Childhood Adversity in Adolescent Custodial Grandchildren: A Study of Daily Stressors, Emotional Dynamics, and the Efficacy of a Mobile Socio-Emotional Program

by

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A Dissertation Presented in Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy

Approved April 2023 by the
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ARIZONA STATE UNIVERSITY

May 2023

ABSTRACT

Guided by the Risky Families model and Daily Process methods, the present study examined how daily stressors are related to emotional well-being at the between- and within-person levels among adolescent grandchildren raised by grandmothers. This study also examined whether risk (i.e., adverse childhood experiences/ACES) and resilience (i.e., socio-emotional skills) factors were linked to differences in daily well-being, stressor exposure, and emotional reactivity, and evaluated the efficacy of an online social intelligence training (SIT) program on daily stressor-emotion dynamics. Data came from a subsample (n = 188) of custodial adolescents who participated in an attention-controlled randomized clinical trial and completed 14-day daily surveys prior to and following intervention. Analyses were conducted with dynamic structural equation modeling. Daily stressors, on average, and experiencing above average stressors, were associated with higher negative emotions and lower positive emotions and social connection. Those with more ACEs, on average, reported higher daily stressors and worse well-being, whereas those with higher socio-emotional skills, on average, reported lower daily stressors and better well-being. At the within-person level, more ACEs were associated with higher daily negative emotions. Nonverbal processing was linked to higher daily positive emotions and social connection. Conversational skills were associated with higher daily positive emotions and social connection, and lower, more inert daily negative emotions. Neither ACEs nor socio-emotional skills were associated with within-person reactivity to stressors. Also, the SIT program did not demonstrate efficacy for any outcome. My discussion focused on how findings extend the literature on custodial adolescents by showing that daily stressors impact well-being, offer knowledge

of how ACEs and socio-emotional skills shape daily stressor-emotion dynamics, and considers reasons why the online, self-guided SIT program failed to show efficacy on key outcomes.

DEDICATION

To the people growing up in the hood, you can do anything you set your mind to.

ACKNOWLEDGMENTS

I could not have made this journey over the past seven years without the support, encouragement, and love of many people. Through your sacrifices, Mom and Dad, you gave me the opportunity to pursue my dreams. To my Brother, I thought of you every step of the way. Dr. Frank Infurna and Dr. Leah Doane were the best mentors one could ask for. Your guidance and thoughtful feedback made this stressful endeavor a fun and rewarding journey. I appreciate Drs. Mary Davis, Kevin Grimm, and Dan McNeish sharing their expertise with me. Thank you, Dr. Sarah Okey, for your patience and generous love. I would not be here if it was not for Clay Jones introducing me to psychology in high school, Cindy Badalemente for encouraging me to apply to college when I did not believe in myself, and Armando Rivas for shaping my growth mindset. A special thanks to the teenagers who shared their social and emotional life for this study.

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INTRODUCTION

In the United States, there are 2.5 million households where grandparents, without presence of parents, are caring for custodial grandchildren under the age of 18 (U.S. Census Bureau, 2020). Since custodial grandparents are disproportionally more likely to be single women living in poverty, and custodial grandmothers typically provide the majority of care even in two grandparent households, this study focuses on grandmothers (U.S. Census Bureau, 2020).

A variety of circumstances lead to grandmothers taking care of their grandchildren, such as child maltreatment and parental mental illness, incarceration, and drug addiction (Haylsip, Fruhauf, & Dolbin-MacNab, 2019). The circumstances leading to care, combined with the demands of full-time parenting, have profound impacts on the social, mental, and physical health of custodial grandmothers and their adolescent grandchildren (Hayslip, Knight, Page, & Phillips, 2020; Hayslip et al., 2019). Adverse childhood experiences (ACEs) common to these families disrupt social relationships, emotion-regulation, and stress mechanisms that facilitate well-being and health across the life span (Miller, Chen, & Parker, 2011), which may transfer across generations, setting up family environments that increase odds of intergenerational transmission of trauma (Isobel, Goodyear, Furness, & Foster, 2019; Repetti, Taylor, & Seeman, 2002).

Previous research has documented that adolescents who have grandparents as custodians exhibit more emotional and behavioral problems than same-aged peers that are not in custodial circumstances (Smith & Palmieri, 2007). However, there is a lack of

knowledge on custodial adolescents' daily life experiences (e.g., socio-emotional well-being, stressor exposure, and emotional reactivity), whether there are identifiable resilience factors that promote positive outcomes, and a lack of low-cost, accessible programs that meet their socio-emotional needs (Hayslip et al., 2020). To fill this research gap, the present study utilizes a nation-wide sample of adolescent custodial grandchildren who participated in a randomized clinical trial (RCT) to examine daily stressor and emotion dynamics underlying mental and physical health in adolescence (e.g., emotional well-being, stressor exposure, emotional reactivity), whether risk (ACEs) and resilience (socio-emotional skills) factors predict differences in daily stressor and emotions dynamics, and evaluate an online socio-emotional intervention's effect on daily stressor and emotion dynamics. To examine daily processes at pre-intervention and intervention effects across time, the present study employs novel statistical approaches for intensive longitudinal data termed dynamic structural equation modeling to examine 14-day daily surveys completed prior to and following the intervention (McNeish & Hamaker, 2019).

Custodial Grandfamilies as Risky Families

The Risky Family Model (RFM) provides a framework for understanding how characteristics common among custodial grandfamilies (e.g., parental neglect and abuse of child, chronic stress) generate a cascade of risk beginning early in life, laying the groundwork for long-term mental health disorders, chronic physical diseases, and early mortality (Repetti et al., 2002). RFM proposes that the environment of risky families leads to deficits in youth's emotion-regulation and social skills, along with disruptions in

stress-responsive bioregulatory systems, that compromise mental and physical health over time. Experiences within risky families contribute to social information-processing biases and unhealthy schemas of self and others that undermine healthy relationships and heighten exposure to stressful experiences (McLaughlin, DeCross, Jovanovic, & Tottenham, 2019). Ultimately, RFM asserts that socio-emotional skills are a key aspect of well-being and health because they facilitate social bonds that provide support and lower stress across the lifespan (Umberson & Karas Montez, 2010).

As noted above, numerous circumstances lead to grandmothers taking care of their grandchildren, such as child maltreatment and parental mental illness, incarceration, and drug addiction (Haylsip et al., 2019). While some grandmothers live with their adult children and the grandchild they are caring for, others take care of their grandchild in the absence of the adult child in what have been called *skipped generation* families (as is the case in the current sample). Custodial grandmothers are often burdened by the perception and associated shame that they laid the foundation for the circumstances that led to them raising their grandchildren (Hayslip et al., 2019). In a recent qualitative study, researchers identified several themes from custodial grandparents on their needs and concerns related to raising their grandchildren (Hayslip et al., 2020). Grandparents reported being marginalized by and isolated from others, difficulty dealing with the grief, anger, and sadness towards their adult child, and coping with one's own emotions, as well as the emotional and behavioral problems of their grandchild. Many also reported dealing with financial strain and health difficulties, while having difficulty affording or accessing social, psychological, medical, and legal services. It is no surprise that the circumstances

leading to care, combined with the demands of full-time parenting, have profound impacts on the social, mental, and physical development of their adolescent grandchildren (Hayslip et al., 2019; 2020).

Adolescent custodial grandchildren tend to describe their relationships with biological parents with feelings of distrust, fear, sadness, and anger, whereas they describe relationships with grandparents with feelings of love, kindness, support, and commitment (Dolbin-MacNab & Keiley, 2009). Nonetheless, adolescent grandchildren also report stress and conflict with their custodial grandparents due to generational differences related to clothing, dating, household chores, leisure activities, and strict rules. Not surprisingly, compared to school peers, children in kinship care (i.e., cared for by a relative) have poorer study habits, attention and concentration skills, more aggressive and attention-seeking behaviors, and higher rates of grade retention and participation in special and remedial education (Dubowitz & Sawyer, 1994; Sawyer & Dubowitz, 1994). Children in kinship care are also more likely to be diagnosed with impaired vision and hearing, obesity, dental issues, and asthma (Simms, Dubowtiz, & Szilagyi, 2000). Adolescents growing up in households without both biological parents, compared to those raised in two-parent households, have exhibited lower academic performance, educational aspiration, self-esteem, and more behavioral problems (Sun, 2003). However, the research noted above examined youth raised by relatives, rather than youth raised by grandparents.

Few studies have focused specifically on youth raised by their grandparents. One study found that custodial grandchildren were reported to function more adaptively by

their grandmothers, compared to children living in nonrelative foster homes (Harnett, Dawe, & Russell, 2014). Another study comparing youth from custodial grandfamilies to age-matched, non-custodial peers found that custodial grandchildren were perceived by their grandmothers as having more emotional symptoms, conduct problems, hyperactivity/inattention, peer issues, and lower prosocial behaviors (Smith & Palmieri, 2007). Despite evidence that adolescent custodial grandchildren are at-risk of developing academic, interpersonal, mental, physical, and behavioral problems, there is a need for process-focused research that examines mechanisms by which risk/vulnerability and resilience factors influence their well-being. Given that there are no studies utilizing intensive longitudinal data methods to examine daily life among custodial adolescents (Townsend, 2012; Hayslip et al., 2019), the present study aims to build knowledge of how daily stressors, on average, and day-to-day fluctuations, are related to their emotional well-being. Moreover, considering the lack of interventions designed to meet the socio-emotional needs of custodial adolescents (Chan, Chen, Lo, Chen, Kelley, & Ip, 2018; Hayslip et al., 2019), the present study also evaluates the efficacy of an online social intelligence training (SIT) program on custodial adolescents' daily well-being, stressors exposure, and emotional reactivity.

Daily Stressors and Emotional Reactivity in Adolescence

Adolescence is a key developmental period between late childhood and early adulthood (i.e., 10 to 18 years old) that has both opportunities and stressors (Dahl, 2004). This phase is characterized by several shifts in school contexts, increased complexity of group interactions, and becoming increasingly self-aware and concerned with peer's

perspectives (Eccles et al., 1997; Steinberg, 2005). Adolescents begin to disengage from parental control by asserting more control over their decisions and behaviors (Lerner & Steinberg, 2004). These interpersonal changes overlap with drastic puberty-related changes in body composition and prefrontal-subcortical brain regions that underlie threat-processing and socio-emotional regulation (Gee et al., 2018). Adolescents show enhanced "bottom-up" processing of emotionally valanced stimuli that manifests as heightened emotional reactivity via frequent, intense emotional reactions to ever-changing contexts. Yet, they also exhibit inefficient "top-down" regulation that disrupts their ability to manage intense emotions because the prefrontal cortex matures at a slower pace. The intensified emotional experiences, coupled with regulation difficulties, leads to more volatile emotional fluctuations, making adolescence a key period to examine daily stressors and emotional reactivity (Heller & Casey, 2016, see below for further detail).

Daily process methods involve repeated measurements of individuals over time and across contexts that reduce the time between an experience and the report of that experience to limit retrospective bias, increase ecological validity, and enable the study of within-person processes (Almeida, 2005). The strength of daily diary studies and other intensive longitudinal data methods is their utility when investigating within-person relations of events and affect across time. Affect broadly refers to numerous states, including emotions, feelings, and mood, that include both negative and positive dimensions of psychological and physiological responses (Gyurak, Gross, & Etkin, 2011). Rather than considering negative and positive emotions as opposite ends of a single continuum, a two-dimensional model has become widely accepted (Watson &

Tellegan, 1985). Negative and positive emotions are both experienced in stressful situations (Folkman & Moskowitz, 2000), and it has been theorized that the capacity to experience both independently underlies well-being and health (Zautra, 2003).

Though daily stressors such as conflict with friends or family may seem benign, research shows that daily stressors negatively impact well-being as much as major life events (Kanner, Feldman, Weinberger, & Ford, 1987; Larson & Ham, 1993). Adolescents who report more daily stressors, on average, report more depressive symptoms (Sim, 2000) and have higher concentrations of inflammatory markers (i.e., C-Reactive Protein [CRP], Fuligni, Telzer, Bower, Cole, Kiang, & Irwin, 2009). Adolescents also report more physical health symptoms, negative emotions, and show higher bedtime cortisol levels on days they report more stressors than usual (Lippold, Davis, McHale, Buxton, & Almeida, 2016). They report more negative and less positive emotions at school on days they experienced above average school problems (Bai & Repetti, 2018), and elevations in emotional distress on days they experienced above average family conflict, even when accounting for ethnic background and gender (Chung, Flook, & Fuligni, 2009). Adolescents report higher anger, anxiety, and less friendliness on days they experienced friend conflict, compared to non-conflict days (Vannucci, Ohannessian, Flannery, De Los Reyes, & Liu, 2018). The consequences of daily stressors in adolescent's lives extends to increased psychotic symptoms a year later (Tessner, Mittal, & Walker, 2009). Although daily process methods have established links between daily stressors and well-being in adolescence, no study to date has examined these associations among adolescents in custodial care.

