 1997, Bearman & Moody, 2004 Kaminski et al., 2010; Taliaferro & Muehlenkamp, 2017). For example, higher levels of parent-family connectedness has been associated with lower risk of suicide attempts for adolescents in (Borowsky, Ireland, & Resnick, 2001). Although parent-family connectedness is likely the most important source in reducing and preventing NSSI in adolescents, connections with one's peers, school, and neighborhood/community are likely important as well.

Peer connectedness and NSSI among Adolescents

The emergence of strong peer relationships is one of the key developments in adolescence, and peers can have a positive or a negative influence on young people's health (Jacard, Blanton, & Dodge, 2005). Strong connections with prosocial peers can support positive health, with peer connections protecting against a broad range of health risk behaviors (e.g., Resnick et al., 1997). Peer connectedness has been defined as perceptions of support, caring, and trust between adolescents and their peer groups (Bernant & Resnick, 2009). Although limited work is available on peer connectedness and NSSI, one study found that the nomination of a self-selected best friend, indicating one salient aspect of connectedness with a peer, negatively predicted subsequent engagement in NSSI in a sample of clinical adolescents 11 months later (Prinstein et al., 2010). Conversely, another study found that when controlling for family, school, and other-adult connectedness, higher levels of peer connectedness was associated with an increased risk of NSSI (Kaminski et al., 2010). In the broader self-harm literature, girls who felt socially isolated from their peers were more likely to report suicidal ideation, as were girls whose friends were not friends with each other, a marker of a less dense social network; whereas these associations were not significant for boys (Bearman & Moody, 2004).

School connectedness and NSSI among Adolescents

Adolescents' relationship to their school environment and adults at school can help shape their positive development. School connectedness reflects the adolescents' sense of belonginess and bonding to one's school (CDC, 2009; Resnick et al., 1997). Research has largely revealed school connectedness to be associated with reduced suicidal thoughts and behaviors (see Marraccini and Brier, 2017; Whitlock et al., 2014, for reviews). Aspects of school connectedness, including perceptions of school safety, greater teacher support, and fairness demonstrated by teachers, have been linked to lower incidence of suicidal thoughts and behaviors both cross-sectionally (Bearman & Moody, 2004; Resnick et al., 1997) and longitudinally (Borowsky, Ireland, & Resnick, 2001). Among gay and lesbian high schoolers, school connectedness served as a particularly important protective factor against repetitive NSSI behaviors (Taliaferro & Muehlenkamp, 2017). Yet one study that included multiple domains of connectedness, did not find support for school connectedness on NSSI reduction among vulnerable adolescents (Foster et al., 2017). Overall, however, these studies suggest the importance of enhancing positive connections in the school environment to protect against self-harm behaviors.

Neighborhood connectedness and NSSI among Adolescents

Connection to others outside the family potentially affects adolescents' health, highlighting the importance of neighborhood and community environments in adolescence (Leventhall & Brooks-Gunn, 2009). Neighborhood and community connectedness has been operationalized as sense of connection to and trust with others outside the more immediate social context of family and peers, including the neighborhood and broader community. Studies of adolescent connectedness to neighborhood and community and suicidal thoughts and behaviors, including NSSI, are

sparse and cross-sectional designs are overrepresented. In one study that examined community connectedness as perceived caring by adults outside the home, higher levels of community connectedness was associated with lower occurrence of suicidal thoughts and attempts among Native American and Alaskan youth (Borowsky, Resnick, Ireland, & Blum, 1999). Whereas one study found that caring relationships with non-parent adults in the youth's community was a protective factor for self-harm behaviors, including NSSI (Borowsky, Taliaferro, & McMorris, 2013), another study did not find support for community connectedness on NSSI among vulnerable adolescents (Foster et al., 2017). However, the scarcity of research like this has led to the call for more research into how neighborhood and community connectedness might affect NSSI (Whitlock, Wyman, & Moore, 2014).

In summary, taken together, these studies examining different levels of connectedness suggest the importance of social connectedness for adolescents in reducing NSSI, but more work concerning prospective predictors of NSSI would be of value. Specifically, research that examines the structural and subjective features of connectedness across contexts with particular attention to mechanisms is needed (Kaminski et al., 2010; Kidd et al., 2006). It remains unclear whether social connectedness operate the same for girls and boys.

Linking Socioecological Connectedness to NSSI among Adolescents

Rationally, lower feelings of connectedness may increase certain common problematic experiences among adolescents, such as bullying victimization and depressive symptoms, which in turn may be associated with NSSI. Bullying has been identified as a public health concern among adolescents and has consistently been linked to NSSI as well as suicidal behaviors (Baiden, Stewart, & Fallon, 2017; Claes et al., 2015; Esposito, Bacchini, & Affuso, 2019). For example, Borowsky, Taliaferro, and McMorris (2013) found that greater perceptions of connectedness with parents, caring by other adults and friends, and liking school were cross-sectionally associated with less suicidal thoughts and attempts among youth who reported bullying victimization. However, school and neighborhood safety did not emerge as a significant predictor of adolescent suicidal thoughts or attempts in this. Specifically, for NSSI, adolescents who reported being bullied was associated with higher NSSI behaviors (Hay & Meldrum, 2010; Heilbron & Prinstein, 2010). The relationship between traditional bullying victimization and gender is nuanced, mixed, and beyond the scope of this study. In the literature it is commonly reported that boys are more likely to be the victims of bullying than girls (e.g., Bouffard and Koeppel, 2016; Carlyle & Steinman, 2007; Cook et al., 2010; Nansel et al., 2001), but other studies report that girls are more likely to be victims of bullying compared to boys (e.g., Claes et al., 2015; Merrill & Hanson, 2016; Schneider, O'Donnell, & Smith, 2015).

Weak perceptions of connectedness across social contexts has also been associated with more depressive symptoms among adolescents (e.g., Barber & Schluterman, 2005; Resnick et al., 1997). Because depression has consistently been associated with NSSI (e.g., Hankin & Abela, 2011; Muehlenkamp & Gutierrez, 2007; Prinstein et al., 2010), depressive symptoms could in part explain the observed associations of socioecological connectedness and NSSI. For example, one study found

that adolescents who perceived greater connections with their parent, peers, and school were more likely to be classified in the no-depressed compared to depressed group (Costello, Swebdseb, Rose, & Dierker, 2008). Moreover, cross-sectional evidence has demonstrated that NSSI and family functioning, with related features of connectedness, are indirectly associated through depressive symptoms (Baetens, Andrews, Claes &, Martin, 2014). One of the reasons depressive symptoms might be an antecedent to NSSI is because NSSI functions to regulate depressive symptoms. Adolescents commonly report that they engage in NSSI to cope with negative emotions (Klonsky, 2007; Lloyd-Richardson et al. 2007), and adolescents who practice NSSI report that this reduces the intensity of negative affect (e.g., Klonsky, 2007; Lloyd-Richardson et al., 2007; Nock & Prinstein, 2004). Evidence of prevalence differences between boys and girls begin to appear in early to mid-adolescence, with girls generally displaying more depressive symptoms than boys (e.g., Chaplin, Gilham, & Seligman, 2009). In a community-based sample of adolescents, depressive symptoms acted as a risk factor for NSSI behaviors at one-year follow up among both boys and girls (Prinstein et al., 2010).

Furthermore, more bullying victimization has been linked to NSSI through higher depressive symptoms (Baiden, Stewart, Fallon, 2017; Claes et al., 2015), but when exposed to positive parenting practices this association significantly decreased (Claes et al., 2015). Given that the onset of depression typically occurs in early adolescence (Schwartz et al., 2012), and that bullying victimization is at the highest levels during middle school years (Kljakovic & Hunt, 2016), research is needed to inform how these experiences may provide the contexts in which NSSI occurs in mid-adolescence, when NSSI behaviors are prominent (e.g., Monto, McRee, & Deryck, 2018).

Current Study

This study aimed to illuminate the role socioecological connectedness may play within NSSI in adolescents. The overriding objective was to understand the relationships of socioecological connectedness with bullying victimization and depressive symptoms in early adolescence and with subsequent NSSI in mid-adolescence among girls and boys. We examined three aims with associated hypotheses depicted in a conceptual model shown in Figure 1.

The first aim was to identify the prevalence of NSSI in 10th grade adolescents across gender (girls/boys). We expected (H1) that girls would report higher prevalence of NSSI compared to boys based on reports of NSSI prevalence in community samples (e.g., Monto, McRee, & Deryck, 2018; Swanell et al., 2014). The second aim was to examine whether the longitudinal associations of adolescents' perceptions of connectedness across socioecological contexts at 7th grade with 10th grade NSSI are linked through 7th grade bully victimization and depressive symptoms (see Fig 1.). Three hypotheses were tested in relation to this aim: (H2) Each level—parent-family, peer, school, and neighborhood—of socioecological connectedness will be negatively associated with NSSI. (H3) Whereas each level of socioecological connectedness will be negatively associated with bullying victimization and depressive symptoms, bullying victimization will be positively associated with depressive symptoms and NSSI, and in turn, depressive symptoms will be positively associated with NSSI. (H4) Furthermore, higher perceptions of socioecological connectedness will be indirectly linked to the absence of NSSI behaviors through the

absence of bully victimization and lower depressive symptoms. The third aim explored how these association between distal and proximal predictors of NSSI (see Aim two) varied between girls and boys. Although paths to NSSI may vary between the gender groups, gender-differentiated hypotheses cannot be provided at this time in the absence of guiding literature.