In addition to stressor exposure, daily diary methods have enabled the study of emotional reactivity to daily stressors, indexed as changes in emotion on days when stressors occurred compared to a person's stressor-free days (Charles et al., 2013; Sin et al., 2015). Research on daily emotional reactivity to stressors in adolescence has demonstrated that adolescents report increased negative and decreased positive emotions on days they report stressors (Schneiders Nicolson, Berkhof, Feron, van Os, & DeVries, 2006; Vannucci et al., 2018). Greater daily emotional reactivity has been concurrently associated with adolescents' loneliness, depression, and anxiety (Bai & Repetti, 2018; Herres, Caporino, Cummings, & Kendall, 2018; van Roeckel, Ha, Verhagen, Kuntsche, Scholte, & Engels, 2015). Heightened emotional reactivity to daily stressors has also been linked to elevated depressive symptoms 2 years later (Herres, Ewing, & Kobak, 2016) and from high school to first year of college (Anderson, Sladek, & Doane, 2020).

No study to date has examined daily stressor exposure and emotional reactivity among custodial adolescent grandchildren. The proposed study aims to examine these daily stressor-emotion dynamics, including not only negatively valanced outcomes but also positive outcomes, such as positive emotions and social connectedness, which are often neglected in the study of adolescent mental health (Gilbert, 2012). As such, this study represents a step towards understanding whether daily stressors disrupt positive emotions and social connection in adolescence. Moreover, understanding how daily stressors relate to well-being outcomes on average, and day-to-day, may help identify daily processes that can be targeted through interventions to boost the resilience of adolescent custodial grandchildren.

Adverse Childhood Experiences and Socio-Emotional Skills as Risk and Resilience Factors

Given the consequences of daily stressor exposure and emotional reactivity to daily stressors in adolescence, it is critical to identify risk and resilience factors that heighten or buffer these mechanisms. One risk factor to consider are adverse childhood experiences (ACEs) such as emotional, physical, and sexual abuse, and parental mental illness, incarceration, and drug addiction (Repetti et al., 2002), which overlap with circumstances leading grandmothers to take care of their grandchildren (Haylsip et al., 2019). Studies in adulthood emphasize the lifelong consequences of ACEs, linking them to higher psychological distress and lower well-being (Nurius et al., 2015; Schafer & Ferraro, 2013), as well as somatic symptoms (Schafer & Ferraro, 2013), inflammation (Danese et al., 2009; Hostinar et al., 2015), cardiovascular disease (Dong et al., 2004), obesity (Greenfield & Marks, 2009), cancer risk (Morton et al., 2012), and early disease onset and mortality (Chen et al., 2016; Felitti et al., 1998; Springer et al., 2007). Importantly, ACEs may exacerbate the effects of daily stressors on subsequent mental and physical health (Kong, Liu, Goldberg, & Almeida, 2021). Research in adolescence has demonstrated that ACEs are associated with poorer relationships with peers, greater delinquency (even when controlling for SES variables), higher rates of substance use and addiction, and unhealthy romantic relationships (Trickett et al., 2011). However, ACEs have not been directly examined among adolescent custodial grandchildren, emphasizing the value of research on how ACEs are associated with daily stressors and emotional well-being among this population.

Broadly, the harmful consequences of ACEs unfold over time through biopsychosocial mechanisms that increase risk for poorer well-being and health across the lifespan, including biological programming, behavioral habits, social relationships, and emotional and physiological reactivity to stressors (Miller et al., 2011). The present study focuses on two daily mechanisms that may underlie the effects of ACEs on well-being—perceptions of stressors and emotional reactivity to stressors. Theory and empirical work suggest that ACEs may shape stressor exposure and emotional reactivity in several ways: information processing biases related to identification of environmental threats, emotional responses to potential threats, learning mechanisms underlying the acquisition of fear, and disengagement from negative emotional content (McLaughlin & Lambert, 2017). Research in daily life has linked childhood adversity to increased stressor exposure, negative affect, and emotional reactivity to stressors across clinical and non-clinical samples in young adulthood and midlife (Cristóbal-Narváez et al., 2015; Glaser et al., 2006; Infurna et al., 2015; Kong, Martire, Liu, & Almeida, 2019; Nayman et al., 2021; Mayer et al., 2021; Tinajero et al., 2019; Weltz et al., 2016). Aside from a study showing greater emotional reactivity to daily stressors in adolescents from high-risk environments (Schneiders et al., 2006), no research to date has examined how ACEs shape daily well-being, stressor exposure, and emotional reactivity in adolescence, nor among custodial grandchildren.

Childhood adversity as a risk factor for many mental and physical health conditions is well-established, but much less is known about resilience factors that protect adolescent custodial grandchildren from disruptions in daily well-being, stressor

exposure, and emotional reactivity. A resilience framework emphasizes the need to identify resources that buffer adolescents from the downstream processes related to growing up in adverse environments (Luthar, Grossman, & Small, 2015). Research in adulthood on daily well-being, stressor exposure, and emotional reactivity has identified several resilience factors, including openness, conscientiousness, and extraversion (Leger, Charles, Turiano, & Almeida, 2016), social support (Almeida, 2005), trait reappraisal (Gunaydin, Selcuk, & Ong, 2016), and purpose in life (Hill, Sin, Turiano, Burrow, & Almeida, 2018). Little is known about resilience resources in the context of daily stressor exposure and emotional reactivity in adolescence. Previous resources in this area include self-control, mother-adolescent communication, and parental warmth (Galla & Wood, 2013; Lippold et al., 2016; Vannucci, Finan, Ohannessian, Tennen, De Los Reyes, & Liu, 2019). For example, self-control was associated with fewer daily stressors (Galla & Wood, 2013), and better communication between mother and adolescent lessened emotional reactivity in negative affect (Vannucci et al., 2019). Parental warmth also buffers emotional and physiological reactivity: adolescents who reported more parental warmth exhibited lower negative emotions and steeper cortisol decline than usual on less stressful days (Lippold et al., 2016). Given the impact of socio-emotional skills on adaptive functioning (Taylor et al., 2017), and to identify resources beyond temperament and parenting factors, this study examines self-reported socio-emotional skills, defined as non-verbal processing of social cues, conversational skills in situations and relationships, and situational awareness of how one's behavior impacts others

(Silvera, Martinussen, & Dahl, 2001), as resilience factors in the context of daily well-being, stressor exposure, and emotional reactivity in custodial adolescents.

Online Social Intelligence Training for Custodial Adolescents' Socio-Emotional and Stress Regulation: Childhood Adversity as a Potential Moderator of Intervention-Related Gains

A fundamental developmental task is learning to navigate one's social world (Baumeister & Leary, 1995). Considerable work confirms links between social relationships and mental and physical health across the lifespan. People with strong social ties have healthier cardiovascular functioning, more efficient immune responses to pathogens, suffer less disability in response to illness, and they live longer (Hawkley & Cacioppo, 2010; Holt-Lunstad et al., 2010). Anxiety and depression are linked to lost, or threatened social bonds, and those without social connections are at greater risk of suicide (Tsai, Lucas, & Kawachi, 2015; Umberson & Karas Montez, 2010). Resilience researchers have emphasized the value of emotion-regulation and social engagement amid life adversity (Davidson & McEwen, 2012; Infurna & Luthar, 2018).

The present study will utilize dynamic structural equation modeling to not only examine custodial adolescents' stressor-emotion associations at the between- and within-person levels (with pre-data), identify risk and resilience factors associated with daily well-being and stressor-emotion dynamics (with pre-data), but also evaluate intervention effects on daily processes within a randomized clinical trial of a socio-emotional program (with pre- and post-data).

Socio-emotional programs have shown well-documented improvements on children and adolescents' skills, attitudes, prosocial behaviors, emotional distress, and academic performance post-intervention and at follow up (Mahoney, Durlak, & Weissberg, 2018). Despite considerable advancements in socio-emotional programs for youth, almost all the programs tested are school-based and require significant resources to implement at scale (Sheridan, Smith, Moorman, Beretvas, & Park, 2019). There is a great need for resilience interventions aimed at improving socio-emotional skills, well-being, stressor exposure, and emotional reactivity that are accessible, affordable, and implemented in community settings (Luthar & Eisenberg, 2017; Wilhelm, Weingarden, Ladis, Braddick, Shin, & Jacobson, 2020). The present study proposes the first rigorous test of an online socio-emotional program, previously shown to improve college students' socio-emotional skills (Zautra, Zautra, Gallardo, & Velasco, 2015) and middle-aged adults' emotional reactivity to daily stressors (Castro et al., 2019), with adolescent custodial grandchildren, a severely at-risk, underserved population (Hayslip et al., 2019; 2020).

The capacity to regulate emotions and socially engage develops across the lifespan and is shaped by childhood experiences with caregivers and family (Bowlby 1969). Those exposed to ACEs often have more difficulty regulating emotions and engaging in positive social ties that protect against risk for mental and physical health problems (Repetti et al., 2002). Harsh family environments typically experienced by custodial families have been linked to more hostile and mistrusting beliefs in others, smaller social networks, and more strain and less social support across familial, romantic,

and friend relationships (Ebbert et al., 2019; Graves et al., 1998; Lynch et al., 1997; Sperry & Widom, 2013). However, experiences of childhood adversity do not preordain difficulties with emotions and relationships, nor do such difficulties, when present, determine health problems (Masten, 2001; Miller et al., 2011). This study addresses a significant scientific question: Are socio-emotional and stress regulation skills modifiable in adolescence through online interventions? Theoretical work proposes that these skills can be developed through training programs that promote self-reflection and prosocial intentional activities, especially for those who experienced ACEs (Davidson & McEwen, 2012). The heightened sensitivity to negative and positive events also suggests that those exposed to childhood adversity may be especially responsive to interventions designed to help them attain more positive social experiences (Infurna et al., 2015). The program tested here focuses on improving the socio-emotional and stress regulation of custodial adolescents, especially those with more ACEs, through an 8-hour, web-based course in social intelligence training (SIT).

Modern definitions of social intelligence include interpersonal skills (Eisenberg & Fabes, 1992), knowledge of social processes (Cantor & Kihlstrom, 2000), and commitment to reducing prejudice towards others (Castro & Zautra, 2016). With lesson plans informed by the latest in social neuroscience, psychology, and related fields (Castro, Infurna, Lemery-Chalfant, Waldron, & Zautra, 2019), the SIT program tested here frames social intelligence as modifiable, and is designed to enhance knowledge of how the mind develops social schemas from early life, and how to move beyond

automatic behavioral patterns to generate positive social relationships through consistent self-reflection and deliberate interpersonal behaviors (Snow, 2010).

A focus on enhancing the socio-emotional skills and stress regulation of adolescent custodial grandchildren is especially valuable for several reasons. First, adolescence is a period of rapid changes in neurobiology, cognition, and social environments, which interact to scaffold the development of key socio-emotional skills (Blakemore & Choudhury, 2016). Second, the adolescent developmental period is linked to increased perceptions of stress and emotional reactivity (Vijayakumar, Pfiefer, Flournoy, Hernandez, & Dapretto, 2019). Third, custodial adolescents navigate disruptions relationships involving their birth parents, while relationships with grandparents are developed or revised (Hayslip et al., 2019; 2020). Fourth, the ACEs common to custodial grandchildren tend to disrupt key socio-emotional skills and stress regulation (Repetti et al., 2002). And finally, there an absence of online interventions that directly targets this at-risk population (Chan et al., 2018). In line with these considerations, I plan to examine whether the online SIT program improves socio-emotional skills, daily well-being, stressor exposure, and emotional reactivity to stressors.

Methodological Advancements in Interventions and Intensive Longitudinal Data Analysis

One avenue to evaluate interventions beyond static measures of outcomes is with daily process methods that can shed light on intervention-related changes in within-person processes occurring in real-world contexts. For example, previous research had participants complete 30 daily surveys prior to and following in-person group

interventions and found reductions in emotional reactivity to daily stress (Davis et al., 2015). Similar daily methods have been infused into randomized trials of online interventions (Davis & Zautra, 2013). More recently, the online SIT program tested in this study was evaluated with daily diaries in a randomized active control trial with midlife adults (Castro et al., 2019). Participation in the SIT intervention led to improved daily socio-emotion regulation, measured via increased social engagement, emotional awareness, and perspective-taking. Individuals were also better able to maintain social engagement with close others on stressor days (i.e., lower reactivity to stressors) and on days without positive events (i.e., lower responsiveness to uplifts). Importantly, individuals who reported more childhood abuse showed the strongest increases in daily social engagement and emotional awareness. The present study examines whether similar improvements in socio-emotional skills and daily emotional reactivity can be realized among custodial adolescents.

The SIT program constitutes a mobile health (mHealth) intervention in that it can be delivered by online technologies such as smartphones and tablet devices (Schueller et al., 2013). mHealth is rapidly expanding and broadening mental health research and services arena in many ways (Jones, 2014). First, smartphones and tablets are an increasingly viable method for providing evidence-based interventions to youth and adults of varying ethnicities, income, and geographic regions (Poushter, 2016; Smith et al., 2015). Second, mobile tools can improve treatment efficiency, cost of services, and scale evidence-based programs to those with limited access, including those who live in under-resourced communities (Clough & Casey, 2015), or those who avoid human

services out of shame or embarrassment (e.g., custodial grandfamilies, Hayslip & Kaminski, 2005). Finally, mHealth tools provide opportunities to support behavior change, extending the reach of face-to-face treatment via on-demand access to psychoeducation, skills, activity suggestions for real-world practice, and design features that increase engagement. Cognitive and behavioral interventions are well suited for leveraging mHealth tools because these protocols are highly structured, implemented in sequential manner, and focus on self-monitoring and out-of-session skills practice (Baggett et al., 2010; Clough & Casey, 2015).

The proposed study combines daily diary methods with a risk and resilience framework that overcomes previous cross-sectional research on custodial adolescent grandchildren by studying within-person processes over time. The utilization of daily survey methods permits a nuanced understanding of how daily stressors correspond to changes in emotions for a given individual, while also testing whether individual differences indicative of risk or resilience account for within-person processes in daily stressors and emotions. Analyses will be done with dynamic structural equation modeling (DSEM), a statistical tool at the frontiers of modeling within-person processes (McNeish & Hamaker, 2019). A DSEM approach offers advantages by merging multilevel, time-series, location-scale, and structural equation modeling to allow for heterogenous autoregressions, latent factors, random intercepts, slopes, and residuals, while accounting for measurement error, missing data, and unequally spaced observations. Finally, the proposed study will combine daily survey methods with DSEM to evaluate improvements in socio-emotional and stress regulation mechanisms of adolescent

custodial grandchildren with an affordable and accessible online SIT program. This will be the first RCT test of an online socio-emotional program, offering the potential of a non-stigmatizing, affordable, and accessible treatment for this at-risk, underserved population (Chan et al., 2018).

The Current Study

The theories and supporting empirical literature reviewed above highlight how childhood adversities common to custodial adolescent grandchildren disrupt socio-emotional and stress regulation mechanisms. They also emphasize the need for resilience interventions that are accessible, affordable, and implemented in everyday settings rather than schools. This study contributes new knowledge in several ways. The current study is the first to examine how daily stressors, on average, and day-to-day fluctuations, are associated with daily well-being outcomes (e.g., negative and positive emotions, social connection) among adolescent custodial grandchildren. Second, taking a risk and resilience approach, this examination is the first to evaluate ACEs and socio-emotional skills as predictors of daily well-being and stressor exposure, and moderators of emotional reactivity to stressors in custodial adolescents. Third, this study is the first to test an online social intelligence training program's effect on custodial adolescents' socio-emotional skills, daily well-being, stressors exposure, and emotional reactivity to daily stressors. Fourth, this daily process study is the first to examine these constructs and evaluate treatment effects using dynamic structural equation modeling, a cutting-edge statistical analyses for intensive longitudinal data.

The current study has **three aims**. I will utilize survey data obtained from a RCT in which 351 custodial adolescents (aged 10 to 18) across the United States were randomized to either SIT or an active control condition (ACC) program on health information. Specifically, I will examine questionnaires and daily survey data collected 14-days prior to beginning and 14-days following completion of either the SIT or ACC. Aim 1 and 2 will be examined only with pre-intervention data, whereas Aim 3 will be assessed with pre-to-post-intervention data. **Aim 1** will determine whether daily stressors are related to well-being outcomes: (A) on average and (B) in day-to-day analyses indicative of within-person processes among custodial adolescents. Given previous work on daily stressors in adolescence (e.g., Bai & Repetti, 2018; Chung et al., 2009; Fuligni et al., 2009; Lippold et al., 2016; Sim, 2000; Tessner et al., 2009; Vannucci et al., 2018), **Hypothesis 1** is that daily stressors will be associated with higher negative affect, and lower positive affect and social connection both on average and within-person.

Aim 2A will assess whether ACEs predict daily well-being and stressor exposure, and moderate emotional reactivity (i.e., within-person associations between stressors and well-being outcomes). Based on prior work in young adulthood and midlife (Cristóbal-Narváez et al., 2015; Glaser et al., 2006; Infurna et al., 2015; Nayman et al., 2021; Mayer et al., 2021; Tinajero et al., 2019; Weltz et al., 2016), **Hypothesis 2A** is that more ACEs will be associated with higher negative affect and stressor exposure, lower positive affect and social connection, and heighten emotional reactivity (i.e., increase the within-person associations between stressors and well-being outcomes). **Aim 2B** will assess whether socio-emotional skills predict daily well-being and stressor exposure, and moderate

emotional reactivity. Considering the adaptive benefits of socio-emotional skills (Mahoney et al., 2018), **Hypothesis 2B** is that higher socio-emotional skills will be associated with lower negative affect and stressor exposure, higher positive affect and social connection, and buffer emotional reactivity (i.e., lessen the within-person associations between stressors and well-being outcomes).

Aim 3A will test whether an online SIT intervention modifies adolescents' socio-emotional skills, daily well-being, stressor exposure, and emotional reactivity. Based on a previous evaluation of the SIT program with midlife adults (Castro et al., 2019), **Hypothesis 3A** is that the SIT group will report improved socio-emotional skills (indexed via global questionnaires), higher positive affect and social connection, lower negative affect and stressor exposure, and attenuated emotional reactivity. **Aim 3B** will test if SIT-related gains are pronounced for adolescents who report more ACES. Given prior work on the SIT program showing greater responsiveness for those who experienced more childhood abuse (Castro et al., 2019), **Hypothesis 3B** is that those who report more ACEs, on average, will show the strongest improvements in socio-emotional skills and daily stressor-emotion dynamics.

CHAPTER 2

METHODS

Participants and Procedure

Participants were drawn from a RCT examining the efficacy of an online SIT program delivered to custodial grandmothers (CGMs) and a target adolescent custodial grandchild (ACG). The overall RCT included 349 CGM and ACG dyads who were recruited from 44 states (see Smith et al, 2022). Inclusion criteria were that CGMs provided care to the target ACG for at least six months in their homes (in the absence of ACG's birth parents), were without cognitive impairments, and fluent in English. Recruitment occurred nationwide with a multipronged approach (e.g., e-mails to high school counselors and principals, social service and health providers, advocacy and support groups; written announcements and brochures; and targeted mailing lists). The present study used data from 188 ACGs who were randomized (with an online tool) into participating in 14-day daily survey bursts prior to and following either intervention.

Only this subsample of 188 CGM and ACG dyads enrolled in the RCT participated in daily diary data collection, which was done under a planned missingness research design. The analytic sample of adolescents (n=189) were primarily females (59.8%) who were 14.2 years of age (Range = 11 to 18), White (64.6%), and non-Hispanic (86.8%). Grandmothers averaged 61 years of age (SD = 5.66, range 46 to 80), were primarily White (75%) and non-Hispanic (93%), caring for target ACG for 4.49 years (SD = 1.76, range 1 to 7), and caring for 1.97 grandchildren (SD = 1.04, range 1 to 7). A large proportion of ACG (43%) and CGMs dwelled in households with income

below $26k (i.e., the poverty line for households of 4 members). Less than half of CGMs reported working full or part-time (39%) or being currently married (42.2%). Prominent reasons for AGC care were parental substance abuse (49.6%), neglect of the target adolescent (22.5%), parental incarceration (18.6%), and parents' unwillingness to provide care (17.5%).

Assent forms were obtained for the 349 adolescent participants. Participants were instructed to answer all questions honestly, yet they were also informed during the consent process that they had the right to not answer any given item. All measures were randomly ordered to minimize reactivity effects and ACE items were always presented last to reduce distress. After enrollment, a subsample of 188 participants were randomly assigned (prior to taking part in either the SIT program or ACC) to participate in the 14-day daily survey bursts prior to and following engagement with either program. Figure 1 shows the CONSORT diagram for this study. Participants were emailed a daily reminder with the questionnaire link and instructed to complete the diary each evening (preferably before going to sleep) through their smartphone or tablet provided for the RCT. Of the 188 adolescents assigned to complete daily surveys, 94 were enrolled into the SIT program, with 35 completing the entire program and providing daily survey data at pre- and post-treatment. There were 94 adolescents enrolled into the ACC, with 57 completing the entire program and providing daily survey data at pre- and post-treatment. Participants assigned to either condition were instructed to view the online 7-module, 42-session programs using a tablet provided as part of the RCT. They were provided a username and password, and were instructed to complete one module per week. Each

module lasted approximately 60-90 minutes. Average completion time for SIT program was 8.18 weeks (*SD* = 4.62, range: 1.86 to 25.43) and 7.94 weeks (*SD* = 4.20, range: 1.43 to 24.29) for the ACC.

Social Intelligence Training Intervention

The SIT program encompassed 42 brief audio-visual content videos, structured into 7 thematic modules, that are self-guided and accessed through an online website. Each session contained a video lesson that ranged from 5-15 minutes, followed by reflection questions designed to provoke thoughtful attention to current and past experiences relevant to the material presented. Each session ended with instructions that moved the participant from awareness to a practice exercise intended to enhance readiness to change and self-efficacy. The sessions built on one another, gradually increasing in depth of awareness and cognitive-behavioral engagement with material to instill the habit of socially intelligent reasoning and thoughtful behavior.

The SIT intervention was designed to broaden knowledge of processes related to social development and interactions (Kihlstrom & Cantor, 2011), and modify key socio-emotional skills regarding how people engage with others (Masi, Chen, Hawkley, & Cacioppo, 2010). It includes attention to evidence of barriers to social-emotional development from adverse childhood experiences (McLaughlin et al., 2019), framing social intelligence as a set of knowledge and skills that can be applied and improved with consistent self-reflection and deliberate actions (Snow, 2010). Four meta-cognitive principles provide the curriculum foundation. The first is *humanization*, which proposes that social relationships are enhanced by deliberately considering the humanity in other

people (Castro & Zautra, 2016). The second is that humans need *social connection* to survive and thrive (Lieberman, 2013). The third is *automaticity* biases and guides much of human thought and behavior (Bargh & Williams, 2006). The fourth, *uniqueness*, emphasized that each human is a unique blend of genetics, environmental experiences, and choices (Boyce, Levitt, Martinez, McEwen, & Shonkoff, 2021).

The four meta-cognitive principles guided development of the 42-session online curriculum, which are organized around seven thematic modules briefly described below (for more information, see socialintelligenceinstitute.org and Castro et al., 2019). The first module, *neuroplasticity*, addressed brain development and the life-long capacity of each person to form new neuro-connections that can support future social relations and habits (Klimecki, Leiberg, Ricard & Singer, 2013). The second module, *(non)conscious*, described how the brain processes information in conscious and nonconscious ways, guided by individual schemas and heuristics, as well as overarching cognitive biases (Kahneman, 2011). The third module, *mindreading*, elaborated on perspective-taking as a skill that improves with conscious attention to the feelings and thoughts of others (Galinsky et al., 2005). The fourth module, *them*, discussed in-group and out-group biases, emphasizing how one's thoughts and behavior toward others are shaped by in-group favoritism and out-group prejudice, which often occurs outside of conscious awareness (Harris & Fiske, 2006; Haslam, 2006). The fifth module, *face-to-face*, discussed the ebb and flow of positive face-to-face social interactions as well as factors that disrupt and boost that natural cadence (Reis et al., 2012; Ybarra & Winkielman, 2012). The sixth module, *the past*, addressed how past experiences, particularly

interactions with caregivers and close others early in life, shape schemas and heuristics related to trust and intimacy in social relationships (Bowlby 1969). The final module, *choice*, emphasized that each person has the capacity to modify their schemas/heuristics, repair long-standing relationships, and form new social connections through both self-awareness and consistent behavioral efforts (Snow, 2010).

Active Control Condition: Healthy Living Tips

The active control condition (ACC) was referred to as The Healthy Living program, which provides information about different aspects of health. The program is expanded from prior online attention-control conditions (see Davis & Zautra, 2013). The ACC encompassed 42 brief sessions that were delivered online and each embedded into one of seven modules: Heart Health and Exercise; Sleep; Aging; Oral Health; Nutrition; Relaxation; and Cold and Flu. The course followed the same structure as the SIT program, gradually presenting new material in short, engaging videos. Each session contained a 5–15-minute video lesson, and reflection questions where participants evaluate their health choices. After each module, participants were awarded a digital badge for their achievement. Engagement was also encouraged by gamification and animated whiteboards after each module that review the covered concepts. The ACC controlled for non-specific factors associated with providing attention to participants that may yield positive outcomes in the absence of specified treatment. It also provided a face valid minimal intervention that prevents differential dropout between the two conditions.