Chapter 2: Methodology

Data came from Healthy PassagesTM, a multisite, longitudinal community cohort study of health behaviors and outcomes and associated risk and protective factors (see Schuster et al., 2012; Windle et al., 2004). The cohort was prospectively assessed across 5th, 7th, and 10th grades (2009-2011). We utilized data from the 7th and 10th grade assessments, defining early (ages 12-13) and mid-adolescence (ages 15-16); the 5th grade assessment did not contain variables consistently relevant to our aims. Institutional review boards at each study site and the Centers for Disease Control and Prevention approved the study.

Participants

Participants were recruited from public schools with ≥25 students enrolled in regular 5th grade classrooms in schools in and around metropolitan areas of Birmingham, Houston, and Los Angeles. A two-stage probability sampling procedure was used to select schools and students with school selection probabilities designed to attain similar proportions of (non-Latinx) Black, Latinx, and (non-Latinx) White participants. Sampling for the Healthy Passages study included 5th graders in regular public-school classrooms in the three sites. Public schools within the three study site communities were randomly selected with probabilities proportionate to a weighted measure of the scarcity of a school's students relative to race/ethnicity targets to ensure adequate sample sizes of the three largest racial/ethnic groups within the U.S. All 5th grade students within selected schools were invited to participate (see Schuster et al., 2012). Among families who provided permission to be contacted and completed interviews in 5th grade (N = 5147; 2607 girls), 89% of the sample (n=4289) completed both the 7th and 10th grade assessments. For the current study, the sample was drawn from the 4,115 (85% of original sample) adolescents who had parent data at 7th and 10th grade, resulting in a distribution that was highly similar to the 5th grade sample regarding race/ethnicity and gender. Furthermore, those who did not complete 7th grade or 10th grade parent and family assessments did not differ on any of the study variables compared to those who completed the assessments (details available from authors).

Procedures

Two trained interviewers completed the full Healthy Passages assessment protocol with the parent and adolescent either at their home or an alternative site. Assessments were administered with each individually in a private space using a computer-assisted personal interview method. A Spanish version could be chosen by either at each assessment, prepared using standard back-translation methods (applied partly or fully at 5th grade: 8% of adolescents, 23% of parents; 7th grade: 4% of adolescents, 30% of parents; 10th grade: 30% of parents). The exception was for adolescents at 10th grade, at which time all were expected to be fluent in English after at least five years of U.S. education. The same procedures were repeated at each assessment.

Measures

Non-Suicidal Self Injury. NSSI was self-reported at 10th grade using one item adopted from the state-level YRBS surveys (CDC, 2003), "During the past 12 months how many times did you do something to hurt or injure yourself on purpose without wanting to die, such as cutting, scraping, burning, or bruising yourself?". Due to the negatively skewed nature of responses on the original item, (as is common in outcomes such as this) a dichotomous variable was created to contrast adolescents who had engaged in NSSI one or more times in the past 12 months with those who had not (0 = never engaged in NSSI; 1 = engaged in NSSI at least once in the past 12 months).

Parent-family connectedness. The 13-item adapted scale from the Parent-Child Connectedness Questionnaire (Sieving, McNeely, & Blum, 2000) was used to assess adolescent perceptions of connectedness with their parents and family at 7th grade. Items evaluated perceptions of warmth, acceptance, closeness, and caring from mothers and fathers (e.g., "How close do you feel to {your mother}?") on a 1 (not at all) to 5 (very much) scale. Prior research has found this scale of parent-family connectedness to be negatively associated with suicidal thoughts and behaviors (Borowsky et al., 2001; Resnick et al., 1997). An average score across items was computed. For the current study, internal consistency was $\alpha = .86$.

Peer connectedness. Adolescents' perception of connectedness with peers at 7th grade was indexed according to a single-item response indicating number of close or best friends they have with responses ranging from none (0) to 20+ friends (20). Given the positively skewed data, a median split was used to create a dichotomous variable (0= less connected vs 1= more connected). Number of connections with friends has been negatively associated with suicidal thoughts and behavior in adolescents (e.g., Bearman & Moody, 2004).

School connectedness. Adolescents in 7th grade completed the ADD-Health school connectedness scale (McNeely et al., 2002; Sieving et al., 2001), consisting of five items that assessed perceptions of connectedness with one's school (e.g., "You are happy to be at your school") with response options ranging from strongly disagree (1) to strongly agree (4). Prior research has found school connectedness to be negatively associated with suicidality (Borowsky et al., 2001; Resnick et al., 1997). An average score across all items was computed. For this study, internal consistency was $\alpha = .83$, consistent with prior research (Furlong, O'Brennan, & You, 2011).

Neighborhood connectedness. Adolescents' perceptions of connectedness with their neighborhood was measured at 7th grade using the Social Interaction Scale adapted from Sastry et al. (2003). This three-item scale assess adolescents' perceptions of safety in their neighborhood, and how many of their neighbors they know. For example, "How many of the kids in your neighborhood do you know? Would you say…?" none (1) to

most (3). An average score across items was computed. For this study, internal consistency was α =.50.

Bullying victimization. A single item of adolescent bullying experiences was used to assess adolescent perceptions of school-based bullying victimization at 7th grade (Nansel et al. 2001), ''How often have you been bullied in the past 12 months?'' The five-point response scale ranged from never (1) to ''a few times a week (5). Because the data were negatively skewed on the original item, a binary variable was created to contrast adolescents who had been bullied at least once in the past year (1) with those who did not report being bullied (0). Test-retest reliability estimates have demonstrated kappas ranging .60–70 (Brener et al. 2002).

Depressive symptoms. Adolescents' depressive symptoms was measured with the self-report form of the Major Depressive Disorder DISC Predictive Scale, which has been shown to have satisfactory reliability and validity for efficiently screening among adolescents (Lucas et al., 2001). Six items ask youth about depressive symptoms (e.g., "Has there been a time when nothing was fun for you and you just were not interested in anything") with response options yes or no. The number of yes responses (0–6) constituted a depressive score. For this study, internal consistency was α =.66.

Sex-Based Gender. Adolescents were asked to indicate which sex-based gender, that is girl or boy, best described them (0=girls; 1=boy). For simplicity, gender will be used herein to describe this variable.

Covariates. Adolescent age at 10th grade and highest level of education completed in the household (4 categories) were reported by the parent.

Statistical Analysis

　　　　　All analyses were conducted using complex sampling weights to account for the complex survey design, including the effects of design, non-response, and attrition, clustering of youth within schools in each area, and stratification by site (see Schuster et al., 2012). Consequently, results are generalizable to the population from which the sample was originally drawn. First, using independent t-tests and chi-square analyses, we examined descriptive information on the sample to determine whether girls and boys differed on study variables. Next, we examined bivariate correlations among study variables in the full sample and then separately in girls and boys. Structural equation modeling via Mplus v.8.4 (Muthén & Muthén, 2019) was then used to estimate the hypothesized path model (Fig. 1), and bootstrapping methods with bias-corrected confidence intervals were used to test indirect effects. Missing data was less than 4% on all variables. Weighted least squares means and variance adjusted (WSLMV) was chosen as the estimator for a dichotomous outcome. We initially estimated the model in the full sample, regardless of gender, to test hypotheses 1-4. To address aim 3 we then tested the model separately for girls and boys. Highest household education and age at 10th grade were controlled for on NSSI.

　　　　　Four goodness-of-fit indices were utilized to determine how well the model reproduced the characteristics of the observed data: the $\chi 2$ index, which should be as

close to zero as possible and non-significant; the root mean square error of approximation (RMSEA), which should be less than 0.08 for close fit (Browne & Cudeck, 1993); the comparative fit index (CFI) and Tucker Lewis Index (TLI) which should exceed 0.90 for good fit, .80-.90 to indicate acceptable fit, and <.80 to indicate poor fit. (Hu & Bentler, 1998). Because the literature recommends using more than one measure of fit, especially when categorical data are used (Hutchinson & Olmos, 1998), we did not reject good model fit based on an individual fit index, but rather considered indices holistically to interpret the results.

Chapter 3: Results

Preliminary Analyses

The average age of the participants in 10th grade was 16.1(.62) years, 49.1% were female, and 29.3% of parents reported having a Bachelor's degree or higher, and 46.5% identified as Latinx, 30.4% non-Latinx Black, and 23.1% as non-Latinx White. NSSI behaviors in the past 12 months was reported by 6.5% of adolescents. Descriptive information on study variables is reported in Table 1.

Bivariate correlations in the full sample are shown in Table 2. Highlighting associations with NSSI here, higher perceptions of each level of socioecological connectedness were associated with the absences of NSSI behaviors (rs= -.03 to -.10, ps<.05). Being bullied and reporting higher levels of depressive symptoms were associated with at least one occurrence of NSSI behavior in the past 12 months (rs = .08 to .09, ps<.05). Correlations for the separate gender groups (see table A1 in Appendix) were consistent with those found for the full sample, with the exception that perceptions of peer connectedness were not associated with NSSI behaviors for boys.

Gender Differences Among Main Study Variables

Gender differences among observed variables are reported in Table 1. Highlighting significant findings here, girls reported significantly lower perceptions of being connected to their school [t(1, 115)=2.61, p=.01] and neighborhood [t(1, 115)=3.71, p <.001] environments compared to boys. Girls reported significantly more depressive symptoms compared to boys [t(1, 115)=2.78, p=.006]. Among categorical variables, girls reported being less connected to friends (X2= 8.3, p=.004), whereas boys more often reported being bullied than girls in the past year (X2= 7.15, p=.007). Girls reported being almost twice as likely to have engaged in NSSI in the past 12 months compared to boys (8.2% vs 4.8%; X2= 21.79, p<.001).

Path Model for Full Sample

Path coefficients for the total sample model are shown in Fig. 2, and fit indices and indirect effects are reported in Table 3. The hypothesized model had good fit to the data for the total sample across all fit indices. Results reported in Fig. 2 supported several hypotheses indicating that: (1) Higher perceptions of parent-family connectedness at 7th grade was directly associated with the absence of NSSI behaviors at 10th grade, whereas peer connectedness, school connectedness, and neighborhood connectedness were not; (2) Higher parent-family connectedness and school connectedness were associated with absence of bully victimization; (3) higher perceived parent-family, peer, and school connectedness were all associated with lower depressive symptoms; (4) both reporting being bullied and higher depressive symptoms were associated with NSSI behaviors. In addition to these direct paths, seven indirect paths were supported, along with several additional indirect paths that approached significance (see Table 3). Of note, the specific indirect paths from parent-family connectedness and school connectedness to NSSI through bully victimization and/or depressive symptoms were significant.

Paths from peer connectedness and neighborhood connectedness to NSSI through bully victimization and depressive symptoms were not significant.

Path Models for Adolescent Girls and Boys

The model was tested separately for each gender group (Kline, 2005) which showed good fit among girls and adequate fit among boys (see Table 2). Results reported in Fig. 3 partially supported several hypotheses for girls, which mirrored the total sample in several instances. Higher perceptions of parent-family connectedness was the only socioecological connectedness predictor to be directly associated with the absence of NSSI behaviors in girls. Higher perceptions of parent-family connectedness and school connectedness were associated with the absence of bully victimization, whereas higher perceptions of parent-family connectedness was associated with less depressive symptoms. Being bullied was associated with higher depressive symptoms. Being bullied and higher depressive symptoms were directly associated with NSSI behaviors. Furthermore, for girls, four significant indirect paths revealed the both parent-family connectedness and school connectedness were indirectly linked to NSSI through depressive symptoms or through the joint path of being bullied and depressive symptoms. For boys, in contrast, socioecological connectedness in any form considered here was not directly associated with NSSI. Higher school and neighborhood connectedness were associated with the absence of bullying victimization in the previous 12 months, and higher parent-family connectedness was associated with fewer depressive symptoms. Consistent with the overall and girls' sample, being bullied was associated with higher depressive symptoms for boys as well. Whereas, being bulled was associated with higher NSSI behaviors, depressive symptoms were not directly associated with NSSI. Two significant indirect paths revealed associations between parent-family connectedness and school connectedness with NSSI through being bullied.

Chapter 4: Discussion

This study, in part, sought to further add to the literature regarding the epidemiology of NSSI among a large, diverse sample of adolescent girls and boys. Results indicated, consistent with recent research on a non-clinical sample of adolescents (e.g., Monto, McRee, & Deryck, 2018), that girls reported almost two times higher prevalence in the past 12 months of NSSI behaviors in 10th grade compared to boys, 8.2% versus 4.8%. In the context of the proposed conceptual model, which had good fit to the data, results for the overall sample showed that the absence of NSSI behaviors in 10th grade were associated with perceptions of higher connections between adolescents and their families both directly as well as indirectly through bully victimization and depressive symptoms three years earlier. Higher perceptions of connections to schools was only indirectly linked to the absence of NSSI through less bully victimization and depressive symptoms. Therefore, bullying victimization and depressive symptoms appear as important mechanisms linking the family and school environments to NSSI behaviors in mid-adolescence, yet in different ways for girls and boys. These findings are unique in demonstrating that depressive symptoms are particularly important for understanding NSSI among girls and possibly less influential for boys, whereas bully victimization appears of particular importance for boys. Findings for each hypothesis are discussed in turn below.

Path Model for Full Sample

Results supported that for all adolescents, feelings of greater connectedness with their parents and family at 7th grade were associated with the absence of NSSI behaviors three years later, partially supporting hypothesis two. This is in line with past theoretical and empirical research suggesting that for adolescents feeling connected to parent-family environments that are characterized as warm, loving, and accepting likely plays the most important role in reducing NSSI behaviors (e.g., Barber & Schluterman, 2008; Bernant & Resnick, Resnick et al., 1997; Taliferino & Muehlenkamp, 2017). Whereas we had hypothesized that adolescents' perception of school connectedness would be directly associated with NSSI behaviors, results did not support that notion. The lack of direct effects of school connectedness on NSSI is consistent with other studies that also accounted for multiple connectedness contexts (Bearman & Moody, 2004; Foster et al., 2017; Kidd et al., 2006), which may point to the interactions of these contexts that are often unexplored in connectedness studies. In general, however, multiple lines of research converge to suggest that positive parent-family connectedness is the most salient factor of reduced self-harm behaviors followed by school connectedness (e.g., Borowsky et al., 2013).

Also, our results are consistent with past research that has generally showed less support for the positive effects of peer and neighborhood connectedness on NSSI (e.g., Foster et al., 2017). One explanation may be that our peer connectedness measure addressed only the structural component of connectedness, when other research has found that the quality of the relationship matters (Whitlock et al., 2013). Additionally, some research suggests that knowing a friend who engages in the behavior may exert the most influence on self-harm behaviors (e.g., Deliberto & Nock, 2008; Pristien et al., 2010),

 suggesting that we still have much to learn about the different ways in which connections with peers influence use of NSSI. Neighborhood and community connectedness may be most beneficial for certain groups of adolescents not examined here. For example, one study found that positive connections with tribal elders among US indigenous youth was a protective factor against suicidal thoughts and behaviors (Borowsky, Resnick, Ireland, & Blum, 1999). Thus, future research should endeavor to measure the positive functions of peer and neighborhood connectedness to better inform our understanding of NSSI in mid-adolescence.

  Along with showing a direct effect on NSSI for parent-family connectedness, there were also indirect effects through bullying victimization and depressive symptoms. Likewise, school connectedness was indirectly associated with NSSI through bullying victimization and depressive symptoms. These findings are in line with an ecological systems theories approach to health risk behaviors in adolescents (Bronfenbrenner, 1986), which emphasizes that adolescent health risk behaviors are situated between individual (e.g., depressive symptoms) and interpersonal (e.g., family, school, bullying victimization) factors. The results also suggest that emotional processes, such as depressive symptoms, should be considered in theoretical frameworks of NSSI (Joiner, 2012; Van Orden et al., 2010). To the best of our knowledge, this is the first such study that has specifically examined with longitudinal data an integrated model of the role of bullying victimization and depressive symptoms between multiple forms of social connections in early adolescence and NSSI in mid-adolescence. Future prospective research on adolescent NSSI should consider incorporating these prominent psychological and social issues.

Differences in Path Model for Adolescent Girls and Boys

  Yet, the results also demonstrated differences for boys and girls regarding pathways to NSSI. For girls, parent-family connectedness and depressive symptoms were important direct predictors of NSSI. In addition, depressive symptoms linked parent and family and school connectedness to NSSI for girls but not in boys. Past research has found that family environments characterized by low support (indicating low connectedness) were linked to more NSSI behaviors in adolescent girls through higher emotion dysregulation problems (Hilt et al., 2008). Given that NSSI typically occurs in the context of emotional problems (Nock & Pristein, 2005), and that adolescent girls are at higher risk for depressive symptoms (Twenge & Nolen–Hoeksema, 2002), our findings further add to the research that that NSSI is at least partially dependent on social contexts and emotional processes for girls.

  For boys, being bullied in the 7th grade was the only significant director predictor of NSSI three years later. Additionally, bullying victimization formed an indirect link from parent and family and school connectedness and NSSI, suggesting that being a victim of traditional bullying may be of particular importance for understanding NSSI in boys. A cross-sectional study reported that boys who were victims of bullying were significantly more likely to self-harm compared to girls (Heilbron & Prinstein, 2010; O'Conner et al., 2009). Speculatively, the process from boys' connectedness with parents and school environments to NSSI may unfold through bullying victimization, in part because boys are less likely to disclose bullying victimization to parents and teachers

compared to girls (e.g., Aceves, Hinshaw, Mendoza-Denton & Page-Gould, 2010; Cortes & Kochenderfer-Ladd, 2014), and using NSSI could function as an extreme means of non-verbal communication (Claes, Vandereeycken, & Vertommen, 2007). Given that these preliminary results, more research needs to be conducted to better understand bullying victimization in the link between socioecological connectedness and NSSI for boys.

Strengths, Limitations, and Future Research

        One of the strengths of this study was examining the longitudinal relationships between multiple layers of socioecological connectedness and later NSSI in an integrative model. The majority of research to date has only examined associations among one or two of these levels, mostly via bivariate associations. The vast majority has used cross-sectional methods. Additional study strengths were the large community-based sample of diverse adolescents, the examination of longitudinal explanatory pathways between socioecological connectedness and NSSI, and exploring differences between girls and boys among these pathways at a high-risk time for NSSI behaviors. Limitations included NSSI, bullying victimization, and peer connectedness were measured using single items, which may result in reduced reliability. Furthermore, we assessed only adolescent perceptions of connectedness with people and their environments, yet past research has shown that in the context of NSSI, adolescents and parents differ in their perceptions of family functioning (e.g., Baetens et al. 2013). Thus, future research should include multi-informant reports and multi-item scales. We were unable to examine genders other than girls and boys. Past research has identified transgender youth as most at-risk for NSSI behaviors compared to their lesbian and gay counterparts, and in turn lesbian, gay and bisexual youth are at greater risk than their heterosexual counterparts (e.g., Taliaferro & Muehlenkamp, 2017; Walls et al., 2010). However traditional epidemiological research is insufficient, as many population-based surveys do not include measures concerning transgender identity (O'Brien et al., 2016). Examining transgender and gender non-conforming youth separately is a social justice matter. Additionally, we were not able to investigate mediational paths and change over time, which require measurement across three time periods (e.g., Singer & Willett, 2003). Finally, because tests of mediation are limited, even with experimental designs, and need to be cumulative across multiple studies and methods (Bullock, Green, & Ha, 2010), the present finding should be considered a starting point for future research to examine these associations further.