Global Measures

Adverse Childhood Experiences (ACEs). During the baseline portion of the RCT, participants completed an ACEs questionnaire that consisted of 14 items: 11 items from the Behavioral Risk Factor Surveillance System Adverse Childhood Experiences Module (Centers for Disease Control and Prevention, 2009), as well as 3 items from the ACE-IQ (WHO, 2018) that measured neighborhood violence, peer bullying, and parental death. Items were scored dichotomously (0 = *no*; 1 = *yes*) and summed together to create an overall total ACE score. Adolescents reported, on average, 4.36 ACEs (SD = 2.94, range 0 to 14), with 59.4% experiencing 4-14, 32.6% reporting 1-3, and 8% reporting no ACES.

Socio-Emotional Skills. Participants reported on their own social and emotional skills via 21 items from the Tromso Social Intelligence Scale (Silvera, Martinussen, & Dahl, 2001). Three distinct sub-scales were included in this scale: non-verbal processing (alpha = 0.82; M = 4.77, SD = 1.14) as the ability to detect social cues and anticipate others' behaviors and feelings; communication skills (alpha = 0.74; M = 4.05, SD = 1.13) as the ability to meet new people and navigate conversations in social situations; and situational awareness (alpha = 0.77; M = 3.94, SD = 1.22) as the ability to understand others' intentions and the impact of one's own behavior on others. Adolescents reported on a 7-point scale how well they were able to perform each skill (1 = Describes me extremely poorly, 5 = Describes me extremely well). Socio-emotional skills were a mean composite of all 21 items (alpha = 0.82; M = 4.25, SD = 0.83).

Daily Survey Measures

Daily Negative and Positive Affect. Each day, participants completed the positive affect and negative affect scale, which totaled 17 items (Watson et al., 1988). The Negative Affect scale consisted of 9 items that assessed a general dimension of aversive affective states, such as feeling anxious, irritable, and distressed. The Positive Affect scale consisted of 8 items that assessed a general dimension of uplifting or positive affective states, such as feeling happy, loved, or hopeful. Respondents indicated how often they had felt this way during the past 24 hours on a 5-point scale (1 = Very slightly/not at all, 5 = Very much). Adolescents reported, on average, negative affect (M = 1.84, SD = 0.88) and positive affect (M = 3.46, SD = 1.04) at pre.

Daily Social Connection. Participants completed two items adapted from the UCLA Loneliness scale (1996) that indexed the capacity to feel engaged and "in tune" with close others. The specific wording for each item was "*I could stay engaged with the people I care about" and* "*I felt 'in tune' with the person/people in the one social interaction that matters most to me."* Respondents indicated the extent to which they felt this way today on a 5-point scale (1 = Not at all, 5 = Very much). The two items were aggregated to create one social connection variable. Adolescents reported, on average, social connection (alpha = 0.78; M = 3.43, SD = 1.16).

Daily Stressor Events. During completion of the online daily survey each evening, participants reported on daily stressor events from that day via items that were adapted from *The Inventory of Small Life Events* (Zautra, Guarnaccia, & Dohrenwend, 1986). The specific wording for daily stressors was, "*Which of these events concerning your grandchild, family members, and friends occurred today?".* The specific events for

grandmother were had an argument, criticized or blamed for something. The specific events for family were had an argument with a family member, and family member did not return call or text. The specific events for friends were had an argument with a friend and friend did not return call or text. Items (0 = *no*; 1 = *yes*) were summed to create a stressor events composite. On average, participants reported 0.85 daily stressors at pre-test (*SD* = 1.30, range: 0 to 6) and 0.62 (*SD* = 1.05, range: 0 to 6) at post-test.

Data Analytic Plan

The DSEM toolbox in *Mplus V8.4* (Muthen & Muthen; 1998-2017) was used to model within-person variability in multiple affect times series while also modeling between-person differences in dynamic stress-emotion regulatory processes (Asparouhov, Hamaker & Muthen, 2018). My analyses focused on intensive longitudinal data (i.e., daily diaries) collected for 14 days at pre-intervention (for Aims 1-2) and post-intervention (for Aim 3). Effect size estimation for nested data is complex, but simulation studies indicate that samples sizes >50 typically provide unbiased, accurate estimates (Mas & Hox, 2005). Continuous between-person indicators were grand-mean centered and daily stressors were latent-mean centered. Individuals that did not report variation in outcomes were excluded from analyses per DSEM default procedures. For **Aims 1 and 2**, the model had Level 1 (i.e., daily reports, n=2337) nested within Level 2 (i.e., individuals, n=188). DSEM enabled estimation of the effect of above-average daily stressors (i.e., continuous scale, 1 to 5) on each person's daily outcomes (i.e., stressor reactivities), which were allowed to vary for each person, and this variation was accounted for by inclusion of between-person predictors of ACEs, SE Skills, and

demographics (age, gender, ethnicity, and race). DSEM also enabled estimation of the effect of each person's outcome at one day on their own outcome in the subsequent day (i.e., inertias or autocorrelations), which were allowed to vary for each person, and this variation was accounted for by between-person covariates. Inertias were included for each outcome to model potential non-stationarity in each time-series (i.e., a linear time trend) and these inertias are required to accommodate trends with residualized DSEM (i.e., RDSEM models residuals rather than outcomes directly; see Asparouhov et al., 2018). Additionally, RDSEM required estimation of the time (i.e., numbers of days since first observation) effect on each person's outcome across their daily survey data collection (i.e., time-trend), which were allowed to vary for each person, and this variation was accounted for by between-person covariates. The proposed model for **Aim 1A/B** yielded estimates of average within-person processes of reactivity, inertia, and time-trend for each outcome (i.e., fixed effects). Inclusion of random effects allowed intercepts and paths (i.e., reactivity, inertia, and time slopes) to become latent variables at the between-person level, such that between-person differences in these latent variables could be accounted for. The proposed model for **Aim 2A/B** included ACEs and each SE Skill as predictors of all random effects, allowing for concurrent examination of whether risk and resilience factors accounted for between-person differences in the within-person means, reactivities, inertias, and time-trends in each outcome.

For **Aim 3**, the models had Level 1 (i.e., daily reports, n=3151) nested within Level 2 (i.e., individuals, n=188). Based on guidelines for pretest-posttest analysis using DSEM (Hamaker, Asparouhov, and Muthen, 2021), the proposed model for **Aim 3A**

tested pre-to-post intervention effects with daily diary data collected prior to and following intervention completion provided by both experimental and control groups. Specifically, the datafile was structured to differentiate variables associated with the first episode (pre-intervention) from the second episode (post-intervention), such that variables were separated for each episode and decomposed into within and between components for each episode separately, allowing for distinct slopes and residual variances at pre and post-intervention. Within-person intercepts and slopes (i.e., reactivity and inertia) were modeled separately for each outcome to minimize model complexity and ensure model convergence. Within-person time-trends were not included in pre-post models due to convergence issues, therefore DSEM was utilized rather than RDSEM. These pre-to-post models provided estimates examining pre-intervention group differences, as well as group differences at post-intervention, while accounting for pre-intervention variables. The proposed model for **Aim 3B** added ACEs as a moderator of post-intervention group differences (via an ACEs predictor and an ACEs by Group interaction predictor) to assess whether pre-to-post intervention effects were more pronounced for those with more ACEs.

For all models, results were considered statistically significant (i.e., non-null) if the 95% credible intervals of the posterior distribution summaries (the Bayesian analog of frequentist point estimates) did not contain zero, whereas effect sizes were obtained via R^2 estimates. Each posterior parameter was estimated using two Markov Chain Monte Carlo chains. The seed and starting values were generated randomly. Each chain had 3000 iterations, with a thin of 5. Model convergence was assessed with potential scale

reduction values below 1.1. Given that time-series analyses require stationarity (i.e., the assumption of no mean level changes, no time-related trends, as well as constant variance, autocovariance, and lagged covariance), augmented dickey-fuller tests were conducted (Dickey & Fuller, 1979) for the three outcomes variables (negative and positive affect and social connection) to evaluate mean-level and trend-level stationary.

CHAPTER 3

RESULTS

The analytic sample of 188 was comprised primarily of females (59.8%) who were 14.2 years of age (Range = 11—18), Caucasian (64.6%), and non-Hispanic (86.8%). On average, participants at pre-treatment (n = 188) completed 12.1 (70% did >10) and participants at post-treatment (n = 89) completed 9.3 surveys (47% did >10). The number of daily surveys completed across the RCT did not differ by any demographic (all *ps* > .09). Table 3 shows that the SIT and AC groups were comparable at baseline in demographics and outcomes, except the AC group had higher conversational skills and more total surveys completed across the RCT. Thus, random assignment yielded relatively equivalent groups at baseline on demographics and outcomes. Participants in the SIT and AC groups were not equally likely to stay in treatment. Completion rates favored the AC group, with 32% of SIT and 60% of AC participants completing all 7 modules (p > .001). Table 3 shows that completer and attritor groups were comparable across demographics and outcomes, except the completer group had higher situational awareness and daily positive affect. Thus, attrition was generally unrelated to demographics and outcomes, but was associated with group condition. Ratings offered voluntarily by participants after program completion suggested both conditions were viewed favorably.

Table 1 shows descriptive statistics and zero-order correlations for study variables at baseline. Correlations indicated that ACEs were negatively associated with socio-emotional skills (each separately and as a composite). Demographically, older age was

associated with lower daily stressors, daily positive affect and social connection, higher daily negative affect, and higher socio-emotional skills. Girls (relative to boys) reported lower daily positive affect, higher daily negative affect, and higher ACEs, as well as lower conversational skills and higher non-verbal processing and situational awareness. Latino/Hispanic adolescents (relative to non-Hispanics) reported higher daily positive affect, lower daily negative affect, more ACEs, and lower situational awareness. Black, Indigenous, and multiracial adolescents (relative to Whites) reported lower daily negative affect, less ACEs, and higher socio-emotional skills. Thus, age, gender, racial identity, and Latino/Hispanic identity were included as covariates in (R)DSEM. Augmented dickey-fuller tests confirmed mean-level and trend-level stationary for all outcomes.

Aim 1: Daily Stressors and Well-Being on Average and Within-Person at Pre

Based on correlational analysis (see Table 1), daily stressors were associated, on average, with lower levels of positive affect, social connection, and higher levels of negative affect. Results from DSEM (Table 4) indicated that experiencing more daily stressors than one's usual was associated with lower within-person mean levels (i.e., equilibrium) of positive affect (Est. = -0.09, 95% CI [-0.14, -0.05]), lower mean levels of social connection (Est. = -0.06, 95% CI [-0.10, -0.01]), and higher mean levels of negative affect (Est. = 0.22, 95% CI [0.17, 0.26]).

Aim 2A: ACEs, Daily Stressors, Well-Being, and Emotional Dynamics at Pre

Based on correlational analysis, ACEs were associated, on average, with higher daily stressor exposure and negative affect, and lower positive affect and social connection. DSEM results (Table 4) indicated that ACEs did not predict mean levels of positive affect

(Est. = -0.04, 95% CI [-0.08, 0.01]), social connection (Est. = -0.03, 95% CI [-0.07, 0.02]), or negative affect (Est. = 0.03, 95% CI [-0.01, 0.07]). ACEs did not predict emotional reactivity (i.e., within-person associations between stressors and outcomes) for positive affect (Est. = 0.01, 95% CI [-0.01, 0.02]), social connection (Est. = 0.01, 95% CI [-0.01, 0.02]), or negative affect (Est. = -0.01, 95% CI [-0.02, 0.01]). Similarly, ACEs were not associated with inertia (i.e., carryover from one observation to next) in positive affect (Est. = -0.02, 95% CI [-0.04, 0.01]), negative affect (Est. = -0.02, 95% CI [-0.04, 0.01]), or social connection (Est. = -0.01, 95% CI [-0.03, 0.01]).

Aim 2B: SE Skills, Daily Stressors, Well-Being, and Emotional Dynamics at Pre

Based on correlational analysis, SE Skills (each separately and as a composite) were associated, on average, with lower daily stressor exposure and negative affect, and higher positive affect and social connection. DSEM results indicated that specific SE Skills were differentially related to outcomes. Nonverbal processing was associated with higher mean levels of positive affect (Est. = 0.14, 95% CI [0.04, 0.25]) and social connection (Est. = 0.22, 95% CI [0.10, 0.34]), but not negative affect (Est. = -0.07, 95% CI [-0.16, 0.03]). Conversational skills predicted higher levels of positive affect (Est. = 0.17, 95% CI [0.05, 0.29]) and lower levels of negative affect (Est. = -0.14, 95% CI [-0.24, -0.03]), but not social connection (Est. = 0.11, 95% CI [-0.02, 0.24]). No SE Skills were not associated with daily emotional reactivity or inertia (see Table 4).