Implications

        Once replicated, these findings may guide family and school level programming efforts in reducing NSSI, specifically focusing on strategies that incorporate ways to lessen depressive symptoms for girls and bullying victimization for boys. Recent reviews of interventions for self-harm behaviors including NSSI have found that the most efficacious interventions focused on improving adolescents' relationships with parents and family (Glenn, Franklin, & Nock, 2015; Ougrin et al., 2015). Given our findings, it may be beneficial for adolescents who engage in NSSI to participate in family-based therapy strategies, particularly if the adolescent has also experienced depressive

symptoms and bullying victimization. Thus, programs that focus on strengthening positive parent practices, like parental monitoring and communication (features of parent-family connectedness), may result in NSSI reduction or cessation (Berger, Hasking, & Martin, 2017; Yip, 2005). Collectively, these findings underscore that healthy family environments are key in NSSI behaviors among adolescents.

On the other hand, schools have the unique ability to reach the vast majority of youth (Hasking et al., 2016), and is an environment where non-trivial amounts of victimization occurs (Turner et al., 2011), which can make prevention and intervention efforts particularly valuable in these settings. However, despite a call from researchers that schools are likely an effective environment to help reduce NSSI (cf. Heath, Toste & MacPhee, 2014), schools may be cautious about the iatrogenic effects that may occur with a sensitive behavior such as NSSI. Additionally, to the best of our knowledge we are not aware of a NSSI-specific prevention or intervention program in schools that focus on promoting connectedness. However, Sources of Strength, a school-based and peer-led suicide prevention approach builds on naturally occurring socioecological protective factors (Wyman et al., 2010), has found promising results in increasing youth-adult connections and emotion-regulation strategies and reducing suicide attempts (Pisani, et al., 2013). It is feasible then, that given NSSI has been identified as a unique predictor of suicidal behaviors (e.g., Klonsky, May, & Glenn, 2013) and that NSSI and suicidal behaviors share many of the same risk factors (e.g., bullying victimization and depressive symptoms; Nock et al., 2006), Sources of Strength could be adapted to include an NSSI-specific module (Whitlock, Wyman, & Moore, 2014). Clearly, future research is vital in this area to provide empirically-based prevention and intervention programming that reduce NSSI.

Clinically, medical professionals need routinely to screen for NSSI behaviors, bullying, and depressive symptoms, and inquire about adolescents' family relationships and school experiences as part of their health assessments. More specifically for girls, providers should pay special attention to depressive symptoms and ways to enhance connectedness with their parents, and for boys focus on bullying victimization, as these emerged as key predictors of NSSI among these groups. Finally, clinicians may consider guiding parents on how to connect with their child through positive parenting practices and discuss ways in which parents can be involved in promoting adolescents' connectedness to their school environment.

References

Aceves, M. J., Hinshaw, S. P., Mendoza-Denton, R., & Page-Gould, E. (2010). Seek help from teachers or fight back? Student perceptions of teachers' actions during conflicts and responses to peer victimization. *Journal of Youth and Adolescence, 39*, 658-669. 10.1007/s10964-009-9441-9

Arango, A., Cole-Lewis, Y., Lindsay, R., Yeguez, C. E., Clark, M., & King, C. (2019). The protective role of connectedness on depression and suicidal ideation among bully victimized youth. *Journal of Clinical Child & Adolescent Psychology, 48*, 728-739. 10.1080/15374416.2018.1443456

Asarnow, J. R., Porta, G., Spirito, A., Emslie, G., Clarke, G., Wagner, K. D., Vitiello, B., Keller, M., Birmaher, B., McCracken, J., Mayes, T., Berk, M., & Brent, D. A. (2011). Suicide attempts and nonsuicidal self-injury in the treatment of resistant depression in adolescents: Findings from the TORDIA Trial. *Journal of the American Academy of Child and Adolescent Psychiatry, 50*, 772-781. 10.1016/j.jaac.2011.04.003

Baetens, I., Claes, L., Martin, G., Onghena, P., Grietens, H., Leeuwen, K. V., Pieters, C., Wiersema, J. R., & Griffith, J. W. (2014). Is Nonsuicidal self-injury associated with parenting and family factors? *The Journal of Early Adolescence, 34,* 387-405. 10.1177/0272431613494006

Baiden, P., Stewart, S. L., & Fallon, B. (2017). The mediating effect of depressive symptoms on the relationship between bullying victimization and non-suicidal self-injury among adolescents: Findings from community and inpatient mental health settings in Ontario, Canada. *Psychiatry Research, 255*, 238-247. 10.1016/j.psychres.2017.05.018

Barber, B. K., & Schluterman, J. M. (2008). Connectedness in the Lives of Children and Adolescents: A Call for Greater Conceptual Clarity. *Journal of Adolescent Health, 43*, 209-216. 10.1016/j.jadohealth.2008.01.012

Bearman, P. S., & Moody, J. (2004). Suicide and friendships among american adolescents. *American Journal of Public Health, 94*, 89-95. 10.2105/ajph.94.1.89

Berger, E., Hasking, P., & Martin, G. (2017). Adolescents' Perspectives of Youth Non-Suicidal Self-Injury Prevention. *Youth & Society, 49*, 3-22. 10.1177/0044118X13520561

Bernat, D. H., & Resnick, M. D. (2009). Connectedness in the lives of adolescents. *Adolescent health: Understanding and preventing risk behaviors* (pp. 375-389). Jossey-Bass/Wiley.

Borowsky, I., Ireland, M., & Resnick, M. (2001). Adolescent suicide attempts: Risks and protectors. *Pediatrics, 107*, 485-493.

Borowsky, I. W., Taliaferro, L. A., & McMorris, B. J. (2013). Suicidal thinking and behavior among youth involved in verbal and social bullying: Risk and protective factors. *The Journal of Adolescent Health, 53*, S4-S12. 10.1016/j.jadohealth.2012.10.280

Bouffard, L. A., & Koeppel, M. D. H. (2014). Understanding the potential long-term physical and mental health consequences of early experiences of victimization. *Justice Quarterly, 31*, 568-587. 10.1080/07418825.2012.734

Bowlby, J. (1958). The nature of the child's tie to his mother. *The International Journal of Psychoanalysis, 39*, 350-373.

Brener, N., Collins, J., Kann, L., Warren, W., & Williams, B. (1995). Reliability of the Youth Risk Behavior Survey Questionnaire. *American Journal of Epidemiology, 141*, 575-80. 10.1093/oxfordjournals.aje.a117473

Bronfenbrenner, U. (1986). Ecology of the family as a context for human development: Research perspectives. *Developmental Psychology, 22*, 723-742.

Browne, M., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. A. Bollen & J. S. Long (Eds.), *Testing Structural Equation Models* (pp. 136–162). Newbury Park.

Bullock, J. G., Green, D. P., & Ha, S. E. (2010). Yes, but what's the mechanism? (don't expect an easy answer). *Journal of Personality and Social Psychology, 98*, 550-558. 10.1037/a0018933

Carlyle, K. E., & Steinman, K. J. (2007). Demographic differences in the prevalence, co-occurrence, and correlates of adolescent bullying at school. *The Journal of School Health, 77*, 623-629. 10.1111/j.1746-1561.2007.00242.x

Centers for Disease Control and Prevention. (2003). Youth Risk Behavior Survey Questionnaire. Available at: www.cdc.gov/yrbs.

Centers for Disease Control and Prevention. (2009). School connectedness: Strategies for increasing protective factors among youth.

Centers for Disease Control and Prevention. (2013). Strategic direction for the prevention of suicidal behavior: Promoting individual, family, and community connectedness to prevent suicidal behavior.

Chaplin, T. M., Gillham, J. E., & Seligman, M. E. P. (2008). Gender, anxiety, and depressive symptoms: A longitudinal study of early adolescents. *The Journal of Early Adolescence, 29*, 307-327. 10.1177/0272431608320125

Claes, L., Luyckx, K., Baetens, I., & Van de Ven, M., Witteman, C. (2015). Bullying and victimization, depressive mood, and non-suicidal self-injury in adolescents: The moderating role of parental support. *Journal of Child and Family Studies, 24*, 3363-3371. 10.1007/s10826-015-0138-2

Claes, L., Vandereycken, W., & Vertommen, H. (2007). Self-injury in female versus male psychiatric patients: A comparison of characteristics, psychopathology and aggression regulation. *Personality and Individual Differences, 42*, 611-621. 10.1016/j.paid.2006.07.021

Cook, C. R., Williams, K. R., Guerra, N. G., Kim, T. E., & Sadek, S. (2010). Predictors of bullying and victimization in childhood and adolescence: A meta-analytic investigation. *School Psychology Quarterly, 25*, 65-83. 10.1037/a0020149

Cortes, K. I., & Kochenderfer-Ladd, B. (2014). To tell or not to tell: What influences children's decisions to report bullying to their teachers? *School Psychology Quarterly: The Official Journal of the Division of School Psychology, American Psychological Association, 29*, 336-348. 10.1037/spq0000078