Aim 2: Sensitivity Analyses Accounting for Time Trend in Outcomes

Models were re-run using residualized dynamic structural equation modeling (RDESM) to account for non-stationarity in key outcomes (Asparouhov & Muthen, 2019). Specifically, a RSEDM model was conducted with identical structure as the aforementioned DSEM model (see Table 5), including a time-trend for each outcome and between-person prediction of that time-trend from ACEs, SE Skills, and covariates. Conversational skills now predicted higher negative affect inertia (Est. = 0.09, 95% CI [0.01, 0.17]). Nonverbal processing continued to predict higher mean levels of positive affect (Est. = 0.16, 95% CI [0.05, 0.31]) and social connection (Est. = 0.25, 95% CI [0.13, 0.37]). Conversational skills continued to predict higher levels of positive affect (Est. = 0.18, 95% CI [0.05, 0.31]) and lower levels of negative affect (Est. = -0.15, 95% CI [-0.26, -0.04]). Results for time-trends in outcomes indicated there were overall declines in negative affect (Est. = -0.13, 95% CI [-0.21, -0.05]) and social connection (Est. = -0.08, 95% CI [-0.15, -0.02]) across time. Higher situational awareness was associated with increased positive affect (Est. = 0.01, 95% CI [0.01, 0.02]) and attenuated declines in social connection (Est. = 0.01, 95% CI [0.01, 0.02]) across time. Conversational skill predicted heightened declines in social connection across time (Est. = -0.01, 95% CI [-0.02, -0.01]). Demographically, age predicted declines in positive affect across time (Est. = -0.01, 95% CI [-0.02, -0.01]). Black, indigenous, and multi-racial adolescents reported heightened declines in negative affect (Est. = -0.02, 95% CI [-0.04, -0.01]) and increased positive affect across time (Est. = 0.02, 95% CI [-0.01, 0.03]). This time-trend RDSEM (compared to DSEM without time-trends) accounted for additional variance in within-person positive affect (11%), social connection (10%), and

negative affect (8%), as well as additional variance in between-person positive affect (2%), social connection (6%), and negative affect (7%).

Aim 3A: Group Comparison of Pre-to-Post Changes in Key Outcomes

DSEM comparing pre-to-post changes across intervention and control groups were conducted for each separate outcome of positive affect, negative affect, and social connection to minimize model complexity and ensure model convergence. Results (Tables 6-8) showed that participation in the SIT program (relative to AC group) did not predict pre-to-post changes in mean levels of positive affect (Est. = 0.02, 95% CI [-0.19, 0.24]), positive affect stressor reactivity (Est. = 0.07, 95% CI [-0.11, 0.26]), or positive affect inertia (Est. = -0.02, 95% CI [-0.27, 0.24]). Participation in the SIT (relative to AC group) did not predict pre-to-post changes in mean levels of negative affect (Est. = -0.06, 95% CI [-0.32, 0.20]), negative affect stressor reactivity (Est. = -0.04, 95% CI [-0.18, 0.10]), or negative affect inertia (Est. = 0.08, 95% CI [-0.22, 0.33]). SIT participation (relative to AC group) did not predict pre-to-post changes in mean levels of social connection (Est. = -0.05, 95% CI [-0.36, 0.24]), social connection stressor reactivity (Est. = -0.01, 95% CI [-0.18, 0.19]), or social connection inertia (Est. = 0.03, 95% CI [-0.24, 0.29]).

Aim 3B: ACEs as Moderator of Pre-to-Post Changes in Outcomes Across Groups

DSEM examining ACEs as a moderator of pre-to-post changes across intervention and control groups were conducted for each separate outcome to minimize model complexity and ensure model convergence. Results indicated that ACEs did not moderate pre-to-post

changes across groups in mean levels of positive affect (Est. = -0.04, 95% CI [-0.14, 0.06]), positive affect stressor reactivity (Est. = -0.04, 95% CI [-0.11, 0.04]), or positive affect inertia (Est. = 0.01, 95% CI [-0.09, 0.10]). ACEs did not moderate pre-to-post changes across groups in mean levels of negative affect (Est. = 0.04, 95% CI [-0.06, 0.16]), negative affect stressor reactivity (Est. = 0.01, 95% CI [-0.05, 0.06]), or negative affect inertia (Est. = 0.03, 95% CI [-0.07, 0.14]). ACEs did not moderate pre-to-post changes across groups in mean levels of social connection (Est. = 0.01, 95% CI [-0.13, 0.15]), social connection stressor reactivity (Est. = 0.01, 95% CI [-0.06, 0.08]), or social connection inertia (Est. = 0.02, 95% CI [-0.07, 0.13]).

CHAPTER 4

DISCUSSION

With a nation-wide sample of adolescent custodial grandchildren who participated in an attention-controlled RCT, the present study used pre-intervention daily diary data to examine how daily stressors were associated with emotional well-being at the between- and within-person levels, and whether risk (i.e., ACEs) and resilience (i.e., socio-emotional skills) factors were related to differences in daily well-being, stressor exposure, and emotional reactivity. Guided by Risky Families theory (Repetti et al., 2002) and Daily Risk and Resilience framework (Almeida, 2005), I expected that daily stressors, both on average and within-person, would be associated with higher negative affect, and lower positive affect and social connection. As hypothesized, adolescents who reported more daily stressors, both on average and relative to their own mean, had higher negative affect, and lower positive affect and social connection. In addition, as hypothesized, correlational analyses indicated that those with more ACEs, on average, reported higher negative affect and stressor exposure, and lower positive affect and social connection. Contrary to expectation, more ACEs did not predict heightened within-person emotional reactivity in DSEM analyses. Correlational findings with socio-emotional skills were consistent with hypotheses, such that more socio-emotional skills, on average, were associated with lower negative affect and stressor exposure, and higher positive affect and social connection. However, contrary to hypotheses, socio-emotional skills did not predict buffered within-person emotional reactivity in DSEM analyses. Findings from pre-to-post DSEM analyses were contrary to expectations, such that those

in the SIT program did not report improvements in global socio-emotional skills or daily stressor-emotion dynamics. Moreover, contrary to hypotheses, those with more ACEs did not report greater improvements in outcomes. My discussion focuses on daily stressor-emotion dynamics and ACEs and socio-emotional skills as risk and resilience factors in the daily life of adolescents in the custody of their grandmothers.

Aim 1: Daily Stressors and Emotions of Adolescent Custodial Grandchildren at Baseline

A range of circumstances lead to grandmothers taking care of their grandchildren, such as child abuse and parental mental illness, incarceration, and drug addiction (Haylsip et al., 2019). The circumstances leading to custodial care, combined with the demands of full-time parenting for grandmothers, can have profound impacts on the social, mental, and physical health of adolescent grandchildren (Hayslip et al., 2020; Hayslip et al., 2019). According to the Risky Family Model (Repetti et al., 2002), the cumulative risk from childhood adversity (i.e., ACEs) lays the groundwork for long-term mental health disorders, chronic physical diseases, and early mortality, primarily through disruptions in youth's emotion-regulation, social skills, and stress-responsive bioregulatory systems that compromise mental and physical health over time. Less is known regarding the daily stressor and emotion dynamics of this population segment. Given that there are no studies utilizing intensive longitudinal data methods to examine daily life among custodial adolescents (Townsend, 2012; Hayslip et al., 2019), the present study offers novel evidence that daily stressors, both on average and in day-to-

day fluctuations, are related to their everyday negative and positive emotions, as well as sense of connection with close others.

Adolescence is a developmental phase between late childhood and early adulthood (i.e., 10 to 18 years old) that is characterized by several shifts in school contexts, more complex group interactions, and increasing awareness of oneself and peers (Dahl, 2004; Eccles et al., 1997; Steinberg, 2005). These interpersonal changes overlap with drastic puberty-related changes in body composition and prefrontal-subcortical brain regions that underlie stress-processing and socio-emotional regulation (Gee et al., 2018). Adolescence a key period to examine daily stressors and emotional reactivity based on the combination of intensified emotional experiences and self-regulation difficulties (Heller & Casey, 2016). My findings indicated that adolescents in the custody of their grandmothers indeed show a pattern of daily stressors impacting their well-being, such that more daily stressors, on average, were associated with higher negative emotions and lower positive emotions and social connection. These findings add to prior work showing that non-custodial adolescents who reported more daily stressors, on average, demonstrated more depressive symptoms and physiological stress via inflammatory markers (Fuligni, et al., 2009; Sim, 2000). The effect of average daily stressors on custodial adolescents' average levels of well-being and social connection are particularly important when considering that daily stress can negatively impact mental health symptoms a year later (Tessner et al., 2009). Using intensive longitudinal methods enables more precise measurement of daily stressor-emotion experiences at the between-person level can advance understanding of why adolescent custodial grandchildren

consistently display lower mental and physical health outcomes relative to same-aged peers.

Intensive longitudinal methods (such as daily diaries) in social sciences have primarily been used to examine within-person relations of events and emotions over time (Almeida, 2005). In addition to the between-person associations of daily stressors and socio-emotional well-being noted above, the present study showed that when custodial adolescents experienced more daily stressors than their average, they reported increased negative emotions and decreased positive emotions and social connection. These findings replicate previous research with non-custodial adolescents documenting within-person associations between daily stressors and increased negative emotions and decreased positive emotions (Bai & Repetti, 2018; Lippold et al., 2016; Schneiders et al., 2006; Vannucci et al., 2018). These findings also add novel insights to the literature on within-person stress processes in adolescence by showing that daily stressors are associated with decreased sense of social connection, which meets a call for inclusion of positively valanced outcomes often neglected in the study of adolescent mental health (Gilbert, 2012). Importantly, RDSEM analyses used a single model and Bayesian estimation to account for concurrent relations of daily stressors with negative emotions, positive emotions, and social connection, rather than separate models for each outcome, strengthening inferences drawn from the observed within-person associations (Asparouhov et al., 2018). The magnitude of within-person associations between stressors and emotions (i.e., differences in emotional reactivity) identified here in custodial adolescents may serve as important predictors of mental health symptoms

concurrently and across time, as seen in daily emotional reactivity being associated with non-custodial adolescents' loneliness, depression, and anxiety concurrently (Bai & Repetti, 2018; Herres et al., 2018; van Roeckel et al., 2015), and depressive symptoms from high school to first year of college (Anderson et al., 2020) and even 2 years later (Herres et al., 2016).

It is important to note that the RDSEM analysis reported on here were utilized to account for time-trends observed for all outcomes rather than the originally planned DSEM approach. Moreover, RDSEM made it necessary to include the autocorrelation of each outcome, which are an emotional dynamic (i.e., inertia) that may or may not confer risk for psychopathology (Dejonckheere, Mestdagh, Houben, Rutten, Sels, Kuppens, & Tuerlinckx, 2019; Houben, Van Den Noortgate, & Kuppens, 2015). Given that data collection for this trial occurred prior to and during the COVID-19 pandemic, a major public health emergency beginning in January 2020 that impacted adolescents mental health across the globe (Panchal, Salazar de Pablo, Franco, Moreno, Parellada, Arango, & Fusar-Poli, 2021), it is not surprising to observe trends in the time-series reflecting changes in the daily equilibrium (i.e., mean level) of negative and positive emotions and social connection. Though the pandemic arising during this RCT was not anticipated, its likely impact on the findings is supported by the fact that nearly 40% of the enrolled adolescents had not finished their pre-intervention daily diaries prior to January 2020.

Aim 2: Risk and Resilience Factors' Effect on Daily Stressors and Emotions at Baseline

Many circumstances leading grandmothers to take custody of their grandchildren, such as child abuse and parental mental illness, incarceration, and drug addiction (Haylsip et al., 2019), are analogous to contemporary measurement of adverse childhood experiences (BRFSS; CDC, 2009; WHO, 2018). Not surprisingly, custodial adolescents reported a high average of 4.36 ACEs, with nearly 60% reporting 4 or more ACEs, which is above samples of non-custodial adolescents in the U.S. who have reported an average of 1.2 to 2.7 ACEs, with only 9.7% to 36% reporting 4 or more ACEs (Balistreri, & Alvira-Hammond, 2016; Crandall, Broadbent, Stanfill, Magnusson, Novilla, Hanson, & Barnes, 2020). Prior research has estimated that high levels of cumulative risk from early adversity (i.e., 4 or more ACEs) can manifest as a 4 to 12 times greater odds of alcoholism, drug use consequences, depression, and suicide attempts in adulthood (Felitti et al., 1998). Though the heightened risk from more ACEs has been well documented, less is known on how ACEs impact daily stressor and emotion dynamics.