Costello, D. M., Swendsen, J., Rose, J. S., & Dierker, L. C. (2008). Risk and protective factors associated with trajectories of depressed mood from adolescence to early

adulthood. *Journal of Consulting and Clinical Psychology, 76*, 173-183. 10.1037/0022-006X.76.2.173

Esposito, C., Bacchini, D., & Affuso, G. (2019). Adolescent non-suicidal self-injury and its relationships with school bullying and peer rejection. *Psychiatry Research, 274*, 1-6. 10.1016/j.psychres.2019.02.018

Foster, C. E., Horwitz, A., Thomas, A., Opperman, K., Gipson, P., Burnside, A., Stone, D. M., & King, C. A. (2017). Connectedness to family, school, peers, and community in socially vulnerable adolescents. *Children and Youth Services Review, 81*, 321-331. 10.1016/j.childyouth.2017.08.011

Furlong, M. J., O'brennan, L. M., & You, S. (2011). Psychometric properties of the Add Health School Connectedness scale for 18 sociocultural groups. *Psychology in the Schools, 48*, 986-997. 10.1002/pits.20609

Glenn, C. R., Franklin, J. C., & Nock, M. K. (2015). Evidence-based psychosocial treatments for self-injurious thoughts and behaviors in youth. *Journal of Clinical Child and Adolescent Psychology, 44*, 1-29. 10.1080/15374416.2014.945211

Guan, K., Fox, K. R., & Prinstein, M. J. (2012). Nonsuicidal self-injury as a time-invariant predictor of adolescent suicide ideation and attempts in a diverse community sample. *Journal of Consulting and Clinical Psychology, 80*, 842-849. 10.1037/a0029429

Hankin, B. L., & Abela, J. R. Z. (2011). Nonsuicidal self-injury in adolescence: Prospective rates and risk factors in a 2 ½ year longitudinal study. *Psychiatry Research, 186*, 65-70. 10.1016/j.psychres.2010.07.056

Hasking, P. A., Heath, N. L., Kaess, M., Lewis, S. P., Plener, P. L., Walsh, B. W., Whitlock, J., & Wilson, M. S. (2016). Position paper for guiding response to non-suicidal self-injury in schools. *School Psychology International, 37, 644-663.* 10.1177/0143034316678656

Hay, C., & Meldrum, R. (2010). Bullying victimization and adolescent self-harm: testing hypotheses from general strain theory. *Journal of Youth and Adolescence, 39*, 446-459. 10.1007/s10964-009-9502-0

Heilbron, N., & Prinstein, M. J. (2010). Adolescent peer victimization, peer status, suicidal ideation, and nonsuicidal self-injury: Examining concurrent and longitudinal associations. *Merrill-Palmer quarterly (Wayne State University. Press)*, *56*, 388–419. 10.1353/mpq.0.0049

Health, N. L., Toste, J.R., & MacPhee, S.D. (2014). Prevention of nonsuicidal self-injury. In M.K. Nock. (Ed), *The Oxford Handbook of Suicide and Self-Injury,* (1st ed., pp. 397–408). Oxford University Press. 10.1093/oxfordhb/9780195388565.001.0001.

Hu, L. T., & Bentler, P. M. (1998). Fit indices in covariance structure modeling: Sensitivity to underparameterized model misspecification. *Psychological Methods, 3*, 424–453.

Hutchinson S.R. & Olmos, A. (1998). Behavior of descriptive fit indexes in confirmatory factor analysis using ordered categorical data. *Structural Equation Modeling: A Multidisciplinary Journal, 5*, 344-364, DOI: 10.1080/10705519809540111

Institute of Medicine (US) Committee on Pathophysiology and Prevention of Adolescent and Adult Suicide, Goldsmith, S. K., Pellmar, T. C., Kleinman, A. M., & Bunney,

W. E. (Eds.). (2002). *Reducing suicide: A national imperative*. National Academies Press (US).

Jacobson, C. M. & Gould, M. (2007). The epidemiology and phenomenology of nonsuicidal self-injurious behavior among adolescents: A critical review of the literature. *Archives of Suicide Research, 11,* 129-147. 10.1080/13811110701247602

Jaccard, J., Blanton, H., & Dodge, T. (2005). Peer influences on risk behavior: An analysis of the effects of a close friend. *Developmental Psychology, 41*, 135-147. 10.1037/0012-1649.41.1.135

Kaminski, J. W., Puddy, R. W., Hall, D. M., Cashman, S. Y., Crosby, A. E., & Ortega, L. A. G. (2010). The relative influence of different domains of social connectedness on self-directed violence in adolescence. *Journal of Youth and Adolescence, 39*, 460-473. 10.1007/s10964-009-9472-2

Kidd, S., Henrich, C. C., Brookmeyer, K. A., Davidson, L., King, R. A., & Shahar, G. (2006). The social context of adolescent suicide attempts: Interactive effects of parent, peer, and school social relations. *Suicide and Life-Threatening Behavior, 36*, 386-395. 10.1521/suli.2006.36.4.386

Kljakovic, M., & Hunt, C. (2016). A meta-analysis of predictors of bullying and victimization in adolescence. *Journal of Adolescence, 49*, 134-145. 10.1016/j.adolescence.2016.03.002

Klonsky, E. D. (2007). The functions of deliberate self-injury: A review of the evidence. *Clinical Psychology Review, 27*, 226-239.

Klonsky, E. D., May, A. M., & Glenn, C. R. (2013). The relationship between nonsuicidal self-injury and attempted suicide: Converging evidence from four samples. *Journal of Abnormal Psychology, 122*, 231-237. 10.1037/a0030278

Klonsky, E. D., Victor, S. E., & Saffer, B. Y. (2014). Nonsuicidal self-injury: What we know, and what we need to know. *The Canadian Journal of Psychiatry, 59*, 565-568. 10.1177/070674371405901101

Langille, D. B., Asbridge, M., Cragg, A., & Rasic, D. (2015). Associations of school connectedness with adolescent suicidality: Gender differences and the role of risk of repression. *Canadian Journal of Psychiatry, 60*, 258-267.

Leventhal, T. & Brooks-Gunn, J. (2009). Diversity in developmental trajectories across adolescence: Neighborhood influences. *Handbook of Adolescent Psychology (3rd ed.), John Wiley and Sons Inc,* Hoboken, NJ. 451-486.

Lloyd-Richardson, E. E., Perrine, N., Dierker, L., & Kelley, M. L. (2007). Characteristics and functions of non-suicidal self-injury in a community sample of adolescents. *Psychological Medicine, 37*, 1183-1192. 10.1017/S003329170700027X

Lucas, C.P., Zhang, H., Fisher, P.W., Shaffer, D., Regier, D.A., Narrow, W.E., & Friman, P. (2001). The DISC Predictive Scales (DPS): Efficiently screening for diagnoses. *Journal of the American Academy of Child & Adolescent Psychiatry, 40,* 443–449. http://dx.doi.org/10.1097/00004583-200104000-00013.

Marraccini, M. E., & Brier, Z. M. F. (2017). School connectedness and suicidal thoughts and behaviors: A systematic meta-analysis. *School Psychology Quarterly, 32*, 5-21. 10.1037/spq0000192

McNeely, C. A., Nonnemaker, J. M., & Blum, R. W. (2002). Promoting school connectedness: Evidence from the National Longitudinal Study of Adolescent Health. *Journal of School Health, 72*, 138-146. 10.1111/j.1746-1561.2002.tb06533.x

Merrill, R. M., & Hanson, C. L. (2016). Risk and protective factors associated with being bullied on school property compared with cyberbullied. *BMC Public Health, 16*, 145-155. 10.1186/s12889-016-2833-3

Modecki, J. M., Minchin, J., Harbaugh, A. G., Guerra, N.G., & Runions, K.C. (2014). Bullying prevalence across contexts: A meta-analysis measuring cyber and traditional bullying. *Journal of Adolescent Health, 55,* 602-611. 10.1016/j.jadohealth.2014.06.007

Monto, M. A., McRee, N., & Deryck, F. S. (2018). Nonsuicidal self-injury among a representative sample of US adolescents, 2015. *American Journal of Public Health, 108*, 1042-1048. 10.2105/AJPH.2018.304470

Muehlenkamp, J. J., & Gutierrez, P. M. (2007). Risk for suicide attempts among adolescents who engage in non-suicidal self-injury. *Archives of Suicide Research: Official Journal of the International Academy for Suicide Research, 11*, 69-82. 10.1080/13811110600992902

Muthén, L.K. & Muthén, B.O. (1998-2020). *Mplus User's Guide* (8th ed.). Los Angeles, CA: Muthén & Muthén.

Nansel, T. R., Overpeck, M., Pilla, R. S., Ruan, W. J., Simons-Morton, B., & Scheidt, P. (2001). Bullying behaviors among US youth: Prevalence and association with psychosocial adjustment. *The Journal of the American Medical Association, 285*, 2094-2100.

Nock, M. K., & Favazza, A. R. (2009). Nonsuicidal self-injury: Definition and classification. In Nock, M. K. (Ed.). Understanding nonsuicidal self-injury: Origins, assessment, and treatment, (pp. 9-18). *American Psychological Association*.

Nock, M. K., Joiner, T. E., Gordon, K. H., Lloyd-Richardson, E., & Prinstein, M. J. (2006). Non-suicidal self-injury among adolescents: Diagnostic correlates and relation to suicide attempts. *Psychiatry Research, 144*, 65-72. 10.1016/j.psychres.2006.05.010

Nock, M. K., & Kessler, R. C. (2006). Prevalence of and risk factors for suicide attempts versus suicide gestures: analysis of the National Comorbidity Survey. *Journal of Abnormal Psychology, 115*, 616-623. 10.1037/0021-843X.115.3.616

O'Brien, K. H. M., Putney, J. M., Hebert, N. W., Falk, A. M., & Aguinaldo, L. D. (2016). Sexual and gender minority youth suicide: Understanding subgroup differences to inform interventions. *LGBT Health, 3*, 248-251. 10.1089/lgbt.2016.0031

Ougrin, D., Tranah, T., Stahl, D., Moran, P., & Asarnow, J. R. (2015). Therapeutic interventions for suicide attempts and self-harm in adolescents: Systematic review and meta-analysis. *Journal of the American Academy of Child and Adolescent Psychiatry, 54*, 97-107.e2. 10.1016/j.jaac.2014.10.009

Pisani, A. R., Wyman, P. A., Petrova, M., Schmeelk-Cone, K., Goldston, D. B., Xia, Y., & Gould, M. S. (2013). Emotion regulation difficulties, youth-adult relationships, and suicide attempts among high school students in underserved communities. *Journal of Youth and Adolescence, 42*, 807-820. 10.1007/s10964-012-9884-2

Prinstein, M. J., Heilbron, N., Guerry, J. D., Franklin, J. C., Rancourt, D., Simon, V., & Spirito, A. (2010). Peer influence and nonsuicidal selfiInjury: Longitudinal results in community and clinically-referred adolescent samples. *Journal of Abnormal Child Psychology, 38*, 669-682. 10.1007/s10802-010-9423-0

Resnick, M. D., Bearman, P. S., Blum, R. W., Bauman, K. E., Harris, K. M., Jones, J., Tabor, J., Beuhring, T., Sieving, R. E., Shew, M., Ireland, M., Bearinger, L. H., & Udry, J. R. (1997). Protecting adolescents from harm: Findings from the National Longitudinal Study on Adolescent Health. *Journal of American Medicine Association, 278*, 823-832. 10.1001/jama.1997.03550100049038

Resnick, M. D., Ireland, M., & Borowsky, I. (2004). Youth violence perpetration: What protects? What predicts? Findings from the National Longitudinal Study of Adolescent Health. *Journal of Adolescent Health, 35*, 424.e1-424.e10. 10.1016/j.jadohealth.2004.01.011

Sastry, N., Ghosh-Dastidar, B., Adams, J., & Pebley, A.R. (2003). The design of a multilevel longitudinal survey of children, families, and communities: The Los Angeles Family and Neighborhood Study, Report DRU-2400/1-1-LAFANS, Labor and Population Program, RAND.

Schuster, M. A., Elliott, M. N., Kanouse, D. E., Wallander, J. L., Tortolero, S. R., Ratner, J. A., Klein, D. J., Cuccaro, P. M., Davies, S. L., & Banspach, S. W. (2012). Racial and ethnic health Ddsparities among fifth-graders in three cities. *New England Journal of Medicine, 367*, 735-745. 10.1056/NEJMsa1114353

Singer, J. D., & Willett, J. B. (2003). Applied longitudinal data analysis : Modeling change and event occurrence. *Oxford University Press.*

Sieving, R., Beuhring, T., Resnick, M., Bearinger, L., Shew, M., Ireland, M., & Blum, R. (2001). Development of adolescent self-report measures from the National Longitudinal Study of Adolescent Health. *Journal of Adolescent Health, 28*, 73-81.

Sieving, R. E., McNeely, C. S., & Blum, R. W. (2000). Maternal expectations, mother-child connectedness, and adolescent sexual debut. *Archives of Pediatrics & Adolescent Medicine, 154*, 809-816. 10.1001/archpedi.154.8.809

Swannell, S. V., Martin, G. E., Page, A., Hasking, P., & St John, N. J. (2014). Prevalence of nonsuicidal self-injury in nonclinical samples: Systematic review, meta-analysis and meta-regression. *Suicide & Life-Threatening Behavior, 44*, 273-303. 10.1111/sltb.12070

Taliaferro, L.A., McMorris, B.J., Rider , G.N., & Eisenberg, M.E. (2019). Risk and protective factors for self-harm in a population-based sample of transgender youth. *Archives of Suicide Research, 23*, 203-221. 10.1080/13811118.2018.1430639

Taliaferro, L. A., & Muehlenkamp, J. J. (2017). Nonsuicidal self-injury and suicidality among sexual minority youth: Risk factors and protective connectedness factors. *Academic Pediatrics, 17*, 715-722. 10.1016/j.acap.2016.11.002

Townsend, K. C., & McWhirter, B. T. (2005). Connectedness: A review of the literature with implications for counseling, assessment, and research. *Journal of Counseling & Development, 83*, 191-201. 10.1002/j.1556-6678.2005.tb00596.x

Turner, H. A., Finkelhor, D., Hamby, S. L., Shattuck, A., & Ormrod, R. K. (2011). Specifying type and location of peer victimization in a national sample of children

and youth. *Journal of Youth and Adolescence, 40*, 1052-1067. 10.1007/s10964-011-9639-5

Twenge, J. M., & Nolen-Hoeksema, S. (2002). Age, gender, race, socioeconomic status, and birth cohort differences on the children's depression inventory: A meta-analysis. *Journal of Abnormal Psychology, 111*, 578-588. 10.1037//0021-843x.111.4.578

Ungar, M. (2004). The importance of parents and other caregivers to the resilience of high-risk adolescents. *Family Process, 43*, 23-41. 10.1111/j.1545-5300.2004.04301004.x

Van Orden, K. A., Witte, T. K., Cukrowicz, K. C., Braithwaite, S., Selby, E. A., & Joiner, T. E. (2010). The interpersonal theory of suicide. *Psychological Review, 117*, 575-600. 10.1037/a0018697

Walls, N. E., Laser, J., Nickels, S. J., & Wisneski, H. (2010). Correlates of cutting behavior among sexual minority youths and young adults. *Social Work Research, 34*, 213-226. 10.1093/swr/34.4.213

Whitlock, J. (2010). Self-injurious behavior in adolescents. *PLoS Medicine, 7, e1000240.* 10.1371/journal.pmed.1000240

Whitlock, J., Muehlenkamp, J., Eckenrode, J., Purington, A., Abrams, G. B., Barreira, P., & Kress, V. (2013). Nonsuicidal self-injury as a gateway to suicide in young adults. *Journal of Adolescent Health, 52*, 486-492. 10.1016/j.jadohealth.2012.09.010

Whitlock, J., Wyman, P. A., & Moore, S. R. (2014). Connectedness and suicide prevention in adolescents: Pathways and implications. *Suicide & Life-Threatening Behavior, 44*, 246-272. 10.1111/sltb.12071

Wyman, P. A., Brown, C. H., LoMurray, M., Schmeelk-Cone, K., Petrova, M., Yu, Q., Walsh, E., Tu, X., & Wang, W. (2010). An outcome evaluation of the Sources of Strength Suicide Prevention Program delivered by adolescent peer leaders in high schools. *American Journal of Public Health, 100*, 1653-1661. 10.2105/AJPH.2009.190025

Yates, T. M., Tracy, A. J., & Luthar, S. S. (2008). Nonsuicidal self-injury among "privileged" youths: Longitudinal and cross-sectional approaches to developmental process. *Journal of Consulting and Clinical Psychology, 76*, 52-62. 10.1037/0022-006X.76.1.52

Yip, K. (2005). A multi-dimensional perspective of adolescents' self-cutting. *Child and Adolescent Mental Health, 10*, 80-86. 10.1111/j.1475-3588.2005.001

Table 1.

Sample Descriptives and Gender Differences for Study Variables.

	Overall sample		Gender		Gender difference
	(N=4115)		Girls (raw n=2093)	Boys (raw n= 2022)	
	Raw n	Weighted %	Weighted %	Weighted %	
Categorical Variables					χ^2 (df)
Gender					
Girls	2093	49.1	100.0	--	
Boys	2022	50.9	--	100.0	
Highest household education					χ^2 (1) = 5.19 (*p*=.16)
< high school graduate	539	17.2	18.4[a]	16.1[a]	
High school graduate/GED	897	23.7	24.1[a]	23.4[a]	
Some college or 2-year degree	1244	29.7	30.1[a]	29.4[a]	
≥ 4-year degree	1396	29.3	27.5[a]	31.1[b]	
Peer Connectedness					χ^2 **(1) = 6.50 (*p*=.011)**
Low connectedness	2350	51.0	59.5[a]	54.8[b]	
High connectedness	1765	49.0	40.5[a]	45.2[b]	
Victim of bullying					χ^2 **(1) = 8.25 (*p*=.004)**
Yes	1269	31.6	30.3[a]	32.7[b]	
No	2846	68.4	69.7[a]	67.3[b]	
NSSI Behaviors					χ^2 **(1) = 21.83 (*p*=<.001)**
Yes	267	6.5	8.2[a]	4.8[b]	
No	3848	93.5	91.8[a]	95.2[b]	

Continuous Variables	*M*	*SE*	*M*	SE	M	SE	*t*(df)
Parent-family connectedness	4.4	0.01	4.4[a]	0.18	4.4[a]	0.15	*t*(1, 115)=-1.10, *p*=.275
School connectedness	3.3	0.57	3.3[a]	0.01	3.2[b]	0.01	***t*(1, 115)=2.61, *p*=.001**
Neighborhood connectedness	2.4	0.01	2.3[a]	0.02	2.4[b]	0.01	***t*(1, 115)=-3.72, *p*=.001**
Depressive symptoms	1.6	0.03	1.7[a]	0.05	1.5[b]	0.02	***t*(1, 115)=3.30, *p*<.001**
Age at 10th grade	16.1	0.62	16.1[a]	0.62	16.2[b]	0.01	***t*(1, 115)=-3.03, *p*=.003**

Note: NSSI= non-suicidal self-injury; bold indicates significant gender difference
[a,b]Different letter superscript in a row represent significant differences between gender.