In light of the consequences of daily stressor exposure and within-person emotional reactivity to stressors in adolescence, it is critical to identify risk and resilience factors that heighten or buffer these mechanisms among a highly at-risk population like adolescent custodial grandchildren. Exposure to daily stressors and emotional reactivity are two mechanisms by which ACEs may negatively shape mental and physical health across development (McLaughlin & Lambert, 2017). As expected, more ACEs, on average, were associated with higher daily stressor exposure and negative emotions, and lower positive emotions and social connection. Adding to work showing the harm of ACEs on mental, behavioral, and interpersonal problems (Scully, McLaughlin, &

Fitzgerald, 2020; Trickett et al., 2011), these findings offer novel evidence for the negative effect of ACEs on daily stressor exposure, negative and positive emotions, and social connection during adolescence generally, as well as custodial adolescents in particular. The impact of ACEs on increased daily stressor exposure is noteworthy, particularly in the context of ACEs also magnifying the harmful effect of daily stress on subsequent mental and physical health (Kong et al., 2021). Contrary to expectation, more ACEs were only associated with a higher equilibrium (i.e., mean level) of daily negative emotions in RDSEM analyses. The higher equilibrium point of negative affect associated with more ACEs is important to note with prior work linking daily negative emotions to heightened physiological stress (i.e., flatter cortisol slopes) and partially accounting for comorbidity of depressive/anxiety disorders in adolescence (Doane, Mineka, Zinbarg, Craske, Griffith, & Adam, 2013). Future research may benefit from examining how ACEs shape between- and within-person emotional experiences, and whether such emotional differences underlie the effect on ACEs on subsequent mental and physical health during adolescence, and with custodial adolescents specifically.

Contrary to expectation, more ACEs did not predict heightened within-person emotional reactivity in RDSEM analyses, which is at odds with prior studies linking childhood adversity to increased daily emotional reactivity to stressors in adulthood (e.g., Infurna et al., 2015; Kong et al., 2019). Aside from one study showing that adolescents from high-risk environments (compared to low-risk) reported heightened emotional reactivity to daily stressors (Schneiders et al., 2006), no study to date has directly examined ACESs' effect on daily emotional reactivity during adolescence. More studies

are needed to further understand whether ACEs are unrelated to daily emotional reactivity in adolescence, if ACEs heighten reactivity specifically in adulthood, or whether emotional reactivity differs across time scales (e.g., momentary vs daily).

In contrast to well-established research on ACEs as a risk factor for worse mental and physical health, much less is known about resilience factors that protect adolescents, especially those in custodial care, from disruptions in daily well-being, stressors exposure and emotional reactivity (Luthar et al., 2015). As expected, the present study found that, on average, higher socio-emotional skills (each separately and as a composite) were associated with lower stressor exposure and negative emotions, and higher positive emotions and social connection. These findings add to previously documented resilience factors showing that self-control is associated with lower daily stressor exposure and negative emotions in adolescence (Galla & Wood, 2013). Socio-emotional skills have been linked to adaptive functioning across several domains (Taylor et al., 2017), and the present study identified three specific skills that lessen average daily stressor exposure and promote emotional well-being, including non-verbal processing of social cues, conversational skills in situations and relationships, and situational awareness of how one's behavior impacts others (Silvera et al., 2001). Contrary to expectations, not all socio-emotional skills were associated with equilibriums (i.e., mean levels) of emotional and social connection outcomes in RDSEM analyses. Specifically, nonverbal processing was associated with higher equilibriums of positive emotions and social connection, whereas conversational skills were associated with lower equilibrium of negative emotions and higher equilibriums of positive emotions and social connection. Situational

awareness was not associated with equilibrium of any outcome. In light of literature emphasizing the value of daily positive emotions and social connection for well-being, health, and development (Gilbert, 2012; Seppala, Rossomando, & Doty, 2013), these findings are noteworthy as they identify specific modifiable socio-emotional skills that can confer resilience during adolescence, especially among custodial grandchildren.

Contrary to expectation, higher socio-emotional skills were not associated with within-person emotional reactivity to daily stressors for any outcome in RDSEM analyses. One reason for the lack of findings for socio-emotional skills is that family-level variables may be more relevant for within-person reactivity than individual-level variables during adolescence. For example, prior research has documented that better adolescent-mother communication and parental warmth each buffer daily emotional reactivity, such that non-custodial adolescents reported smaller increases in negative emotions on days with more stressors than usual (Lippold et al., 2016; Vannucci et al., 2019). A recent study indicated that a history of adolescent-parent conflict heightened within-person emotional reactivity to daily stressors (Chiang, Chen, & Liu, 2022). Another reason for the lack of findings for socio-emotional skills and within-person reactivity is due to differences in statistical analyses. For instance, prior studies have utilized standard multilevel modeling procedures in SAS (i.e., Proc Mixed; Chiang et al., 2022; Lippold et al., 2016) or Mplus (Vannucci et al., 2019), both of which examine one moderator and outcome per model. In contrast, the present study used RDSEM analyses that simultaneously estimated within-person reactivities for all outcomes and predicted those reactivities from all moderators in a single model. Future work should consider

differences across statistical analyses when examining within-person reactivity in order to comprehensively model covariation between theoretically-relevant daily processes and moderators of those processes.

Though not a central research question in the present study, it is notable that those with more ACEs, on average, reported lower levels of each socio-emotional skill. Essentially, custodial adolescents with more ACEs described themselves as less able to read non-verbal behaviors and identify social cues, having a lower ability to initiate and carry conversations, and being less aware of how their own behavior impacts others in situations. These findings, along with ACEs' associations with more daily stressors and worse socio-emotional well-being, are in line with theory that the harmful consequences of ACEs unfold over time through disruptions in social information-processing, emotion-regulation, and social skills (McLaughlin et al., 2019; Miller et al., 2011). From a Risky Families perspective (Repetti et al., 2002), these findings showcase how custodial adolescents grow up in high adversity contexts that undermine their development of core socio-emotional and stress mechanisms that nurture resilience and health. More research is needed to uncover whether specific adversities experienced by custodial adolescents are particularly relevant for development of socio-emotional and stress regulation, and whether these skills mediate the effects of ACEs on subsequent functioning across domains.

As noted earlier in the discussion, the RDSEM analysis reported on here accounted for time-trends observed for all outcomes. The findings indicated that there were trends in the time-series reflecting overall declines in the daily equilibrium (i.e.,

mean level) of negative emotions and social connection. Importantly, random effects were applied to time-trends for all outcomes, and these person-specific differences were predicted by between-person differences in socio-emotional skills. Specifically, adolescents with higher conversational skills reported heightened declines in social connection across time, which may reflect more socially-oriented adolescents being especially harmed by COVID-related lockdown measures (i.e., increased social isolation; Branje, & Morris, 2021). This may also by why older adolescents, who were likely more integrated in their social networks at the pandemic's onset, reported declines in positive emotions across time as seen in non-custodial adolescents (Green et al., 2021). In contrast, adolescents who reported higher situational awareness reported buffered declines in social connection across time, possibly reflecting greater sensitivity to one's impact on others during a macro-level stressful experience that sustained social connection. The observed declines in negative affect across time are contrary to research during the pandemic showing increased negative emotions for adolescents (Branje & Morris, 2021). However, these declines in negative emotions over time may reflect custodial adolescents having access to family resources that enabled them to function well amid pandemic adversity (Branje & Morris, 2021), especially black, indigenous, and multi-racial adolescents who reported the strongest declines in negative affect. Though the findings with baseline data from this RCT were likely impacted by the unanticipated emergence of the COVID-19 pandemic, it should be noted there is no clear way to statistically verify this.

The use of RDSEM to account for time-trends in outcomes necessitated the inclusion of an autocorrelation of each outcome in the model. Such autocorrelations (i.e., inertia or carryover) have been examined as one type of emotional dynamic in a meta-analysis, with more inert emotions being associated with lower psychological well-being (Houben et al., 2015). However, some research has called into question whether emotional inertia accounts for additional variance in well-being above and beyond mean levels of negative and positive affect (Dejonckheere et al., 2019). Still, these findings offer novel evidence that adolescents with higher conversational skills reported higher inertia for negative affect, suggesting that those with more conversational skills exhibit lower, more inert negative emotions in daily life. Future work can capitalize on the DSEM approach to simultaneously assess distinct daily emotional dynamics (e.g., equilibrium, reactivity, inertia, variability) and rigorously test whether each dynamic differentially accounts for variance in well-being and health concurrently and longitudinally within the same model.

Aim 3: Group Comparisons of Pre-to-Post Changes in Daily Stressor-Emotion Dynamics

Using pre- and post-intervention daily diary data, the present study also evaluated the effects of an online, self-guided socio-emotional program on custodial adolescents daily well-being, stressor exposure, and emotional reactivity. In particular, this is the first RCT examining the efficacy of SIT on key daily stressor-emotion dynamics among adolescents who are being taken care of by their grandmothers. Contrary to expectations, participation in the SIT was not associated with improvements in daily well-being,

stressor exposure, or emotional reactivity. These unexpected findings may be partly attributable to the mental health consequences of the COVID-19 public health emergency on adolescents (Branje & Morris, 2021; Panchal et al., 2021). Although there is no clear way to statistically examine this, its likely impact on the findings is supported by the fact that nearly 40% of the enrolled adolescents did not begin their intervention phase until January 2020 (or afterwards) and nearly 60% completed their immediate post-intervention survey after January 2020.

Despite the SIT group not showing favorable changes relative to the AC group, there were overall changes in outcomes from pre-to-post intervention. For positive affect, the intercept declined and reactivity to stressors increased, such that adolescents reported lower levels of positive emotions and stronger decreases on days with above average stress at post-intervention relative to pre-intervention. For negative affect, the intercept and reactivity to stressors increased, such that adolescents reported higher levels of negative emotions and stronger increases on days with above average stress at post-intervention relative to pre-intervention. For social connection, the intercept and reactivity to stressors decreased, such that adolescents reported higher levels of social connection and smaller decreases in social connection on days with above average stress at post-intervention relative to pre-intervention. These findings of pre-to-post deterioration in daily well-being and reactivity to stressors are in line with mental health research among adolescent during the COVID-19 pandemic (Panchal et al., 2021). In contrast, the pre-to-post improvements in social connection may reflect a family-level process whereby social distancing regulations limited outside interactions and promoted

stronger social connection with co-residing family members such as adolescents' grandmothers (Branje & Morris, 2021). This interpretation is supported by evidence from custodial grandmother data of this RCT (Smith et al., under review), indicating that grandmothers in the SIT group (relative to control group) reported buffered pre-to-post declines in relational (e.g., support from grandchild, anxious and avoidant attachment, prosocial behaviors) rather than psychological outcomes (e.g., depression, anxiety). Qualitative interviews with a subsample of 27 custodial grandmothers from the SIT group corroborated the likely impact of COVID-19 on the present study and findings (Dolbin-McNabb et al., in prep). Common themes included fear and distress from disease exposure and lockdowns, isolation from friends and family, as well as the pandemic reminding grandmothers of the value of relationships with their grandchildren and giving them more time to practice SIT skills, like actively listening, spending more time together, and engaging in more face-to-face communication.

The lack of SIT-related improvements reported here are at odds with a prior attention-controlled RCT among middle-aged adults showing improvements in daily means of social connection, negative affect, emotional awareness, perspective-taking, as well as attenuated within-person stressor reactivity of positive emotions and social connection (Castro et al., 2019l Castro et al., 2023). Some improvements reported in those studies, such as daily social connection and emotional awareness, were strongest for those reporting more childhood trauma. However, contrary to expectations, the present study did not find that adolescents with more ACEs benefitted most (or at all) from the SIT program. That SIT did not yield positive changes on outcomes may suggest

that, especially during a pandemic, efforts to improve emotional well-being may require opportunities for social contact (e.g., online social participation) in addition to improving social skills and maladaptive social cognitions (Branje & Morris, 2021; Masi et al., 2011). Overall, given the prior efficacy of SIT, the likely impact of COVID-19 on study findings, and the need for interventions that can meet the socio-emotional needs of custodial adolescents (Chan et al., 2018; Haylsip et al., 2019), future studies on the efficacy of SIT with custodial adolescent grandchildren under normal environmental conditions are warranted.