Table 2.

Correlation Matrix of Study Variables for Full Sample

Model Measures	1	2	3	4	5	6	7	8	9	10
1. Parent-family connectedness	1	--	--	--	--	--	--	--	--	--
2. Peer connectedness	**.04**	1	--	--	--	--	--	--	--	--
3. School connectedness	**.42**	**.08**	1	--	--	--	--	--	--	--
4. Neighborhood connectedness	**.19**	.02	.20	1	--	--	--	--	--	--
5. Victim of bullying	**-.12**	-.01	**-.13**	**-.06**	1	--	--	--	--	--
6. Depressive symptoms	**-.21**	-.01	**-.18**	**-.08**	**.22**	1	--	--	--	--
7. NSSI	**-.10**	**-.03**	**-.06**	**-.05**	**.08**	**.09**	1	--	--	--
8. Sex	.02	**-.05**	**-.05**	**.08**	**.04**	**-.04**	**-.07**	1	--	--
9. Highest household education	**.13**	**.01**	**.15**	**.07**	-.01	-.01	-.03	.03	1	--
10. Age at 10th grade	**-.08**	**-.04**	-.04	.03	.01	.02	.01	**.06**	**.05**	1

Note. NSSI =non-suicidal self-injury; gender = (0 = females; 1 = males). Bolded correlations = $p < .05$.

Table 3.

Indirect Path Coefficients and Fit Indices for Structural Model for Overall Sample and Gender

Specific Indirect Paths	Total Sample (raw N=4115)			Girls (raw n=2093)			Boys (raw n= 2022)		
	Unstandardized Coefficient (SE)	CI [95%]	p-value	Unstandardized Coefficient (SE)	CI [95%]	p-value	Unstandardized Coefficient (SE)	CI [95%]	p-value
Parent-family connectedness to bully victimization to NSSI	**-.03** (.01)	[-.007, -.046]	.02	-.02 (.02)	[-.047, .011]	.22	**-.04** (.02)	[-.071, -.002]	.04
Parent-family connectedness to depressive symptoms to NSSI	**-.03** (.01)	[-.003, -.052]	.001	**-.05** (.02)	[-.085, -.020]	.002	-.004 (.01)	[-.029, .021]	.74
Parent-family connectedness to bully victimization to depressive symptoms to NSSI	**-.01** (.01)	[-.001, -.010]	.02	**-.01** (.004)	[-.015, -.001]	.02	-.001 (.01)	[-.006, .004]	.74
Peer connectedness to bully victimization to NSSI	-.01 (.02)	[-.055, .008]	.63	-.02 (.04)	[-.053, .019]	.37	-.004 (.06)	[-.116, .108]	.94
Peer connectedness to depressive symptoms to NSSI	-.03 (.02)	[-.001, .06]	.06	-.04 (.04)	[-.046, .118]	.39	-.005 (.02)	[-.034, .035]	.74
Peer connectedness to bully victimization to depressive symptoms to NSSI	-.002 (.01)	[-.001, .008]	.88	-.007 (.01)	[-.025, .011]	.43	-.001 (.001)	[-.003, .003]	.94
School connectedness to bully victimization to NSSI	**-.03** (.01)	[-.047, -.005]	.02	-.02 (.02)	[-.050, .009]	.18	**-.04** (.02)	[-.069, -.001]	.04
School connectedness to depressive symptoms to NSSI	**-.02** (.01)	[-.029, -.005]	.004	**-.03** (.01)	[-.046, -.007]	.007	-.003 (.008)	[-.019, .013]	.73
School connectedness to bully victimization to depressive symptoms to NSSI	**-.01** (.01)	[-.010, -.002]	.02	**-.01** (.003)	[-.015, -.002]	.007	-.001 (.003)	[-.006, .004]	.69
Neighborhood connectedness to bully victimization to NSSI	-.01 (.01)	[-.025, .007]	.12	-.003 (.006)	[-.014, .008]	.56	-.03 (.02)	[-.073, .008]	.11

Neighborhood connectedness to depressive symptoms to NSSI	-.002 (.01)	[-.011, .007]	.71	-.001 (.01)	[-.016, .018]	.90	-.001 (.002)	[-.004, .003]	.78
Neighborhood connectedness to bully victimization to depressive symptoms to NSSI	-.003 (.01)	[-.006, .001]	.10	-.001 (.002)	[-.005, .003]	.50	-.001 (.002)	[-.006, .004]	.75
Fit indices									
$X^2,(df)$ [p-value]	9.44 (8) [>.30]			1.90 (4) [>.74]			8.20 (4) [>.09]		
CFI	.99			.99			.96		
TLI	.95			.97			.84		
RMSEA [CI]	.01 [.00 to .03]			.01 [.00 to .04]			.02 [.00 to .04]		

Note. NSSI=Non-suicidal self-injury; CI=confidence interval; CFI= comparative fit index; TLI=Tucker-Lewis Index; RMSEA= root mean square error of approximation.
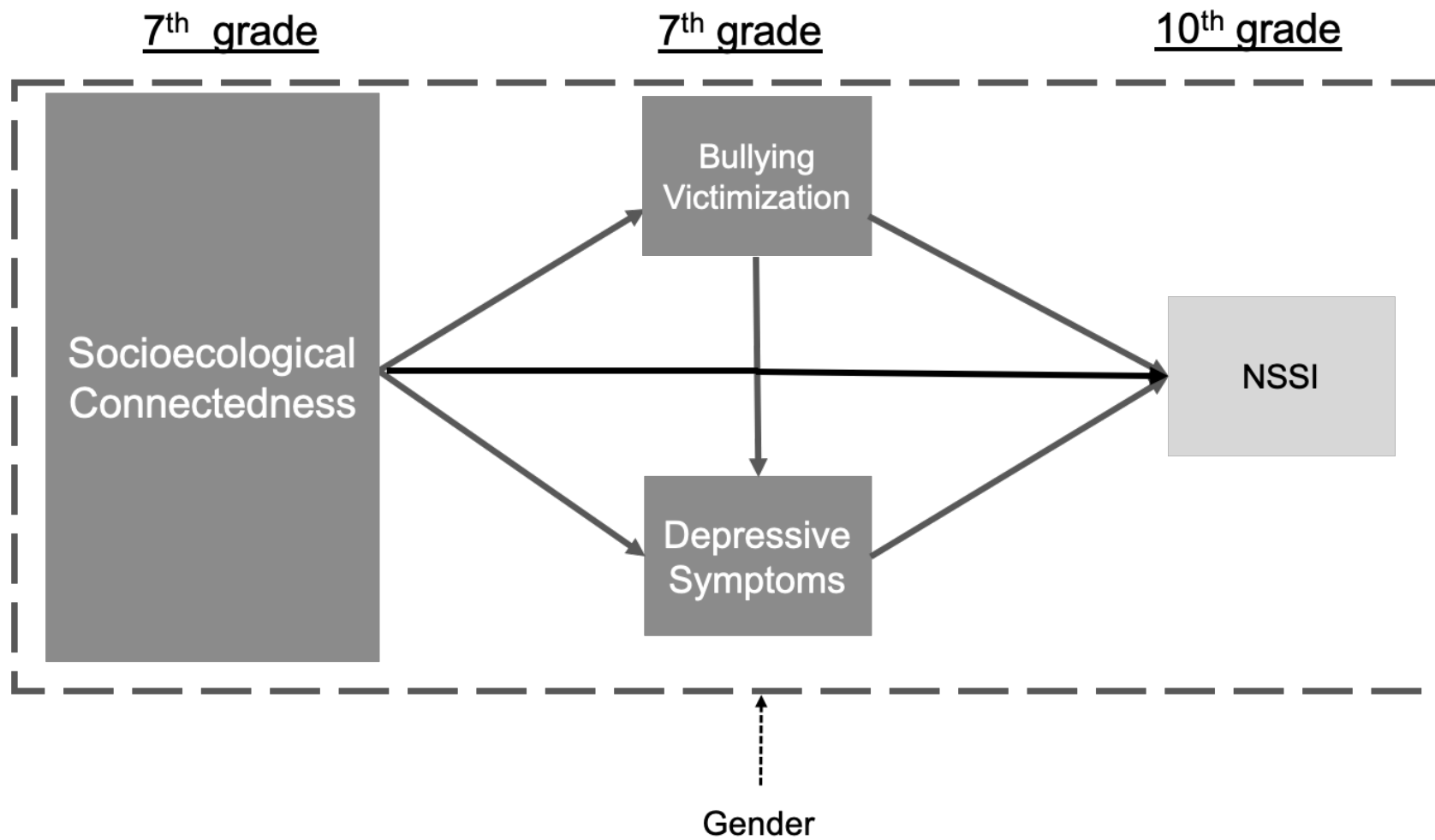
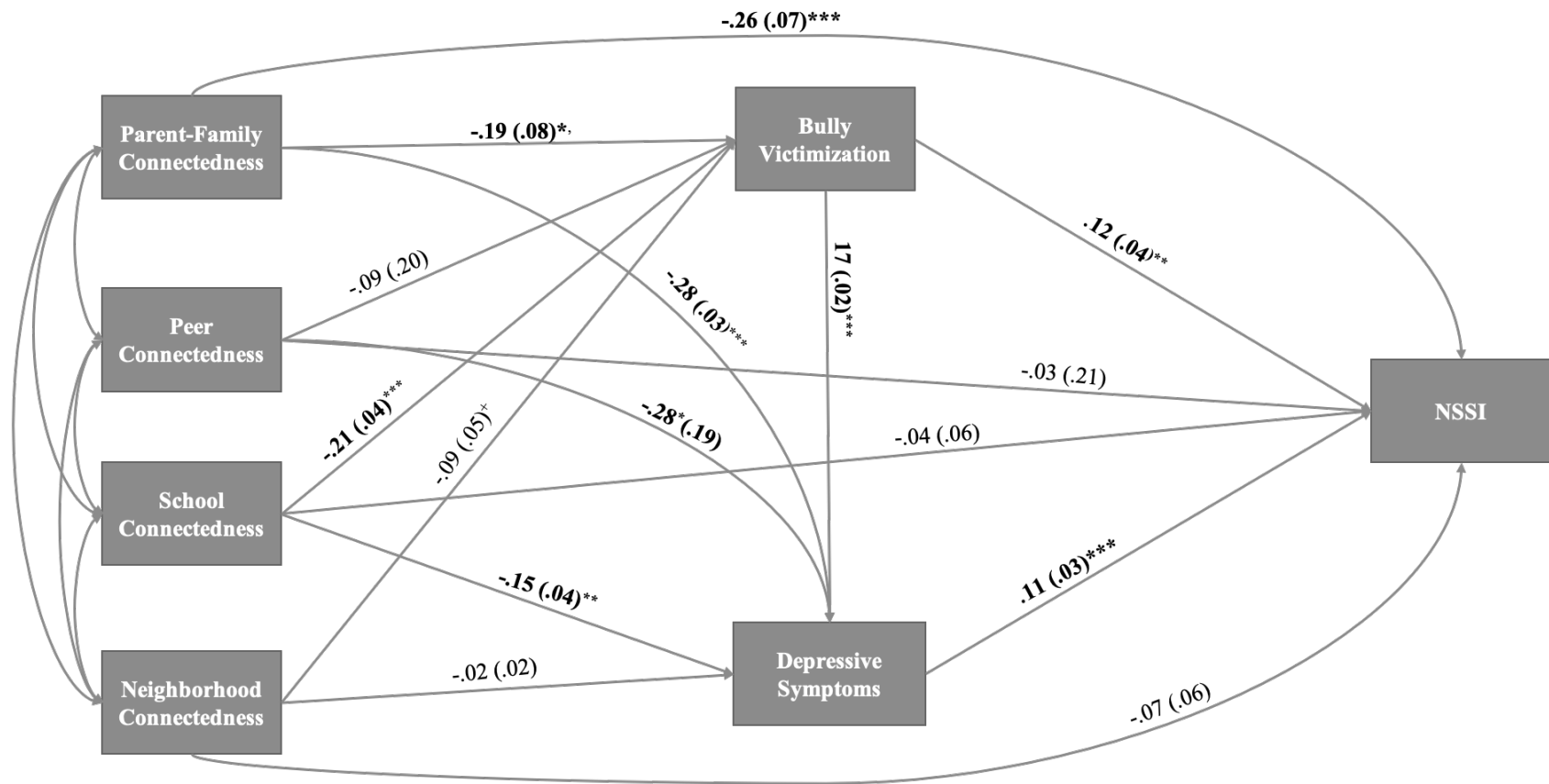*Figure 1*. Conceptual hypothesized study model; NSSI= non-suicidal-self-injury