Strengths, Limitations, and Conclusion

Within an attention-controlled RCT, the present study innovated with diary methods and cutting-edge statistical analyses to examine custodial adolescents' stressor-emotion dynamics at the between- and within-person levels (with pre-data), identify risk and resilience factors associated with daily stressor-emotion dynamics (with pre-data), and evaluate the effects of a socio-emotional program on daily stressor-emotion dynamics (with pre- and post-data). There were several strengths in this study. First, both the SIT program and AC were delivered online, without manualized protocols or the need for labor-intensive and expensive clinical personnel for group and one-on-one treatments. The online, self-guided format of the SIT program points to the potential utility for vulnerable and underserved custodial grandfamilies (Hayslip et al., 2019), as well as the broader unmet needs of individuals and communities via increased scalability and affordable access (Wilhelm et al., 2020). Second, baseline and intervention effects were tested on stressor-emotion dynamics via online daily survey methods, which enabled the

capture of “life as it is lived” and provided examination of day-to-day processes often neglected in custodial grandfamilies and intervention research (Hamaker & Wichers, 2017; Townsend, 2012). Third, the rigor of this RCT is supported by several methodological aspects, such as evaluation of baseline equivalency and differential attrition across conditions, and the utilization of dynamic structural equation modeling (McNeish, & Hamaker, 2019; Steeger et al., 2021).

This study also had several limitations. First, baseline and intervention findings from this RCT were likely impacted by the emergence of the COVID-19 pandemic, although there is no clear way to verify this. Second, despite comparing favorably to the U.S. Census data (Generations United, 2022), the sample comprised primarily of non-Hispanic White adolescents who were fluent in English and had access to the internet. As such, there is a possibility that findings could differ with adolescents from different educational, ethnic-racial, or rural backgrounds. Third, this study did not include measurement of puberty, which may have profound implications on study findings given the importance of puberty timing on social, emotional, and stress-related functioning during adolescence, as well as the development of mental health issues among vulnerable adolescents (Berenbaum, Beltz, & Corley, 2015). Fourth, this study focused solely on adolescents and did not include other family members. Inclusion of grandmothers or family-based variables in analyses could further understanding of how daily stressors impact not only one’s own emotional well-being but also the stressor-emotion dynamics of other family members. Also, inclusion of caregivers’ ACEs could offer novel evidence for the daily intergenerational transmission of trauma across generations (Isobel et al.,

2019). Fifth, any inferences drawn from intervention-related changes in outcomes would have been limited given the lack of equivalent groups at baseline and higher attrition in the SIT group (Steeger et al., 2021). Finally, due to significant attrition and missing data across both groups, post-intervention findings are limited by the use of per-protocol analyses rather than intent-to-treat (Gupta, 2011).

Within the context of an online RCT, the present study examined pre-intervention daily diaries to find that average daily stressors, and experiencing more stressors than usual, were associated with worse emotional well-being among custodial adolescents. Additionally, it was found that higher ACEs, on average, were related to more daily stressors, worse well-being, and lower socio-emotional skills. In contrast, higher average socio-emotional skills were related to less daily stressors and better well-being. Unfortunately, there was no evidence for the efficacy of an online SIT program on adolescents daily stressor-emotion dynamics, likely due to the mental health consequences brought forth by the COVID-19 pandemic. Nonetheless, the baseline findings for the harm of daily stressors and relevance of ACEs and socio-emotional skills for daily well-being point to the value of future work with custodial adolescents that incorporates intensive longitudinal methods to examine their everyday life. Moreover, despite the lack of efficacy for the SIT program, future research is warranted to evaluate whether online, self-guided programs can improve custodial adolescents' outcomes under more normal circumstances.

Table 1. Descriptive statistics and zero order correlations for key study variables at baseline

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Daily Stressors	-												
2. Daily Positive Affect	-.19**	-											
3. Daily Negative Affect	.35**	-.38**	-										
4. Daily Social Connection	-.18**	.74**	-.32**	-									
5. ACEs	.17**	-.14**	.20**	-.09**	-								
6. Socioemotional Skills	-.18**	.24**	-.28**	.23**	-.22**	-							
7. Conversational Skills	-.11**	.23**	-.26**	.16**	-.17**	.73**	-						
8. Non-Verbal Processing	-.09**	.17**	-.14**	.22**	-.04**	.64**	.15**	-					
9. Situational Awareness	-.18**	.12**	-.21**	.11**	-.26**	.78**	.43**	.21**	-				
10. Age	-.08**	-.21**	.04*	-.16**	.04	.08**	-.02	.13**	.05*	-			
11. Gender	.03	-.06**	.05*	-.03	.09**	.08**	-.14**	.26**	.05*	.04	-		
12. Latino/Hispanic Identity	.03	.05*	-.05*	-.01	.06**	-.03	-.01	.02	-.09**	-.11**	.05*	-	
13. Racial Identity	-.03	-.03	-.05*	-.01	-.16**	.18**	.22**	.05*	.12**	.02	.04*	.14**	-
Mean	0.85	3.46	1.84	3.43	4.36	4.25	4.05	4.77	3.94	14.19	0.60	0.13	0.35
Standard Deviation	1.30	1.04	0.88	1.16	2.94	0.83	1.13	1.14	1.22	1.69	0.49	0.34	0.48
Minimum	0.00	1.00	1.00	1.00	0.00	1.10	1.00	1.14	1.00	11.00	0.00	0.00	0.00
Maximum	6.00	5.00	5.00	5.00	14.00	6.57	7.00	6.86	7.00	18.00	1.00	1.00	1.00
Missing Data %	1.9	1.9	1.9	2.1	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Note. *N* = 188. *Observations* = 2337. ACEs = Adverse Childhood Experiences. Gender: Male = 0, Female = 1;
Latino/Hispanic Identity: No = 0, Yes = 1; Racial Identity: White = 0, Black/Indigenous/Multiracial = 1. *p < .05; **p < .01.

Table 2 SIT/AC Comparisons for Demographics and Outcomes at Baseline

	SIT	AC	χ^2/t (p value)
Sex			0.1 (0.72)
Female	58.5%	61.1%	
Male	41.5%	38.9%	
Ethnic-Racial Identity			1.7 (0.19)
White	69.1%	60.0%	
Black/African American	22.3%	22.1%	
American Indian	0.0%	4.2%	
Other	1.1%	4.2%	
Multiple Ethnic-Racial Identities	7.4%	9.5%	
Latino/Hispanic Identity			3.6 (0.06)
Latino/Hispanic	8.5%	17.9%	
Not Latino/Hispanic	91.5%	82.1%	
Mean			
Age	14.2	14.2	0.01 (0.99)
Adverse Childhood Experiences	4.56	4.15	0.96 (0.34)
Socio-Emotional Skills	4.14	4.36	1.76 (0.08)
Conversational Skills	3.88	4.21	2.04 (0.04)
Non-Verbal Processing	4.76	4.78	0.11 (0.91)
Situational Awareness	3.79	4.08	1.61 (0.11)
Daily Social Connection	3.39	3.48	0.68 (0.49)
Daily Positive Affect	3.31	3.53	1.82 (0.07)
Daily Negative Affect	1.97	1.83	1.32 (0.19)
Daily Surveys (at pre-treatment)	11.5	12.7	1.34 (0.18)
Daily Surveys (at post-treatment)	2.50	6.08	4.04 (0.01)
Daily Surveys (across pre and post-treatment)	14.0	18.8	3.43 (0.01)
Program Completion (in weeks)	8.18	7.94	

Note. SIT = Social Intelligence Training (N = 94). AC = Attention Control (*N* = 94). T tests conducted for continuous variables. Chi-Square tests conducted for categorical variables. Comparisons were conducted on baseline data. Racial Identity (0 = White, 1 = Black/Indigenous/Multiracial). Educational Attainment (1 = College Degree/Grad School Experience, 0 = < College Degree).

Table 3 Completer/Attritor Comparisons for Demographics and Outcomes at Baseline

	Attritors	Completers	χ^2/t (p value)
Sex			1.0 (0.32)
Female	56.9%	64.0%	
Male	43.1%	36.0%	
Ethnic-Racial Identity			1.8 (0.18)
White	68.6%	59.3%	
Black/African American	18.6%	26.7%	
American Indian	2.0%	2.3%	
Other	2.0%	3.5%	
Multiple Ethnic-Racial Identities	8.8%	8.1%	
Latino/Hispanic Identity			0.0 (0.99)
Latino/Hispanic	12.7%	12.8%	
Not Latino/Hispanic	87.3%	87.2%	
Mean			
Age	14.2	14.1	0.42 (0.67)
Adverse Childhood Experiences	4.31	4.41	0.22 (0.82)
Socio-Emotional Skills	4.13	4.40	2.27 (0.03)
Conversational Skills	3.95	4.16	1.23 (0.20)
Non-Verbal Processing	4.71	4.85	0.81 (0.42)
Situational Awareness	3.72	4.20	2.70 (0.01)
Daily Social Connection	3.32	3.57	1.86 (0.07)
Daily Positive Affect	3.29	3.57	2.26 (0.03)
Daily Negative Affect	1.97	1.83	1.31 (0.19)

Note. Attritors (N = 102). Completers (*N* = 86). T tests conducted for continuous variables. Chi-Square tests conducted for categorical variables. Racial Identity (0 = White, 1 = Black/Indigenous/Multiracial). Educational Attainment (1 = College Degree/Grad School Experience, 0 = < College Degree).

Table 4

Means, Reactivity, and Inertia of Key Outcomes: Findings from Dynamic Structural Equation Models for Objectively Reported Events at Baseline

	PA Mean	PA Reactivity	PA Inertia	NA Mean	NA Reactivity	NA Inertia	SC Mean	SC Reactivity	SC Inertia
	Est. (*SD*)	Est. (*SD*)	Est. (*SD*)	Est. (*SD*)	Est. (*SD*)	Est. (*SD*)	Est. (*SD*)	Est. (*SD*)	Est. (*SD*)
Between Effects									
Intercept	3.42* (0.06)	-0.07* (0.02)	0.27* (0.03)	1.90* (0.05)	0.16* (0.02)	0.32* (0.04)	3.42* (0.07)	-0.05* (0.02)	0.24* (0.03)
ACEs	–0.04 (0.02)	0.01 (0.01)	–0.02 (0.01)	0.03 (0.02)	–0.01 (0.01)	–0.02 (0.01)	–0.03 (0.02)	0.01 (0.01)	–0.01 (0.01)
Nonverbal Processing	0.14* (0.06)	–0.01 (0.02)	0.02 (0.03)	–0.07 (0.05)	0.02 (0.02)	0.01 (0.04)	0.22* (0.06)	–0.01 (0.02)	–0.01 (0.03)
Conversational Skills	0.17* (0.06)	0.01 (0.02)	0.01 (0.03)	–0.14* (0.05)	–0.02 (0.02)	0.05 (0.04)	0.11 (0.07)	0.01 (0.02)	0.01 (0.03)
Situational Awareness	0.02 (0.06)	0.01 (0.02)	–0.02 (0.03)	–0.08 (0.05)	–0.01 (0.02)	0.01 (0.04)	0.02 (0.06)	0.01 (0.02)	–0.01 (0.03)
Gender	–0.13 (0.13)	0.01 (0.04)	–0.05 (0.07)	0.09 (0.11)	0.03 (0.05)	–0.16 (0.09)	–0.17 (0.14)	–0.04 (0.05)	–0.04 (0.07)
Age	–0.11* (0.04)	0.01 (0.01)	0.02 (0.02)	0.01 (0.03)	0.01 (0.01)	–0.02 (0.02)	–0.10* (0.04)	–0.01 (0.01)	0.01 (0.02)
Latino/Hispanic	0.20 (0.18)	0.05 (0.05)	0.11 (0.09)	–0.16 (0.15)	–0.07 (0.06)	–0.11 (0.11)	0.03 (0.19)	0.04 (0.06)	0.04 (0.08)
Racial Identity	–0.15 (0.13)	0.02 (0.04)	0.01 (0.06)	–0.02 (0.12)	0.01 (0.04)	0.03 (0.08)	–0.10 (0.14)	–0.01 (0.05)	0.02 (0.06)
Within Effects									
Estimate	--	-0.09* (0.02)	0.26* (0.03)	--	0.22* (0.02)	0.31* (0.03)	--	-0.06* (0.02)	0.24* (0.03)
Residual Variances	0.84* (0.02)	--	--	0.72* (0.03)	--	--	0.86* (0.02)	--	--
R^2 Effect Sizes									
Within Estimate	0.16* (0.02)	--	--	0.29* (0.02)	--	--	0.15* (0.02)	--	--
Between Estimate	0.21* (0.05)	0.24* (0.12)	0.24* (0.09)	0.16* (0.05)	0.19* (0.07)	0.25* (0.09)	0.20* (0.06)	0.22* (0.10)	0.17* (0.08)

Note. N of Observations = 2337. ACEs = Adverse Childhood Experiences. PA = Positive Affect. NA = Negative Affect. SC = Social Connection. Racial Identity (0 = White, 1 = Black/Indigenous/Multiracial). Est. = Posterior Median Estimate. SD = Posterior Standard Deviation. Between Effects based on unstandardized estimates. Within Effects and Effect Sizes based on within-cluster standardized estimates averaged across clusters.
* = credible intervals did not contain zero.

Table 5

Means, Reactivity, and Inertia of Key Outcomes: Findings from Residualized Dynamic Structural Equation Models for Objectively Reported Events at Baseline

	PA Mean	PA Reactivity	PA Inertia	NA Mean	NA Reactivity	NA Inertia	SC Mean	SC Reactivity	SC Inertia
	Est. (*SD*)	Est. (*SD*)	Est. (*SD*)	Est. (*SD*)	Est. (*SD*)	Est. (*SD*)	Est. (*SD*)	Est. (*SD*)	Est. (*SD*)
Between Effects									
Intercept	3.45* (0.06)	-0.09* (0.02)	0.28* (0.04)	2.01* (0.06)	0.16* (0.02)	0.36* (0.04)	3.47* (0.26)	-0.07* (0.02)	0.24* (0.03)
ACEs	–0.04 (0.02)	0.01 (0.01)	–0.02 (0.01)	0.04* (0.02)	–0.01 (0.01)	–0.02 (0.02)	–0.03 (0.03)	0.01 (0.01)	–0.01 (0.01)
Nonverbal Processing	0.16* (0.06)	–0.01 (0.01)	0.02 (0.03)	–0.03 (0.05)	0.02 (0.02)	0.03 (0.04)	0.25* (0.06)	–0.02 (0.02)	0.01 (0.03)
Conversational Skills	0.18* (0.06)	–0.01 (0.02)	0.02 (0.04)	–0.15* (0.06)	–0.01 (0.02)	0.09* (0.04)	0.18* (0.07)	–0.01 (0.02)	–0.02 (0.03)
Situational Awareness	–0.04 (0.06)	0.01 (0.02)	–0.03 (0.03)	–0.10 (0.05)	–0.01 (0.02)	–0.03 (0.04)	–0.07 (0.06)	0.02 (0.02)	0.01 (0.03)
Gender	–0.13 (0.14)	0.03 (0.04)	–0.05 (0.08)	0.18 (0.12)	0.01 (0.04)	–0.15 (0.09)	–0.12 (0.15)	–0.03 (0.05)	–0.04 (0.07)
Age	–0.07* (0.04)	–0.01 (0.01)	0.01 (0.02)	0.02 (0.03)	0.01 (0.01)	–0.04 (0.03)	–0.07 (0.04)	0.01 (0.01)	0.01 (0.02)
Latino/Hispanic	0.27 (0.19)	0.05 (0.05)	0.08 (0.10)	–0.15 (0.17)	–0.07 (0.06)	–0.06 (0.13)	0.13 (0.20)	0.08 (0.07)	–0.02 (0.09)
Racial Identity	–0.28* (0.07)	0.02 (0.04)	0.03 (0.07)	0.11 (0.12)	–0.03 (0.04)	–0.01 (0.09)	–0.22 (0.15)	–0.01 (0.05)	0.05 (0.07)
Within Effects									
Estimate	--	-0.11* (0.02)	0.28* (0.03)	--	0.21* (0.02)	0.33* (0.03)	--	-0.08* (0.02)	0.23* (0.03)
Residual Variances	0.75* (0.02)	--	--	0.63* (0.02)	--	--	0.76* (0.02)	--	--
R^2 Effect Sizes									
Within Estimate	0.25* (0.02)	--	--	0.37* (0.02)	--	--	0.25* (0.02)	--	--
Between Estimate	0.23* (0.06)	0.33* (0.14)	0.21* (0.09)	0.23* (0.06)	0.18* (0.08)	0.25* (0.09)	0.26* (0.07)	0.22* (0.10)	0.17* (0.08)

Note. N of Observations = 2337. ACEs = Adverse Childhood Experiences. PA = Positive Affect. NA = Negative Affect. SC = Social Connection. Racial Identity (0 = White, 1 = Black/Indigenous/Multiracial). Est. = Posterior Median Estimate. SD = Posterior Standard Deviation. Between Effects based on unstandardized estimates. Within Effects and Effect Sizes based on within-cluster standardized estimates averaged across clusters.
* = credible intervals did not contain zero.

Table 6

Pre-to-Post Group Changes in Means, Reactivity, and Inertia of Positive Affect: Findings from Dynamic Structural Equation Models for Objectively Reported Events

	PA Mean Pre	PA Mean Post	PA Reactivity Pre	PA Reactivity Post	PA Inertia Pre	PA Inertia Post
	Estimate (*SD*)	Estimate (*SD*)	Estimate (*SD*)	Estimate (*SD*)	Estimate (SD)	Estimate (SD)
Between Effects						
Intercept	3.54* (0.09)	-0.09 (0.07)	-0.07* (0.03)	0.03 (0.05)	0.29* (0.05)	0.01 (0.08)
SIT Group	-0.20 (0.13)	0.02 (0.11)	-0.01 (0.04)	0.07 (0.09)	0.05 (0.07)	-0.02 (0.13)
Within Effects						
Estimate	--	--	-0.10* (0.02)	-0.01 (0.04)	0.31* (0.03)	0.29* (0.05)
Residual Variances	0.80* (0.03)	0.72* (0.03)	--	--	--	--
R^2 Effect Sizes						
Within Estimate	0.21* (0.03)	0.28* (0.03)	--	--	--	--
Between Estimate	0.01 (0.03)	0.94* (0.04)	0.01 (0.02)	0.53* (0.20)	0.01 (0.02)	0.41* (0.09)

Note. N of Observations = 3151. PA = Positive Affect. SIT = Social Intelligence Training. SD = Posterior Standard Deviation. Standard Errors. Between Effects based on unstandardized estimates. Within Effects and Effect Sizes based on within-cluster standardized estimates averaged across clusters.

* = credible intervals did not contain zero.

Table 7

Pre-to-Post Group Changes in Means, Reactivity, and Inertia of Negative Affect: Findings from Dynamic Structural Equation Models for Objectively Reported Events

	NA Mean Pre	NA Mean Post	NA Reactivity Pre	NA Reactivity Post	NA Inertia Pre	NA Inertia Post
	Estimate (*SD*)	Estimate (*SD*)	Estimate (*SD*)	Estimate (*SD*)	Estimate (SD)	Estimate (SD)
Between Effects						
Intercept	1.80* (0.07)	0.01 (0.08)	0.16* (0.03)	-0.10* (0.04)	0.25* (0.05)	-0.03 (0.09)
SIT Group	0.16 (0.11)	-0.06 (0.13)	0.02 (0.04)	-0.04 (0.07)	0.04 (0.07)	0.08 (0.14)
Within Effects						
Estimate	--	--	0.24* (0.02)	0.08 (0.05)	0.27* (0.03)	0.26* (0.05)
Residual Variances	0.78* (0.03)	0.74* (0.03)	--	--	--	--
R^2 Effect Sizes						
Within Estimate	0.22* (0.03)	0.26* (0.03)	--	--	--	--
Between Estimate	0.01 (0.01)	0.66* (0.06)	0.01 (0.02)	0.82* (0.15)	0.01 (0.02)	0.44* (0.12)

Note. N of Observations = 3151. NA = Negative Affect. SIT = Social Intelligence Training. SD = Posterior Standard Deviation. Standard Errors. Between Effects based on unstandardized estimates. Within Effects and Effect Sizes based on within-cluster standardized estimates averaged across clusters.

* = credible intervals did not contain zero.

Table 8

Pre-to-Post Group Changes in Means, Reactivity, and Inertia of Social Connection: Findings from Dynamic Structural Equation Models for Objectively Reported Events

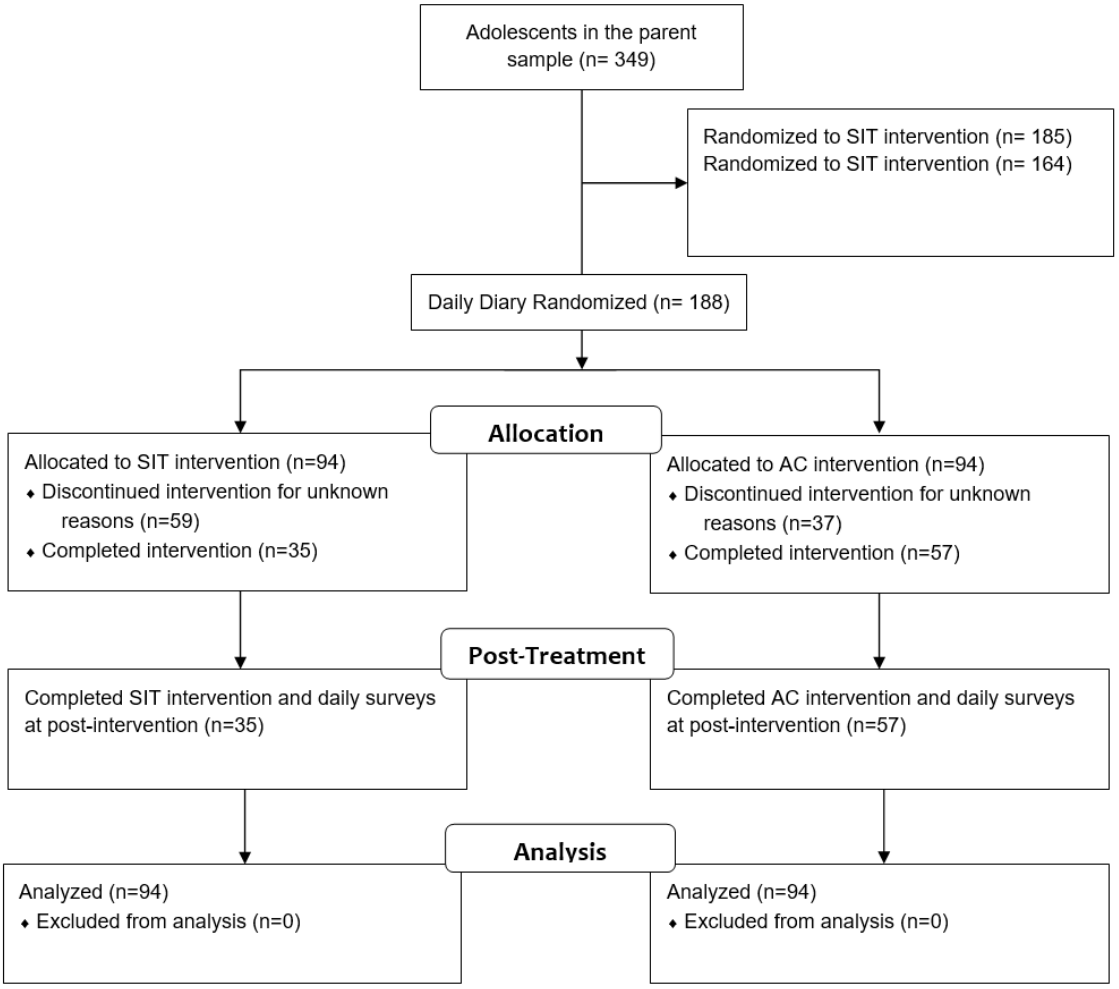
	SC Mean Pre	SC Mean Post	SC Reactivity Pre	SC Reactivity Post	SC Inertia Pre	SC Inertia Post
	Estimate (*SD*)	Estimate (*SD*)	Estimate (*SD*)	Estimate (*SD*)	Estimate (*SD*)	Estimate (*SD*)
Between Effects						
Intercept	3.47* (0.09)	0.01 (0.09)	-0.03 (0.03)	-0.01 (0.06)	0.30* (0.05)	-0.06 (0.09)
SIT Group	-0.10 (0.14)	-0.05 (0.15)	-0.05 (0.05)	-0.01 (0.09)	0.05 (0.07)	0.03 (0.14)
Within Effects						
Estimate	--	--	-0.06* (0.02)	-0.05 (0.04)	0.32* (0.03)	0.26* (0.01)
Residual Variances	0.79* (0.02)	0.76* (0.03)	--	--	--	--
R^2 Effect Sizes						
Within Estimate	0.01 (0.01)	0.24* (0.07)	--	--	--	--
Between Estimate	0.01 (0.01)	0.81* (0.07)	0.02 (0.04)	0.80* (0.19)	0.01 (0.02)	0.47* (0.12)

Note. N of Observations = 3151. SIT = Social Intelligence Training. SC = Social Connection. SD = Posterior Standard Deviation. Standard Errors. Between Effects based on unstandardized estimates. Within Effects and Effect Sizes based on within-cluster standardized estimates averaged across clusters.

* = credible intervals did not contain zero.

CONSORT
TRANSPARENT REPORTING of TRIALS

Figure 1: CONSORT Flow Diagram



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