Figure 2. Unstandardized path coefficients (standard errors) for the total sample (N=4115) structural model. Age at 10th grade and highest household education were controlled for on NSSI. Indirect path coefficients and fit indices are presented in Table 2. Bold indicates significant coefficients. NSSI= non-suicidal self-injury.
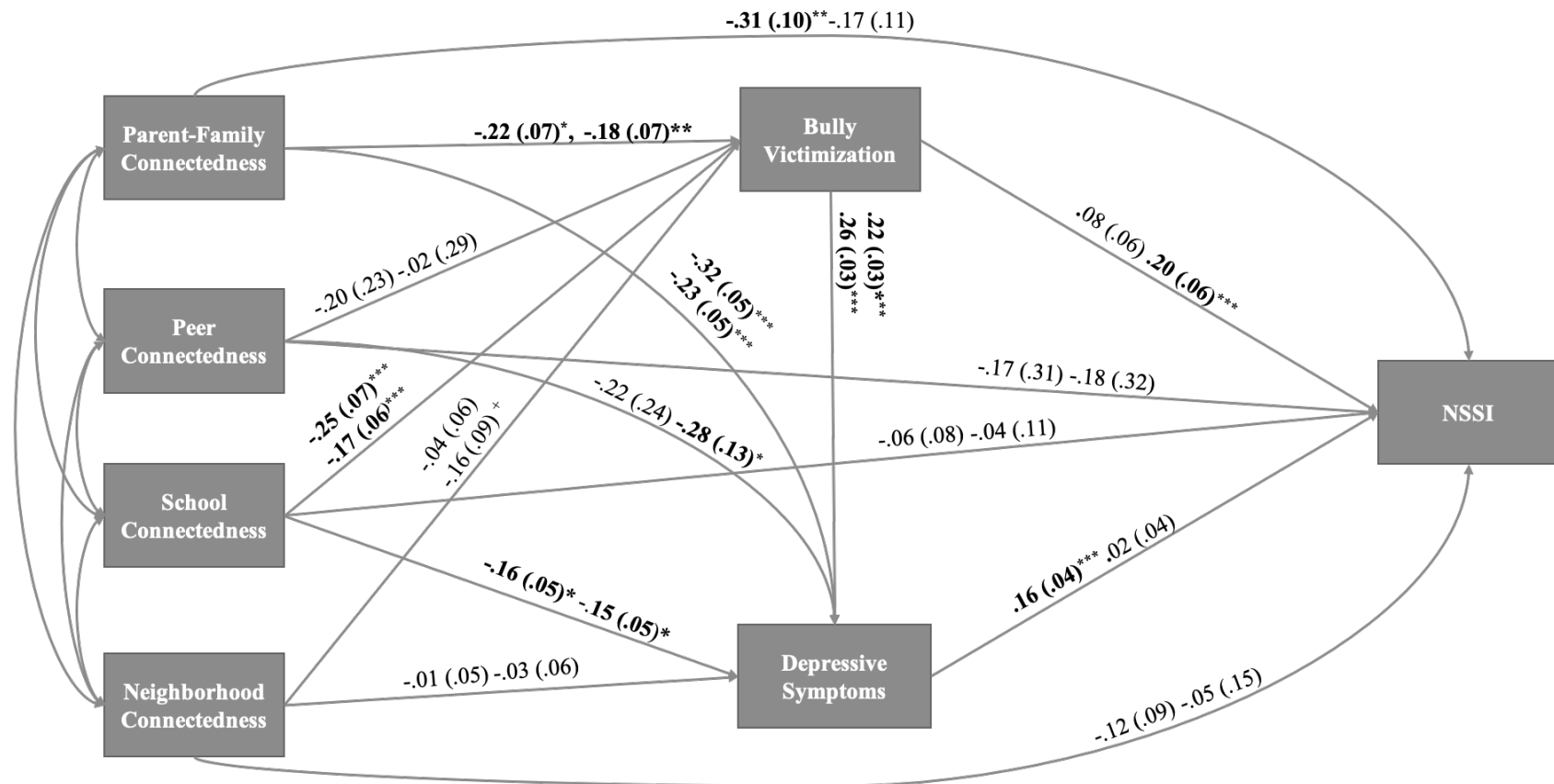*p < .05, **p < .01, ***p < .001

Figure 3. Unstandardized path coefficients (standard errors) for girls (n= 2093) and boys (n=2022) structural model. The first path coefficients for each path represents results for girls. Age at 10th grade and highest household education were controlled for on NSSI. Indirect path coefficients and fit indices are presented in Table 3.

NSSI= non-suicidal self-injury.

p < .05, **p* < .01, ***p* < .001, +p <.10.

Appendix

Correlation Matrix of Study Variables for Girl and Boys Samples

	Girls (raw n = 2093; above diagonal)								
Boys (raw n = 2022; below diagonal)	1	2	3	4	5	6	7	8	9
1. Parent-family connectedness	1	.03	**.44**	**.19**	**-.15**	**-.26**	**-.12**	**.11**	**-.12**
2. Peer connectedness	**.05**	1	.04	.01	**-.03**	**-.05**	**-.05**	.03	.01
3. School connectedness	**.42**	**.12**	1	**.19**	**-.14**	**-.22**	**-.10**	**.16**	**-.06**
4. Neighborhood connectedness	**.19**	.04	**.22**	1	**-.07**	**-.09**	**-.07**	.05	-.01
5. Victim of bullying	**-.12**	-.02	**-.11**	**-.07**	1	**.21**	**.11**	-.03	.03
6. Depressive symptoms	**-.18**	-.01	**-.19**	**-.08**	**.23**	1	**.12**	-.04	**.05**
7. NSSI	**-.06**	-.03	**-.03**	-.01	**.04**	**.12**	1	-.01	-.01
8. Highest household education[*]	**.16**	**-.07**	**.15**	**.09**	.02	-.01	**-.05**	1	**-.16**
9. Age at 10th grade[*]	-.04	-.01	-.02	**.05**	-.03	.001	.02	**-.09**	1

Note. NSSI =non-suicidal self-injury; gender = (0 = females; 1 = males).
[*]=control variables in multivariate models
Bolded correlations = $p < .05$.